CLOUD FORMATION TEMPLATE

A **CloudFormation template** is a **declarative text file (written in YAML or JSON)** that describes the infrastructure you want to create in **AWS**. It allows you to provision and manage AWS resources in an **automated and repeatable way**.

Why Use CloudFormation Templates?

- **Automates Infrastructure Deployment:** No manual clicking in the console.
- **Infrastructure as Code (IaC):** Treat your infrastructure like code (version control, reuse, etc.).
- **Repeatable and Consistent:** Deploy the same environment again and again without errors.
- **Simplifies Resource Management:** All resources are managed as a single unit (called a stack).

Key Sections:

1. **AWSTemplateFormatVersion:** Template version (optional).
2. **Description:** A short description of what the template does (optional).
3. **Metadata:** Provides additional information about the template (optional).
4. **Parameters:** User inputs like instance types, key pairs, etc (optional).
5. **Rules:** Defines rules to validate parameter values (optional).
6. **Mappings:** Defines fixed values based on region, environment, etc (optional).
7. **Conditions:** Defines conditions to control resource creation based on parameter values (optional).
8. **Resources:** The actual AWS resources you want to create (mandatory).
9. **Outputs:** Outputs after the stack is created (optional).

How CloudFormation Works:

1. **Write the Template:** Describe your infrastructure in YAML/JSON.
2. **Upload to AWS CloudFormation:** AWS reads the template.
3. **CloudFormation Provisions Resources:** AWS creates all the resources automatically.
4. **Manage with Stacks:** All resources are treated as one unit called a **stack**.

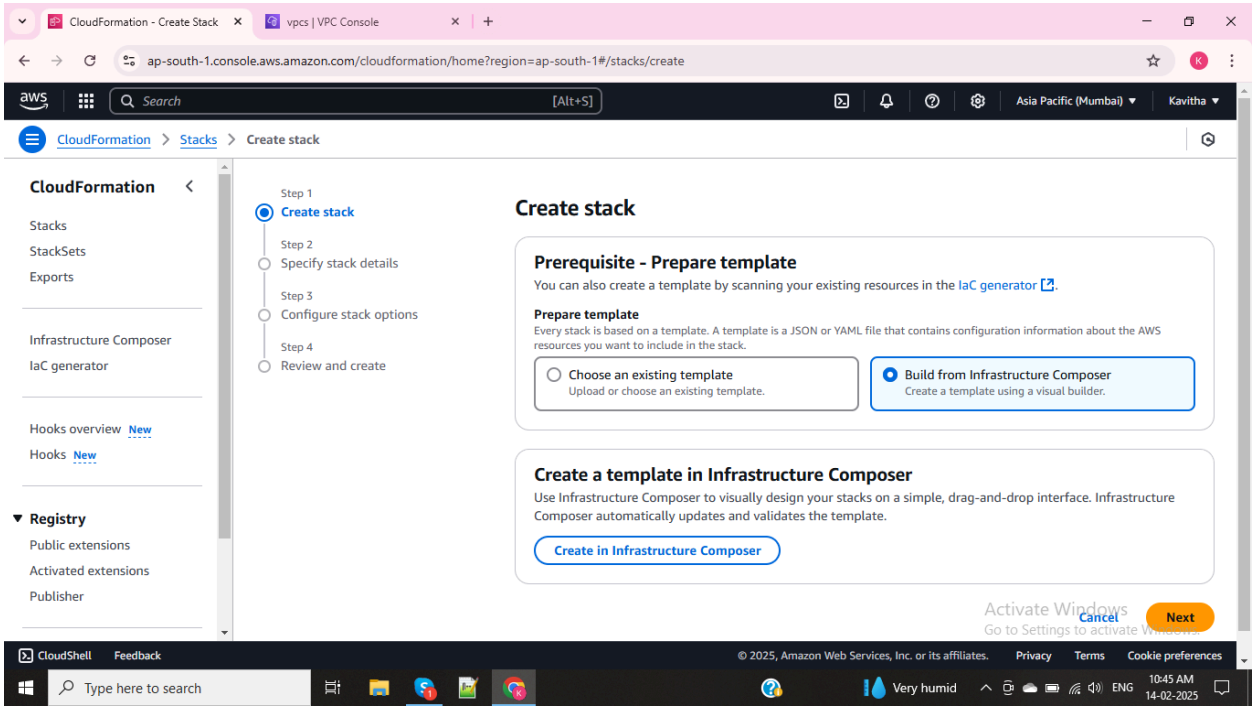
Example:

You can create an **EC2 instance**, **VPC**, **subnets**, and more using one CloudFormation template, instead of manually creating each one in the AWS console.

