



**School of Computer Science, Engineering and Applications(SCSEA)**

**B.C.A. TY (CCSA)**

**Subject : Infrastructure Orchestration (P)**

**Name of the Student:** ABCDEF GHIJKL MNOPQR **PRN:** 20220801024

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

**NOTE:**

1. DO THE NECESSARY CHANGES IN TEMPLATE (eg:AMI)
2. CREATE ROLE WITH SPECIFIC PERMISSIONS
3. CREATE KEYPAIR

**Step 1: CREATE TEMPLATE(CAN USE NOTEPAD OR VSCODE)**

components of template used are:

**Description:** [comments about your template.] For this practical , we are creating vpc with both public and private subnet along with two ec2 instances for both public and private subnet using dynamic parameter.

**Parameters:** [used to provide custom or dynamic values to the stack during runtime.]  
dynamic parameter used are: KeyPair, vpcCIDR, PublicSubnetCIDR, PrivateSubnetCIDR.

**Resources:** [specify the properties of AWS resources you want in your stack.]  
here we mention all our resources such as vpc, ec2 instance.

**Output:** [ defines the value which is generated as an output when you view your cloud formationstack properties.] public and private instances



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```
*Untitled - Notepad
File Edit Format View Help
Description: creating vpc along with public and private subnet and launching ec2(ubuntu)instance in each subnet.

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

VpcCIDR:
  Type: String
  Default: 10.0.0.0/16

PublicSubnetCIDR:
  Type: String
  Default: 10.0.1.0/24

PrivateSubnetCIDR:
  Type: String
  Default: 10.0.2.0/24

Resources:
customVPC:
  Type: AWS::EC2::VPC
  Properties:
    CidrBlock: !Ref VpcCIDR
    EnableDnsSupport: true
    EnableDnsHostnames: true
  Tags:
    - Key: Name
      Value: customVPC

InternetGateway:
  Type: AWS::EC2::InternetGateway
  Properties:
  Tags:
    - Key: Name
      Value: custom_IG
```



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**InternetGateway:**

**Type:** AWS::EC2::InternetGateway

**Properties:**

**Tags:**

- **Key:** Name

**Value:** custom\_IG

**InternetGatewayAttachment:**

**Type:** AWS::EC2::VPCGatewayAttachment

**Properties:**

**InternetGatewayId:** !Ref InternetGateway

**VpcId:** !Ref customVPC

**PublicSubnet:**

**Type:** AWS::EC2::Subnet

**Properties:**

**VpcId:** !Ref customVPC

**CidrBlock:** !Ref PublicSubnetCIDR

**MapPublicIpOnLaunch:** true

**Tags:**

- **Key:** Name

**Value:** custom\_public-subnet

**PrivateSubnet:**

**Type:** AWS::EC2::Subnet

**Properties:**

**VpcId:** !Ref customVPC

**CidrBlock:** !Ref PrivateSubnetCIDR

**MapPublicIpOnLaunch:** false

**Tags:**

- **Key:** Name

**Value:** custom\_private-subnet

**PublicRouteTable:**

**Type:** AWS::EC2::RouteTable





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**PublicRouteTable:**

**Type:** AWS::EC2::RouteTable

**Properties:**

**VpcId:** !Ref customVPC

**Tags:**

- **Key:** Name

**Value:** custom\_Public-Route-table

**DefaultPublicRoute:**

**Type:** AWS::EC2::Route

**DependsOn:** InternetGatewayAttachment

**Properties:**

**RouteTableId:** !Ref PublicRouteTable

**DestinationCidrBlock:** 0.0.0.0/0

**GatewayId:** !Ref InternetGateway

**PublicSubnet1RouteTableAssociation:**

**Type:** AWS::EC2::SubnetRouteTableAssociation

**Properties:**

**RouteTableId:** !Ref PublicRouteTable

**SubnetId:** !Ref PublicSubnet

**PrivateRouteTable:**

**Type:** AWS::EC2::RouteTable

**Properties:**

**VpcId:** !Ref customVPC

**Tags:**

- **Key:** Name

**Value:** custom\_Private-Route-table

**PrivateSubnetRouteTableAssociation:**

**Type:** AWS::EC2::SubnetRouteTableAssociation

**Properties:**

**SubnetId:** !Ref PrivateSubnet





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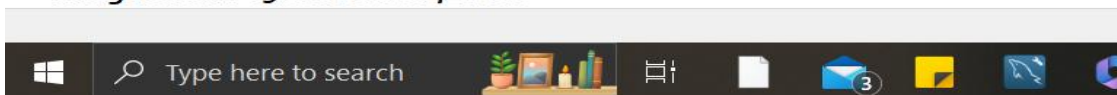
\*Untitled - Notepad

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```
PrivateSubnetRouteTableAssociation:
  Type: AWS::EC2::SubnetRouteTableAssociation
  Properties:
    SubnetId: !Ref PrivateSubnet
    RouteTableId: !Ref PrivateRouteTable
```

```
# EC2 Security Group
EC2SecurityGroup:
  Type: AWS::EC2::SecurityGroup
  Properties:
    GroupDescription: Allow SSH and HTTP access
    VpcId: !Ref customVPC
    SecurityGroupIngress:
      - IpProtocol: tcp
        FromPort: 22
        ToPort: 22
        CidrIp: 0.0.0.0/0 # SSH
      - IpProtocol: tcp
        FromPort: 80
        ToPort: 80
        CidrIp: 0.0.0.0/0 # HTTP
      - IpProtocol: tcp
        FromPort: 443
        ToPort: 443
        CidrIp: 0.0.0.0/0 # HTTPS
```

```
PublicInstance:
  Type: AWS::EC2::Instance
  Properties:
    AvailabilityZone: ap-south-1a
    InstanceType: t2.micro
    KeyName: !Ref KeyName
    SubnetId: !Ref PublicSubnet
    ImageId: ami-09boa86a2c84101e1
```