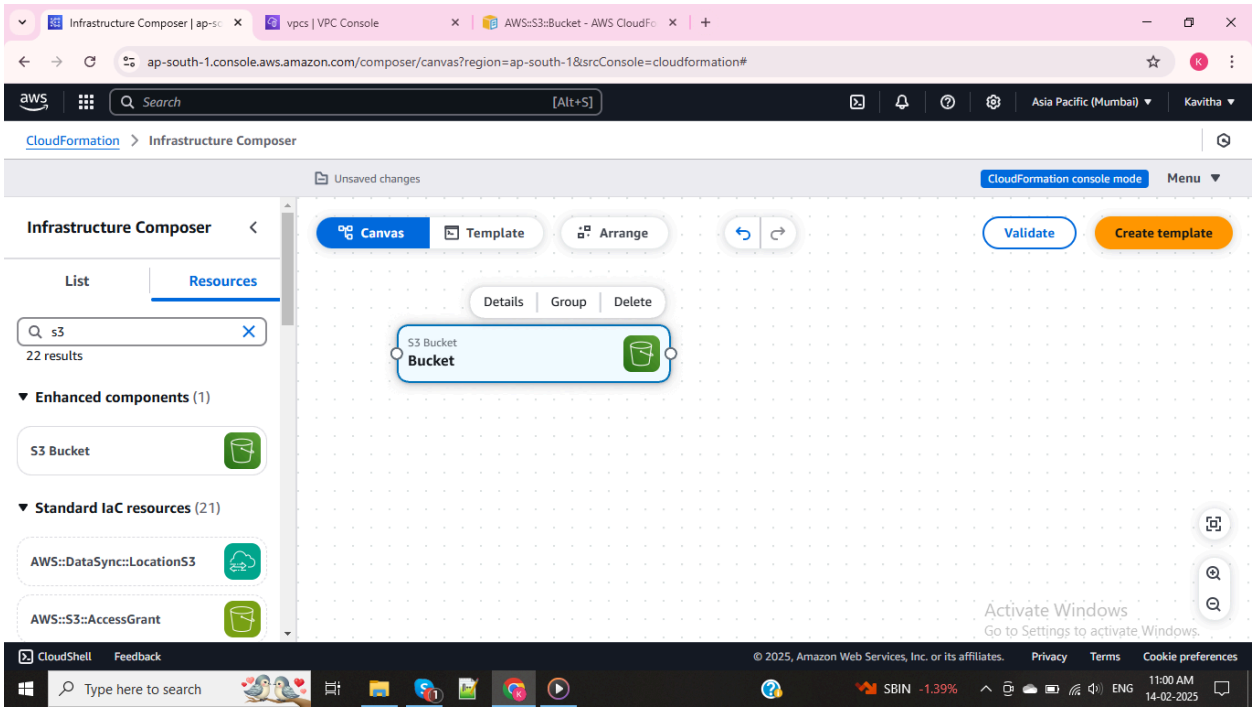
TASK 1: Creating S3 Bucket using CloudFormation Template

✅ 1. Using **AWS Console**

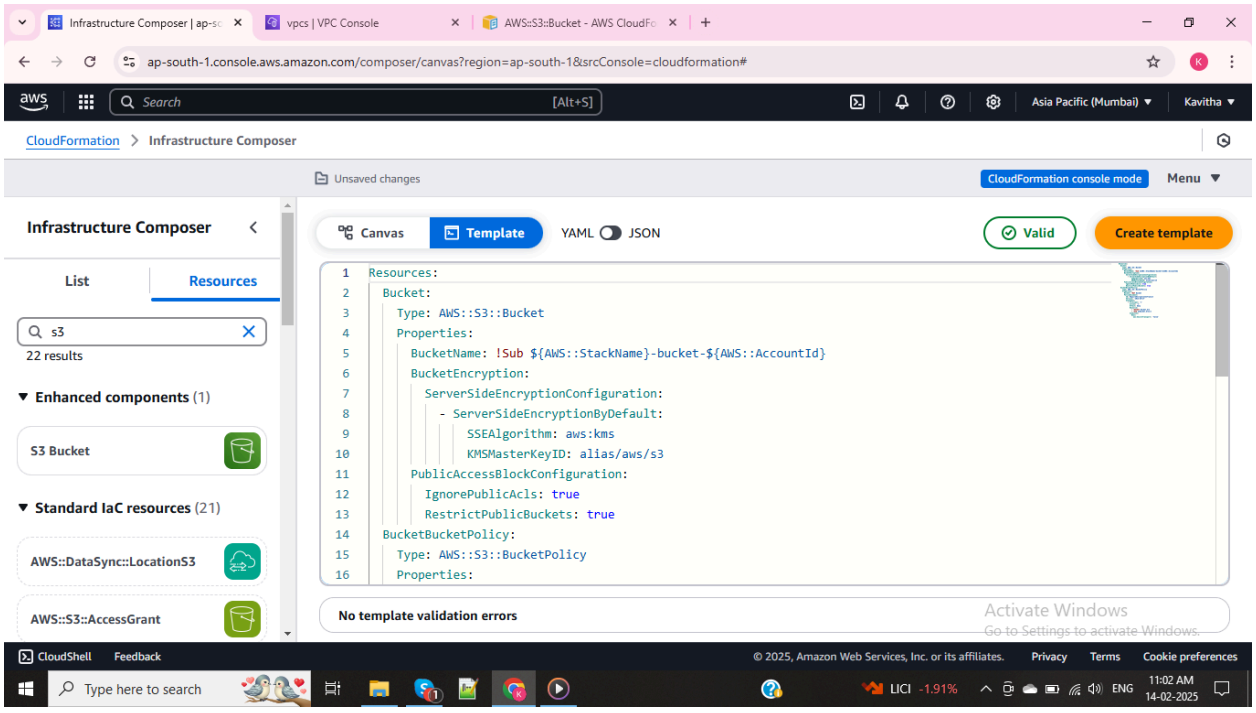
1. Go to AWS Management Console → **CloudFormation Template**
2. Click **Create Stack**
3. Choose Build from Infrastructure Composer



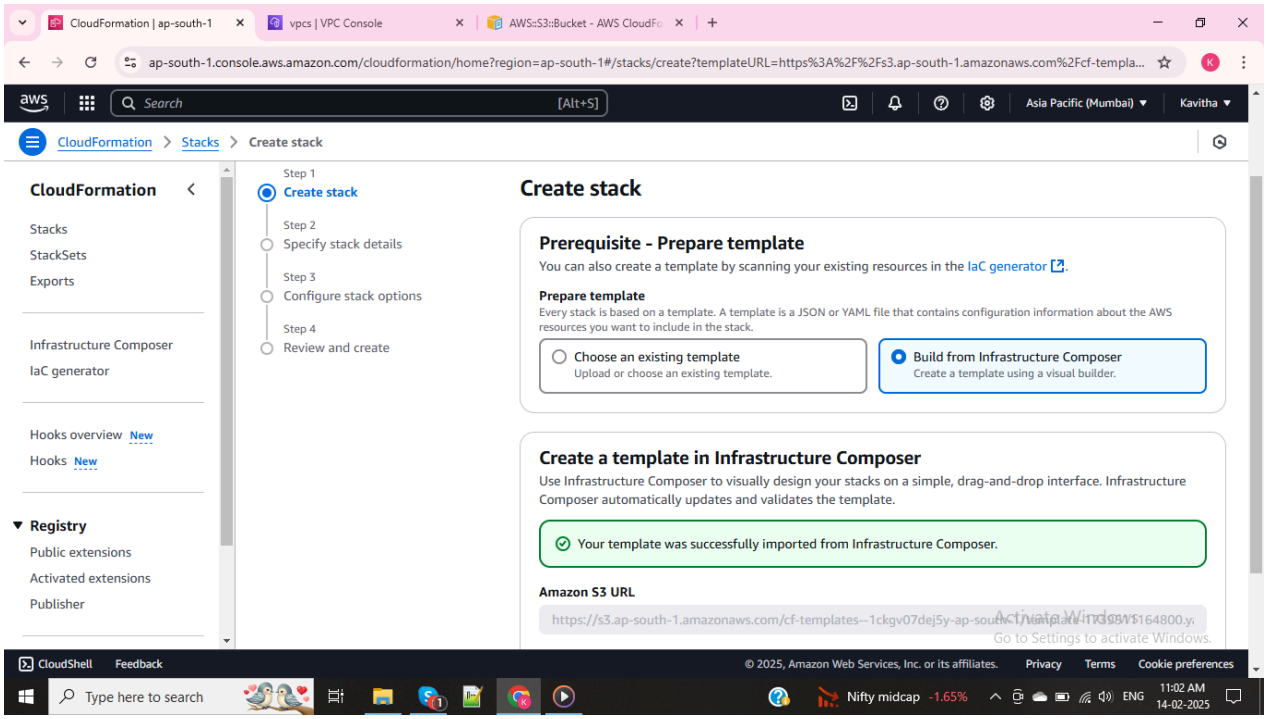
4. Click **Next** --> In Canvas search **S3 BUCKET** and drag into right side --> Create Template