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**PublicInstance:**

**Type:** AWS::EC2::Instance

**Properties:**

**AvailabilityZone:** ap-south-1a

**InstanceType:** t2.micro

**KeyName:** !Ref KeyName

**SubnetId:** !Ref PublicSubnet

**ImageId:** ami-0gboa86a2c84101e1

**SecurityGroupIds:**

- !Ref EC2SecurityGroup

**Tags:**

- Key: Name

Value: PublicInstance

**PrivateInstance:**

**Type:** AWS::EC2::Instance

**Properties:**

**AvailabilityZone:** ap-south-1a

**InstanceType:** t2.micro

**KeyName:** !Ref KeyName

**SubnetId:** !Ref PrivateSubnet

**ImageId:** ami-0gboa86a2c84101e1

**SecurityGroupIds:**

- !Ref EC2SecurityGroup

**Tags:**

- Key: Name

Value: PrivateInstance

**# SNS Topic for Notifications**

**SNSTopic:**

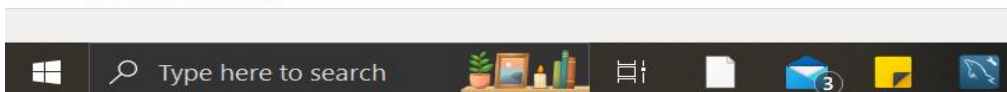
**Type:** AWS::SNS::Topic

**Properties:**

**Subscription:**

- Endpoint: "shrushtishreeo4@gmail.com"

Protocol: email





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**SubnetId: !Ref PrivateSubnet**

**ImageId: ami-0gboa86a2c84101e1**

**SecurityGroupIds:**

- **!Ref EC2SecurityGroup**

**Tags:**

- **Key: Name**

**Value: PrivateInstance**

**# SNS Topic for Notifications**

**SNSTopic:**

**Type: AWS::SNS::Topic**

**Properties:**

**Subscription:**

- **Endpoint: "shrushtishreeo4@gmail.com"**

**Protocol: email**

**DisplayName: "launch Notification"**

**Outputs:**

**VPCId:**

**Description: VPC ID**

**Value: !Ref customVPC**

**PublicSubnetId:**

**Description: Public Subnet ID**

**Value: !Ref PublicSubnet**

**PrivateSubnetId:**

**Description: Private Subnet ID**

**Value: !Ref PrivateSubnet**

**PublicInstanceId:**

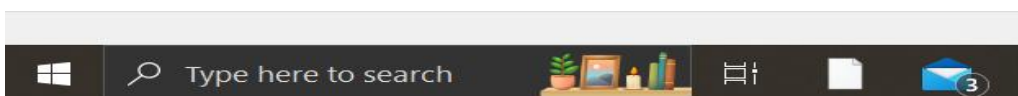
**Description: Public EC2 Instance ID**

**Value: !Ref PublicInstance**

**PrivateInstanceId:**

**Description: Private EC2 Instance ID**

**Value: !Ref PrivateInstance**



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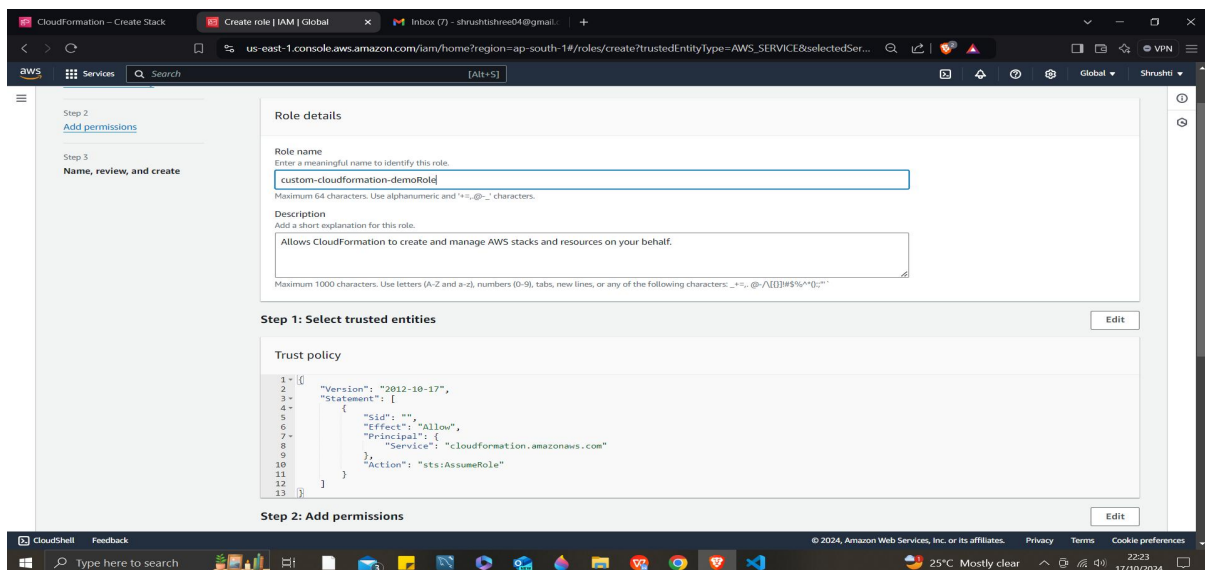
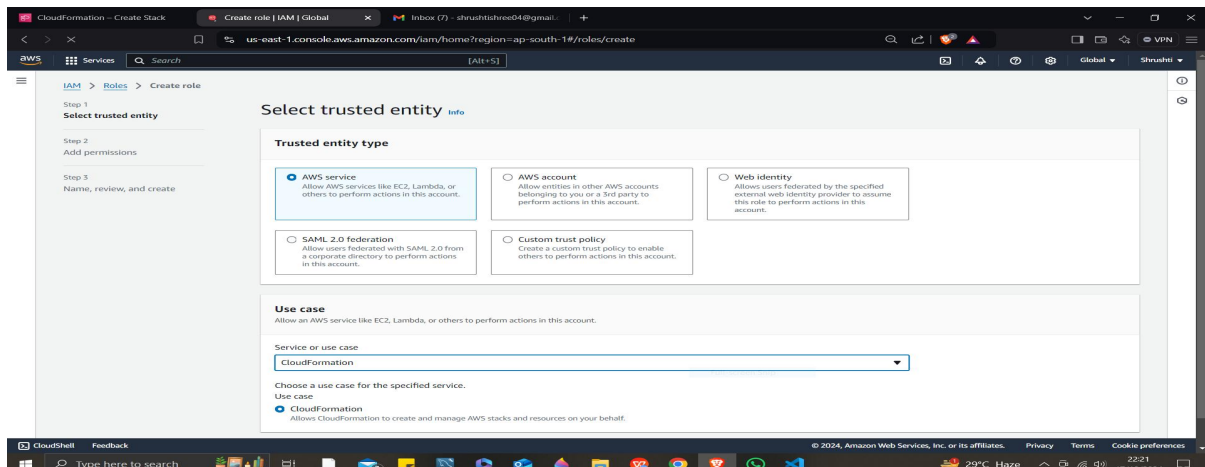
### Step2: CREATE ROLE FOR CLOUDFORMATION