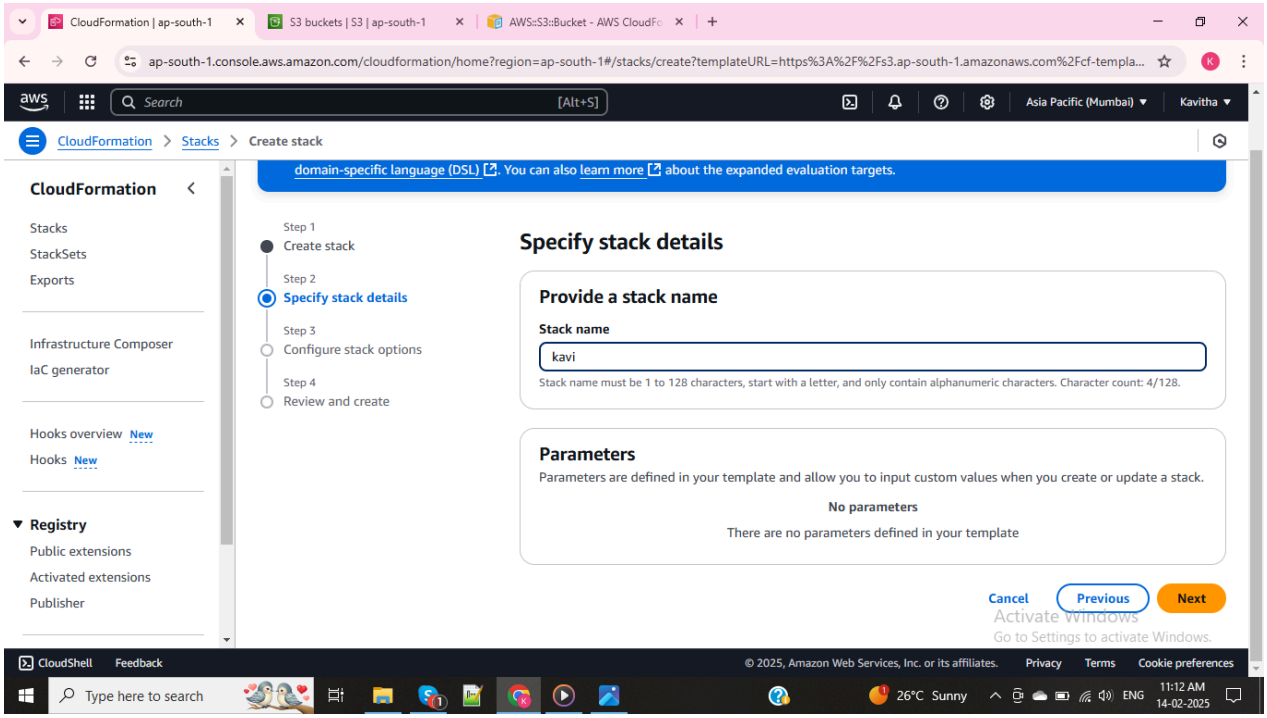
Automatically Template is created for S3 Bucket and validate whether code is correct



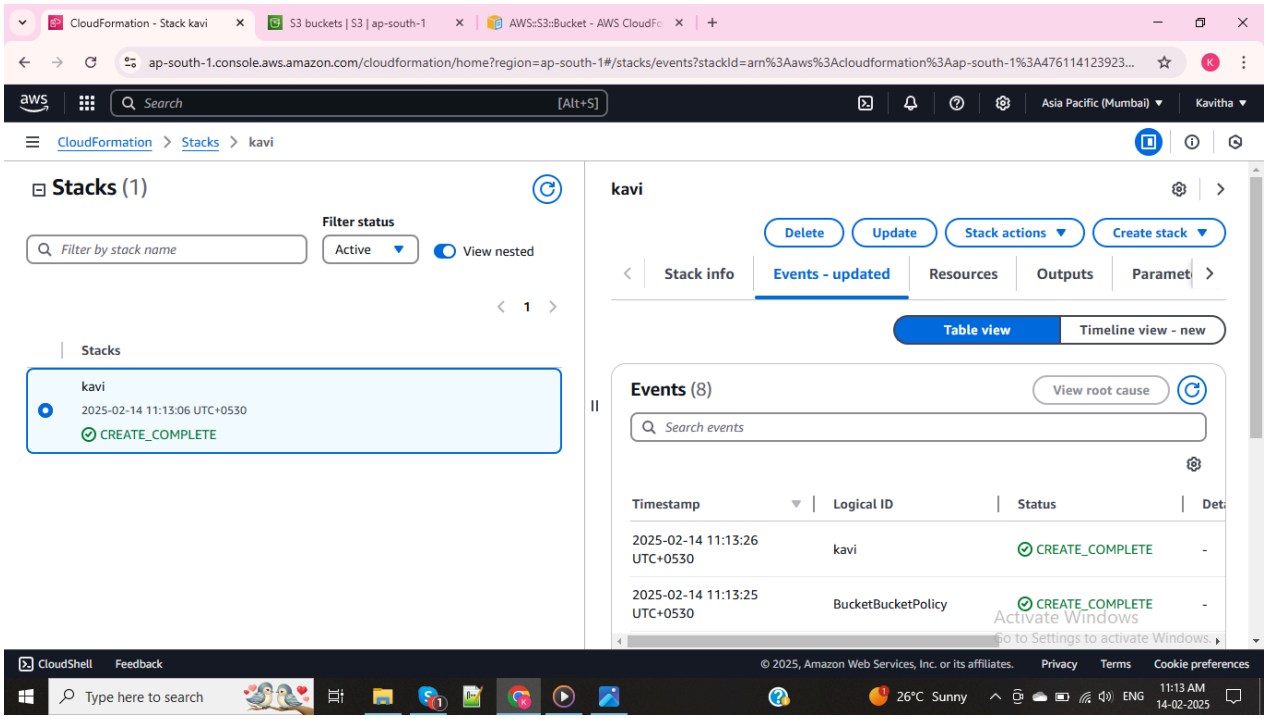
6. Template created successfully --> Next