Go to IAM service-- roles-- create role with 3 policies

A)AmazonEC2FullAccess

B)AmazonVPCFullAccess

C)AmazonSNSFullAccess

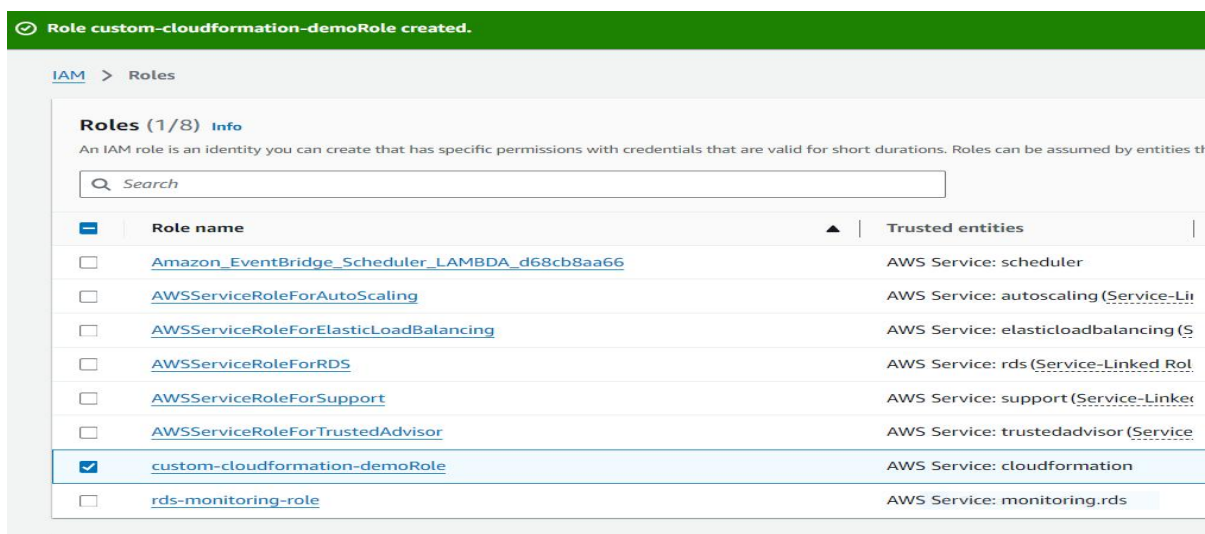
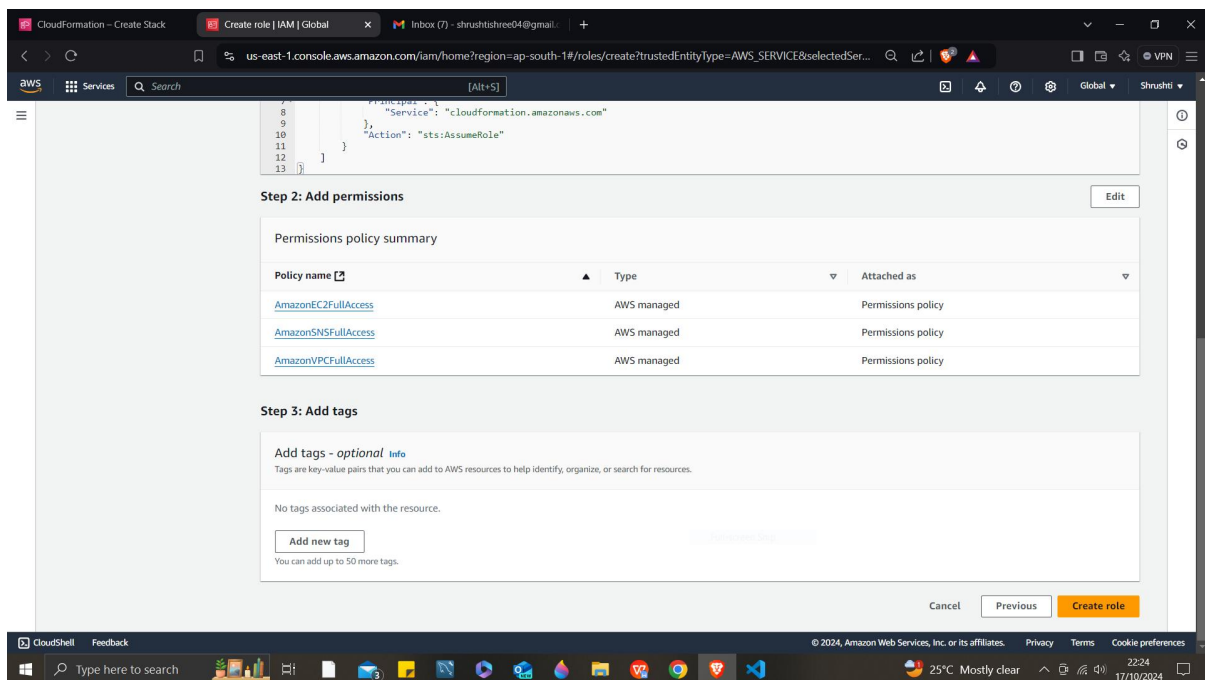




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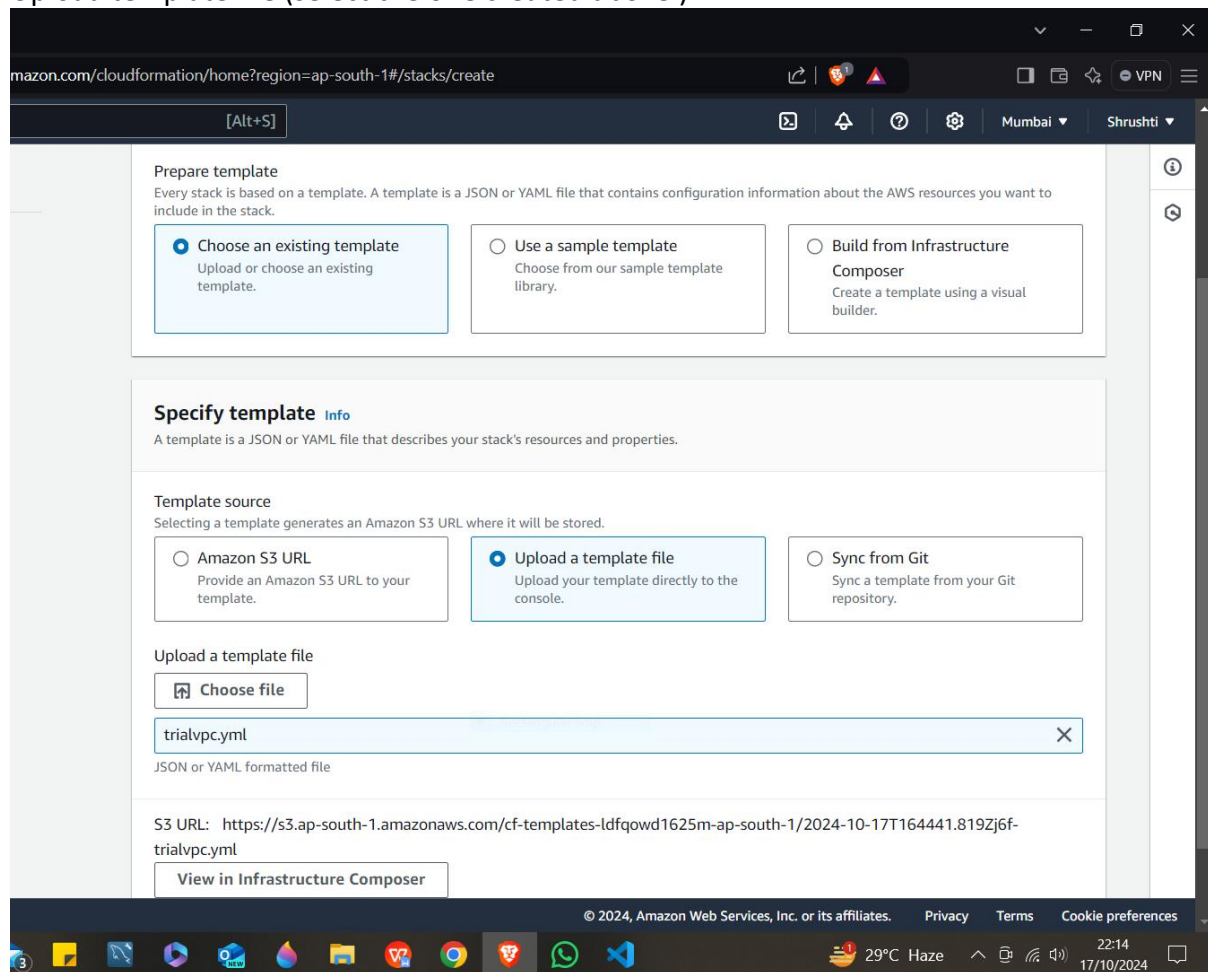
### Step3: CREATE STACK IN CLOUDFORMATION

Go to CloudFormation service-- create stack-- (4 steps to create stack)

#### A)Create Stack---

Choose an existing template (we need to attach the one we created using vscode.)

Upload template file (select the one created above.)





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**B) specify stack detail-----**

Name the stack (CCSA-BCA-TY-1024-cloudformation)

Attach keypair (IOdemo1--previously created one.)

[Alt+S] Mumbai Shrushti

Create stack

### Specify stack details

**Provide a stack name**

Stack name

CCSA-BCA-TY-1024-cloudformation

Stack name must be 1 to 128 characters, start with a letter, and only contain alphanumeric characters. Character count: 31/128.

**Parameters**

Parameters are defined in your template and allow you to input custom values when you create or update a stack.