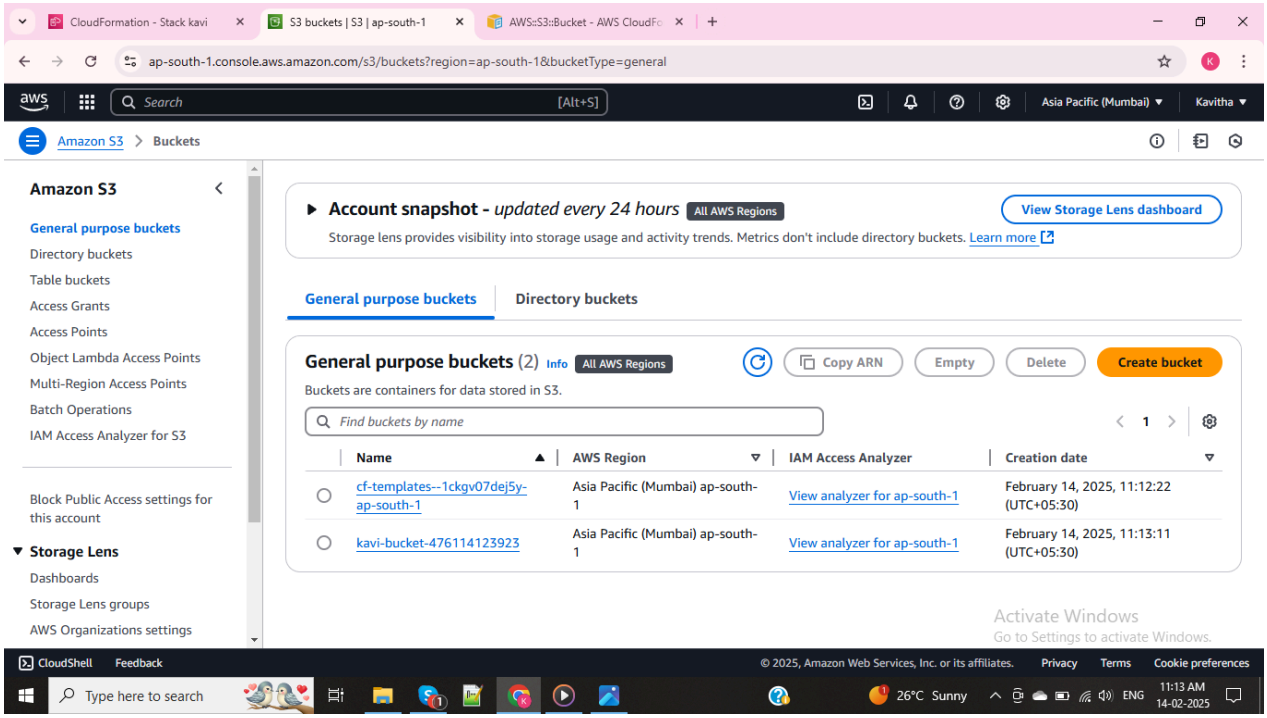
Provide Stack name



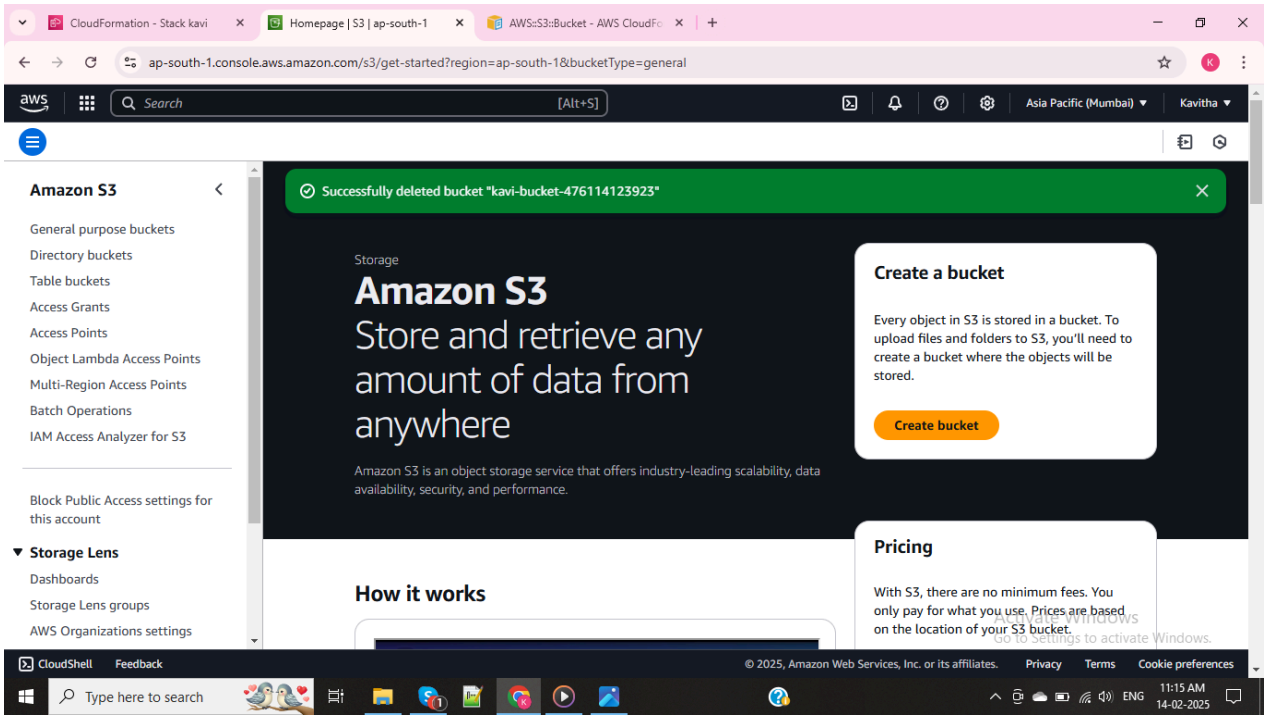
7. Stack created completed



Go to S3 service and check S3 Bucket is created or not and **OUTPUT**



Now, S3 bucket created using Cloudformation Template but bucket was deleted manually



Drift Detection in AWS CloudFormation is a feature that helps you identify whether the