KeyName

IOdemo1

PrivateSubnetCIDR

10.0.2.0/24

PublicSubnetCIDR

10.0.1.0/24

VpcCIDR

10.0.0.0/16

Cancel Previous **Next**

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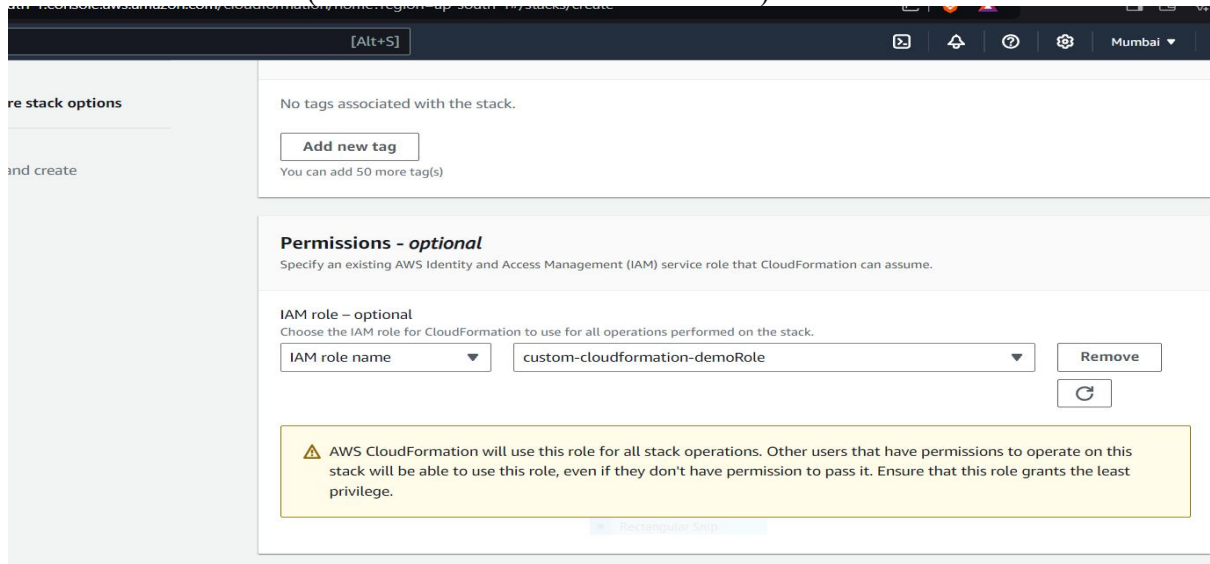
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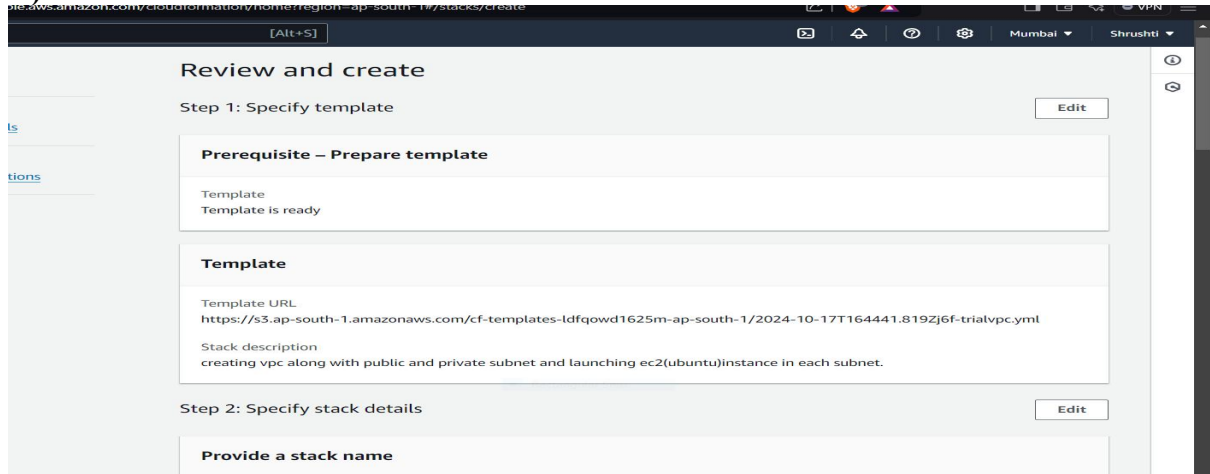
**C)configure stack options----**

**Attach the created role (custom-cloudformation-demoRole)**



The screenshot shows the 'Configure stack options' page in the AWS CloudFormation console. The 'Permissions - optional' section is expanded, showing the 'IAM role - optional' configuration. The 'IAM role name' dropdown is set to 'custom-cloudformation-demoRole'. A warning message states: 'AWS CloudFormation will use this role for all stack operations. Other users that have permissions to operate on this stack will be able to use this role, even if they don't have permission to pass it. Ensure that this role grants the least privilege.'

**D)review and create-----**



The screenshot shows the 'Review and create' page in the AWS CloudFormation console. The 'Step 1: Specify template' section is expanded, showing the 'Prerequisite - Prepare template' and 'Template' details. The 'Template URL' is 'https://s3.ap-south-1.amazonaws.com/cf-templates-ldfqwd1625m-ap-south-1/2024-10-17T164441.819Zj6f-trialvpc.yml'. The 'Stack description' is 'creating vpc along with public and private subnet and launching ec2(ubuntu)instance in each subnet.'

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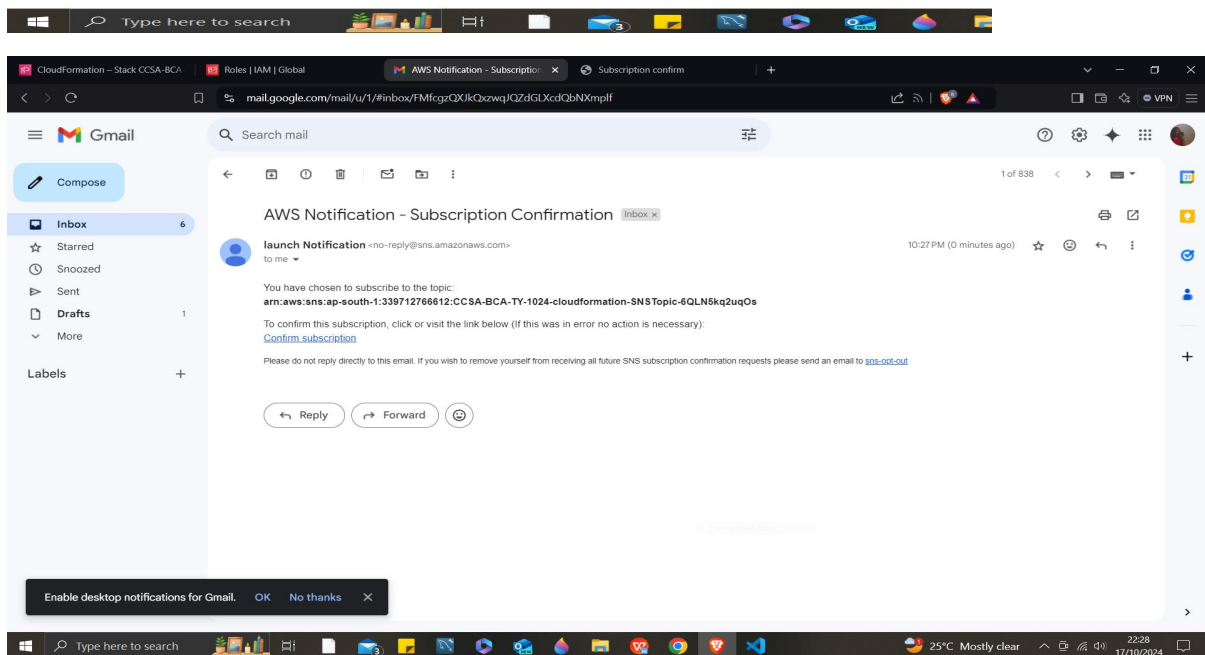
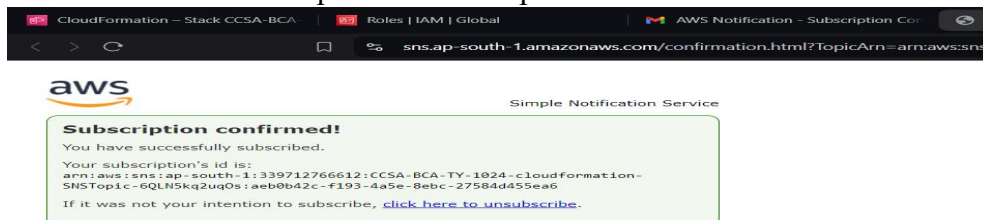
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### Step4: SUBSCRIBE.

Go to the email address provided in template and subscribe to SNS





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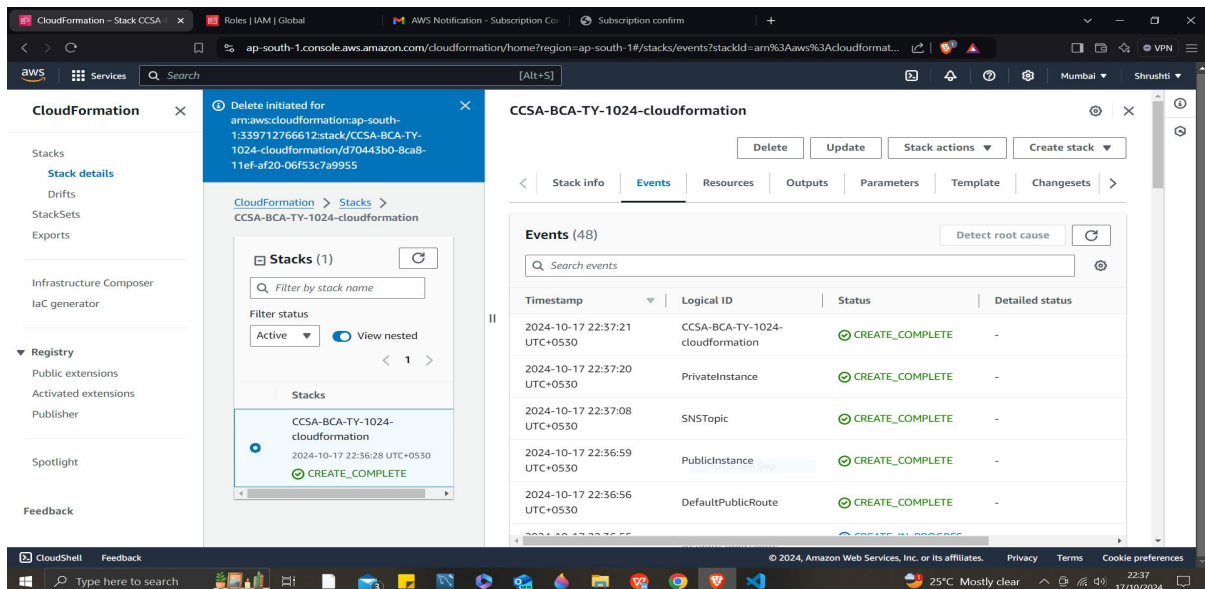
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**Step5: CHECK THE STATUS OF STACK**

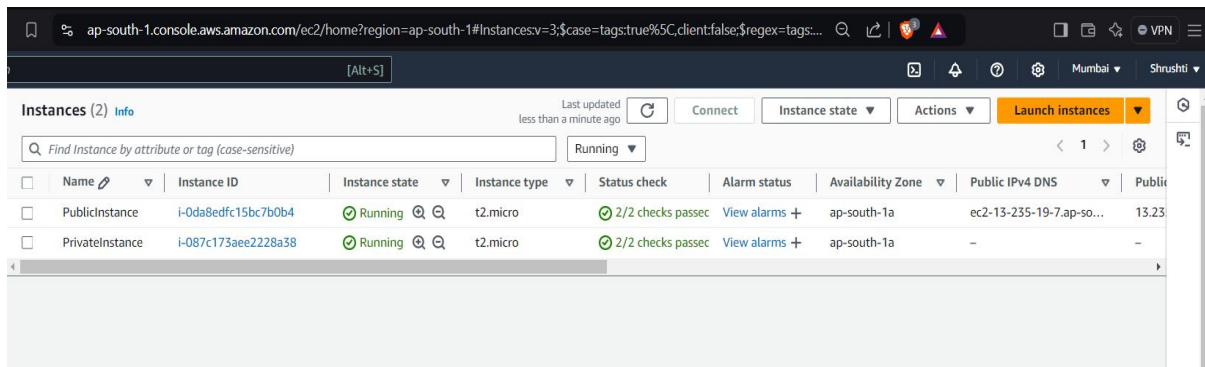


The screenshot shows the AWS CloudFormation console. The stack 'CCSA-BCA-TY-1024-cloudformation' is in the 'CREATE\_COMPLETE' state. The Events tab shows a list of events, all with a status of 'CREATE\_COMPLETE'.