actual state of your AWS resources differs from the expected state defined in your CloudFormation templates.

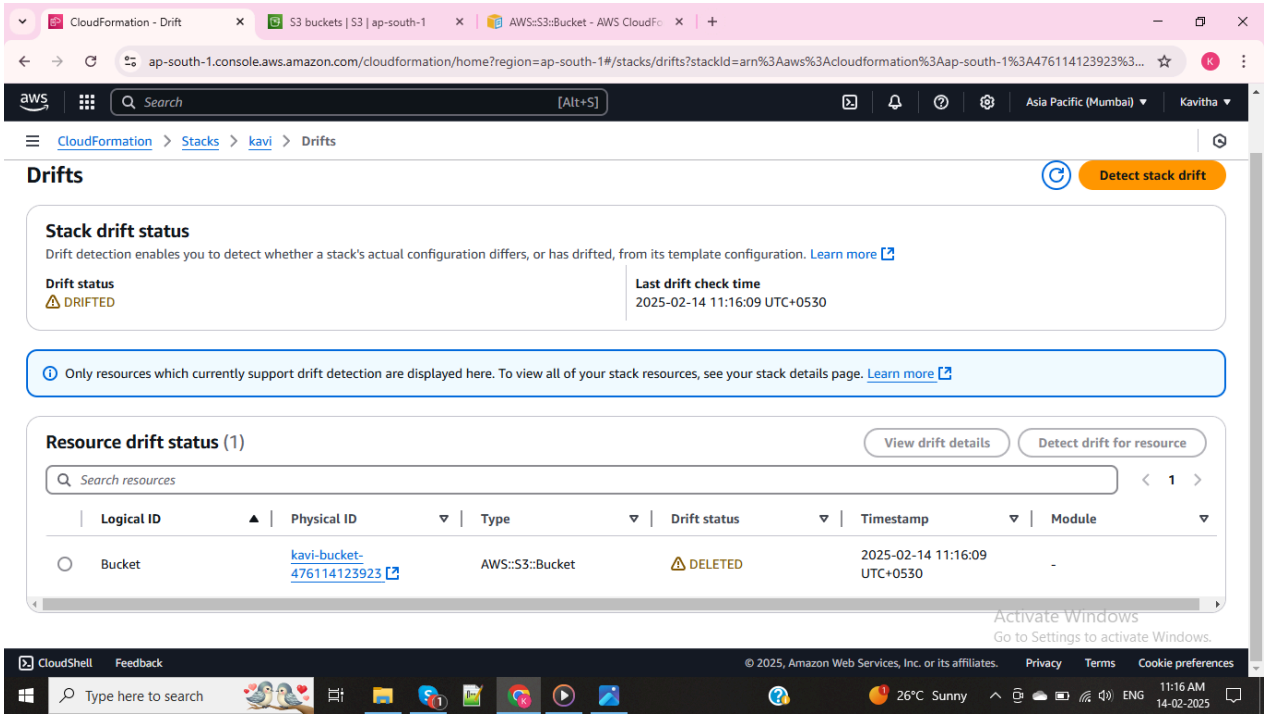
Why Drift Detection Matters:

- Over time, manual changes (outside CloudFormation) may be made to AWS resources.
- Drift detection helps ensure that your infrastructure remains consistent with your original template definitions.