Timestamp	Logical ID	Status	Detailed status
2024-10-17 22:37:21 UTC+0530	CCSA-BCA-TY-1024-cloudformation	CREATE_COMPLETE	-
2024-10-17 22:37:20 UTC+0530	PrivateInstance	CREATE_COMPLETE	-
2024-10-17 22:37:08 UTC+0530	SNSTopic	CREATE_COMPLETE	-
2024-10-17 22:36:59 UTC+0530	PublicInstance	CREATE_COMPLETE	-
2024-10-17 22:36:56 UTC+0530	DefaultPublicRoute	CREATE_COMPLETE	-

**Step6: CHECK IF INSTANCE, VPC, ROUTETABLE, INTERNETGATEWAY ARE CREATED TOO**

**--instance (public and private):**



The screenshot shows the AWS EC2 console. The 'Instances' tab shows a list of instances, both with a status of 'Running'.

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IP
PublicInstance	i-0da8edfc15bc7b0b4	Running	t2.micro	2/2 checks passed	View alarms	ap-south-1a	ec2-13-235-19-7.ap-so...	13.23
PrivateInstance	i-087c173aee2228a38	Running	t2.micro	2/2 checks passed	View alarms	ap-south-1a	-	-

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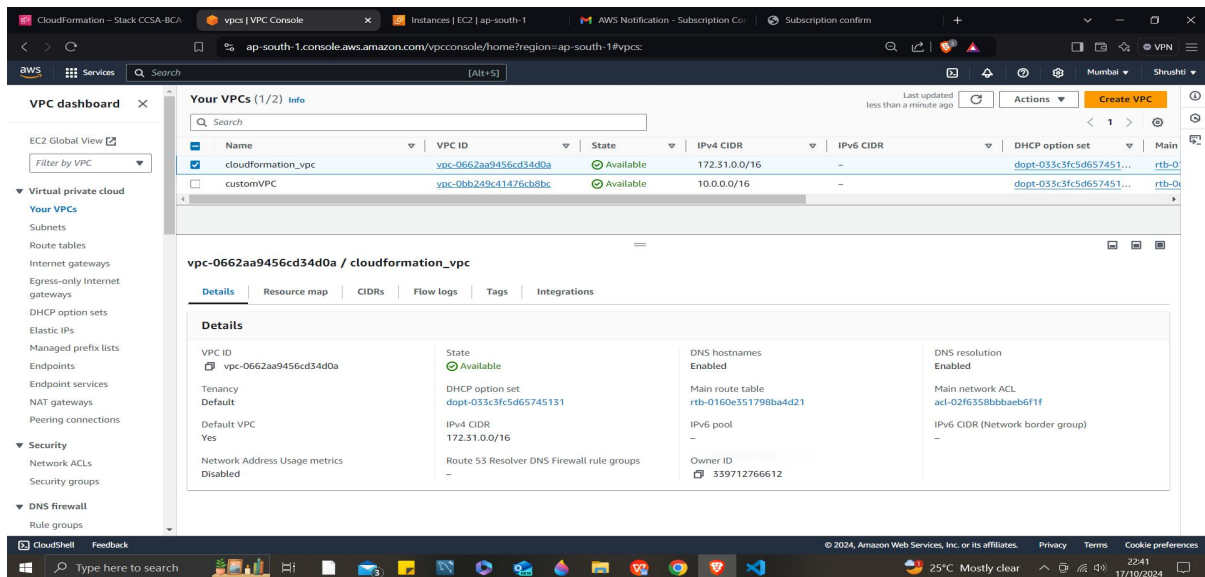
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**--vpc(customVPC):**



The screenshot shows the AWS VPC console interface. The left sidebar contains navigation links for VPCs, Subnets, Route tables, Internet gateways, Egress-only Internet gateways, DHCP option sets, Elastic IPs, Managed prefix lists, Endpoints, Endpoint services, NAT gateways, Peering connections, Security, Network ACLs, Security groups, DNS firewall, and Rule groups. The main content area displays 'Your VPCs (1/2) Info' with a table listing VPCs. The selected VPC, 'cloudformation\_vpc' (vpc-0662aa9456cd34d0a), is shown in detail. The details section includes VPC ID, State (Available), DNS hostnames (Enabled), DNS resolution (Enabled), Main route table (rtb-0160e351798ba4d21), IPv4 CIDR (172.31.0.0/16), and Owner ID (339712766612).

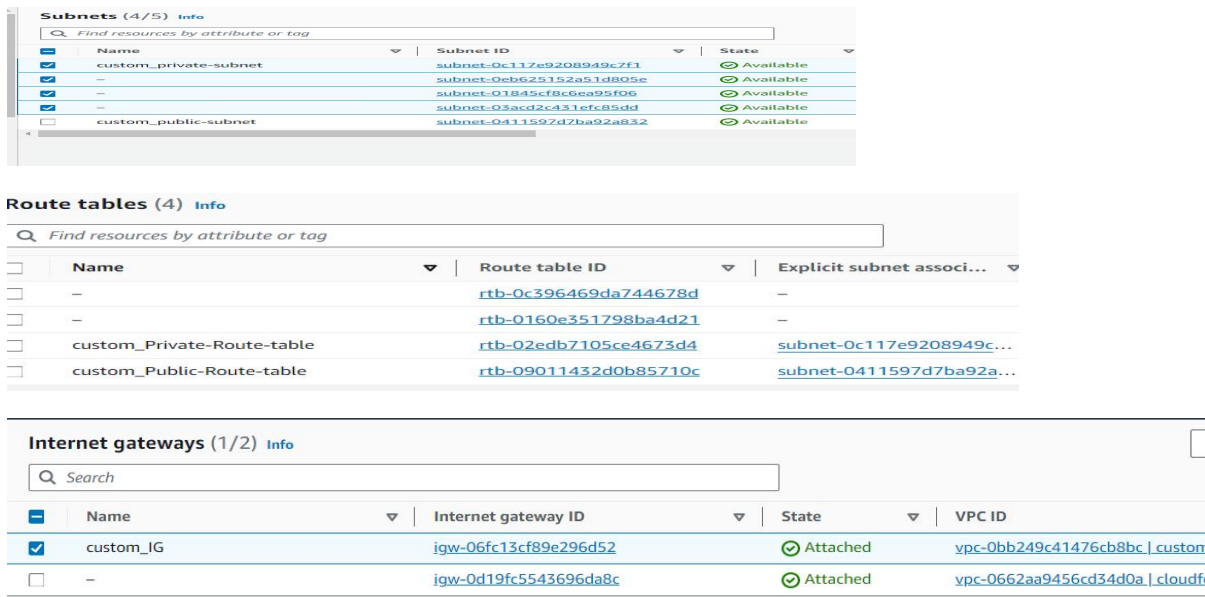
Name	VPC ID	State	IPv4 CIDR	IPv6 CIDR	DHCP option set	Main route table
cloudformation_vpc	vpc-0662aa9456cd34d0a	Available	172.31.0.0/16	-	dopt-033c3fc5d657451...	rtb-0160e351798ba4d21
customVPC	vpc-0bb249c41476cb8bc	Available	10.0.0.0/16	-	dopt-033c3fc5d657451...	rtb-0160e351798ba4d21