Key Concepts:

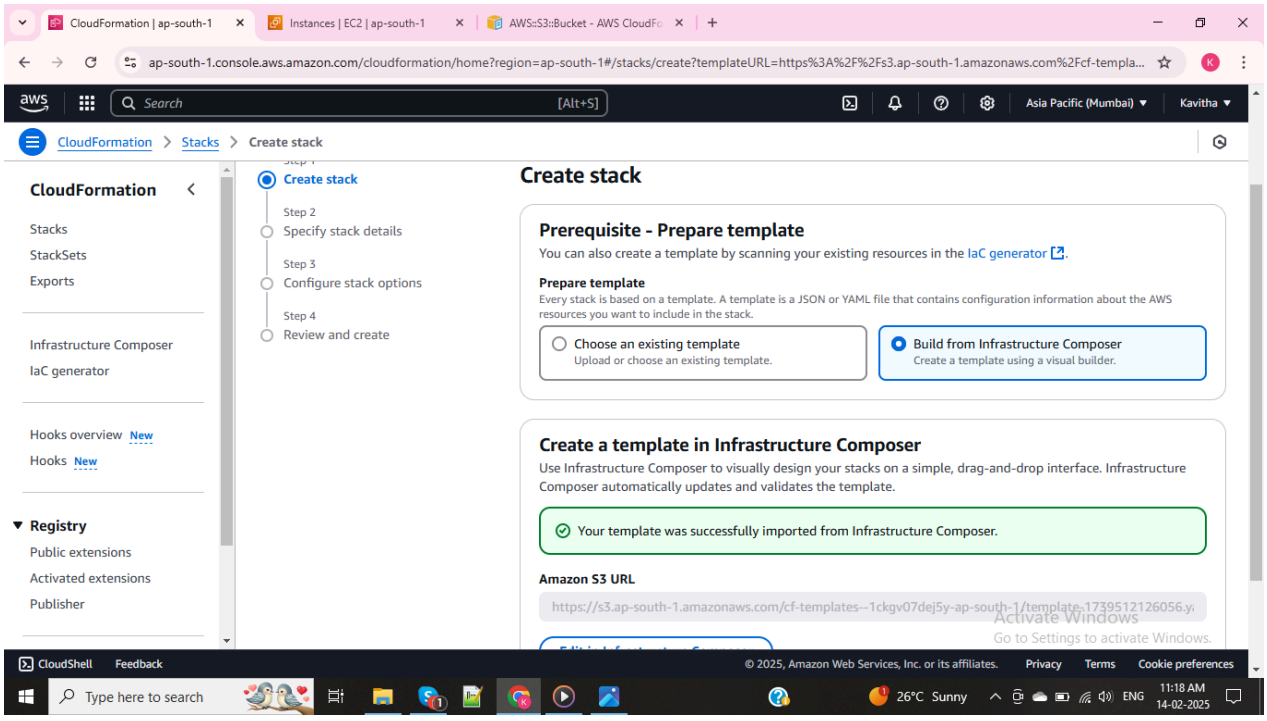
- **Drifted**: A resource has been changed manually outside CloudFormation.
- **In-Sync**: A resource matches its CloudFormation template definition.
- **Drift Detection**: The process of comparing your current stack resources with the template definitions.