**vpc-0662aa9456cd34d0a / cloudformation\_vpc**

**Details**

Property	Value
VPC ID	vpc-0662aa9456cd34d0a
State	Available
DNS hostnames	Enabled
DNS resolution	Enabled
Main route table	rtb-0160e351798ba4d21
IPv4 CIDR	172.31.0.0/16
Owner ID	339712766612

**--subnet, routetable, internetgateway**



The screenshots show the AWS console for Subnets, Route Tables, and Internet Gateways. The Subnets section shows a list of subnets, including 'custom\_private-subnet' and 'custom\_public-subnet'. The Route Tables section shows a list of route tables, including 'custom\_Private-Route-table' and 'custom\_Public-Route-table'. The Internet Gateways section shows a list of internet gateways, including 'custom\_IG'.

**Subnets (4/5) Info**

Name	Subnet ID	State
custom_private-subnet	subnet-0c117e9208949c7f1	Available
-	subnet-0eb625152a51d805e	Available
-	subnet-01845cf8c6ea95f06	Available
-	subnet-03acd2c431efc85dd	Available
custom_public-subnet	subnet-0411597d7ba92a832	Available

**Route tables (4) Info**

Name	Route table ID	Explicit subnet associ...
-	rtb-0c396469da744678d	-
-	rtb-0160e351798ba4d21	-
custom_Private-Route-table	rtb-02edb7105ce4673d4	subnet-0c117e9208949c...
custom_Public-Route-table	rtb-09011432d0b85710c	subnet-0411597d7ba92a...

**Internet gateways (1/2) Info**

Name	Internet gateway ID	State	VPC ID
custom_IG	igw-06fc13cf89e296d52	Attached	vpc-0bb249c41476cb8bc   custom
-	igw-0d19fc5543696da8c	Attached	vpc-0662aa9456cd34d0a   cloudfc

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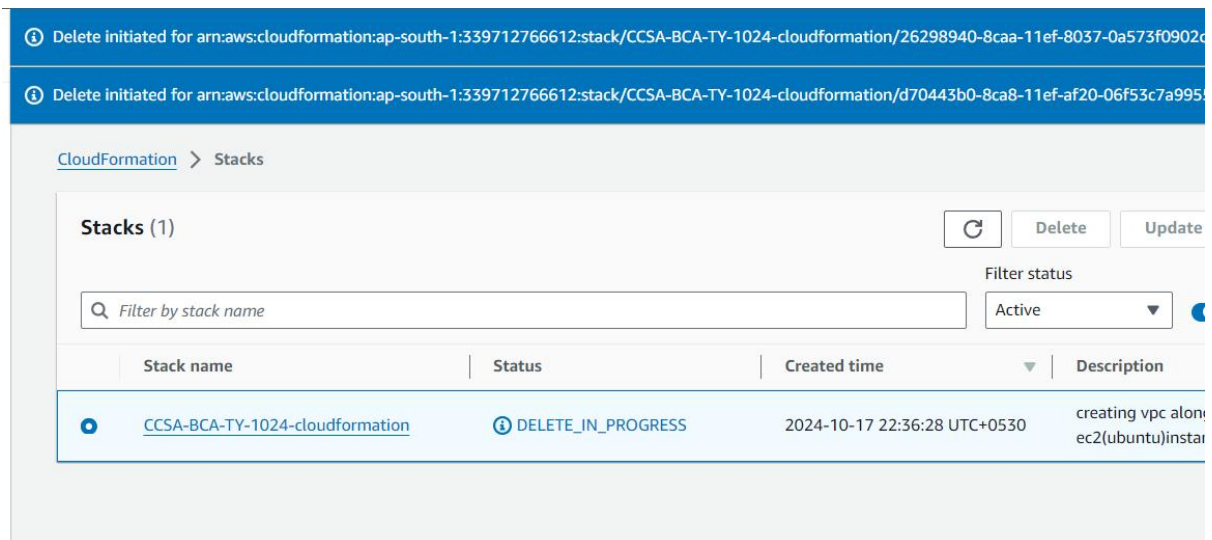
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### Step7: DELETE STACK

Once you delete the stack all the components created will be deleted automatically along with stack



The screenshot shows the AWS CloudFormation console. At the top, there are two blue notification banners: "Delete initiated for arn:aws:cloudformation:ap-south-1:339712766612:stack/CCSA-BCA-TY-1024-cloudformation/26298940-8caa-11ef-8037-0a573f0902d" and "Delete initiated for arn:aws:cloudformation:ap-south-1:339712766612:stack/CCSA-BCA-TY-1024-cloudformation/d70443b0-8ca8-11ef-af20-06f53c7a995". Below the notifications, the breadcrumb "CloudFormation > Stacks" is visible. The main content area shows "Stacks (1)" with a search bar "Filter by stack name" and a "Filter status" dropdown set to "Active". A table lists the stack:

Stack name	Status	Created time	Description
<a href="#">CCSA-BCA-TY-1024-cloudformation</a>	DELETE_IN_PROGRESS	2024-10-17 22:36:28 UTC+0530	creating vpc along with ec2(ubuntu)instances

Done.