OUTPUT

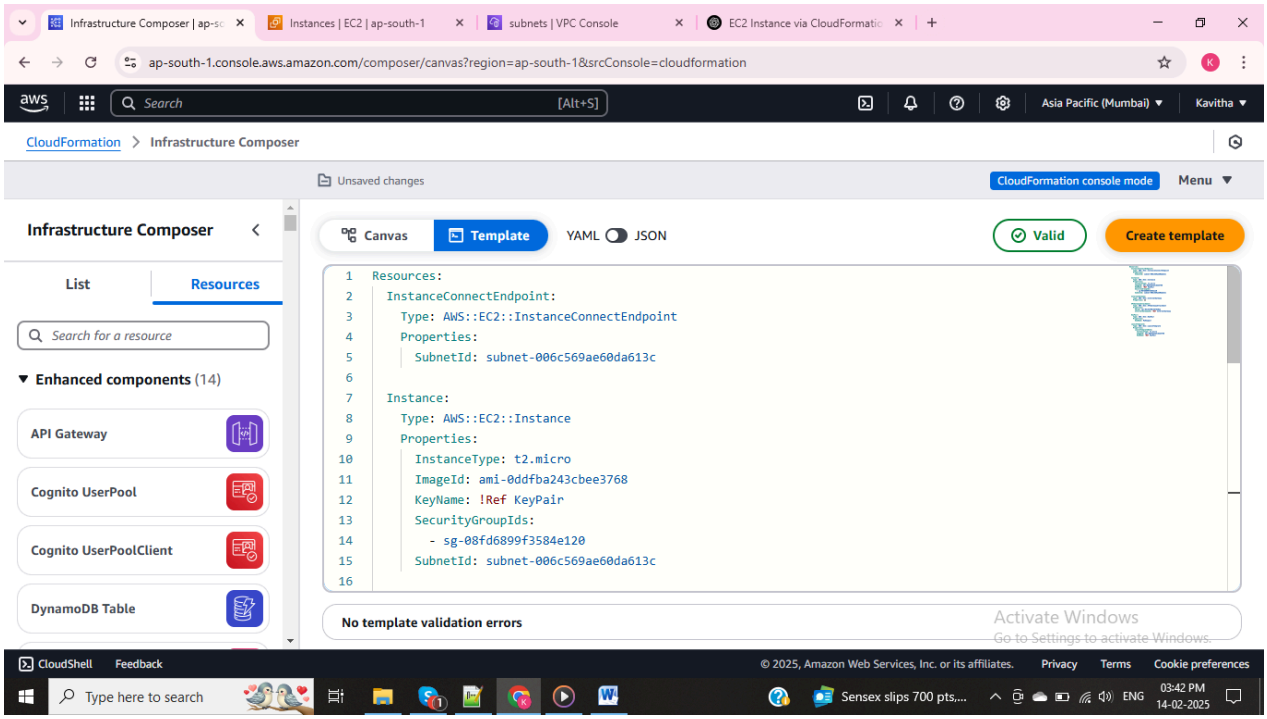


TASK 2: Creating EC2 Instance using CloudFormation Template

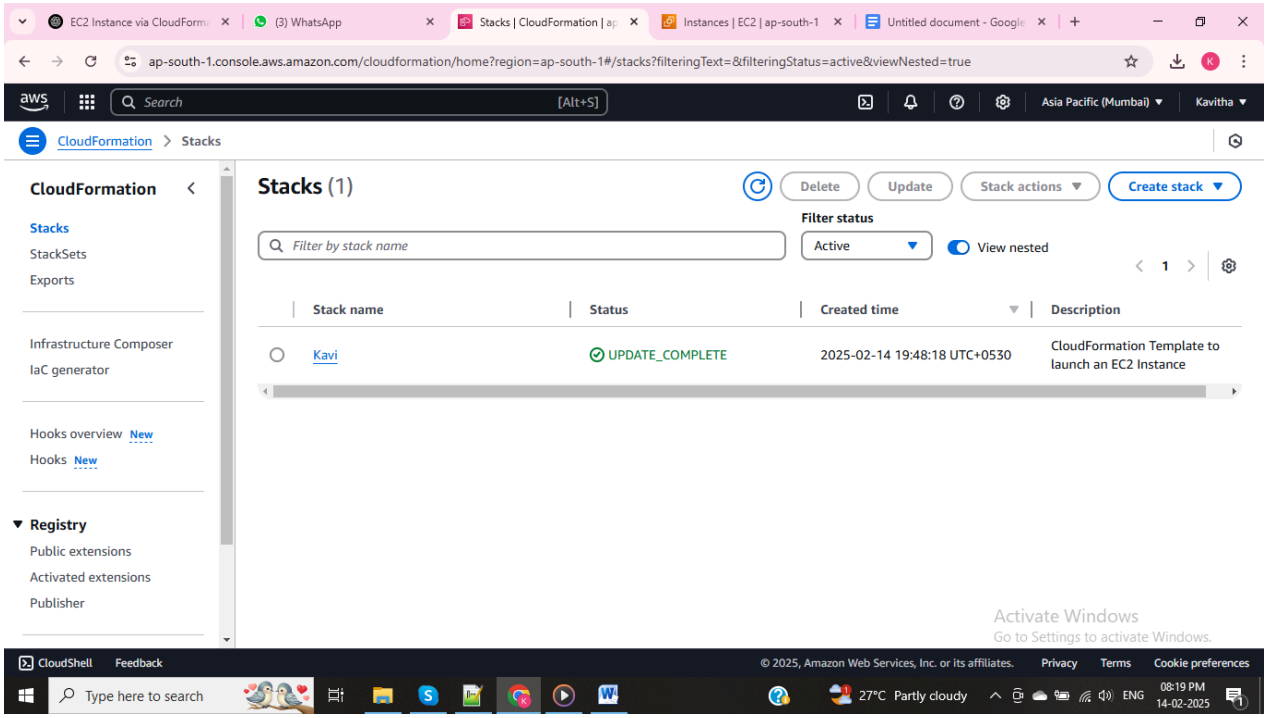
Create another **Stack** --> Choose Build from infrastructure composer



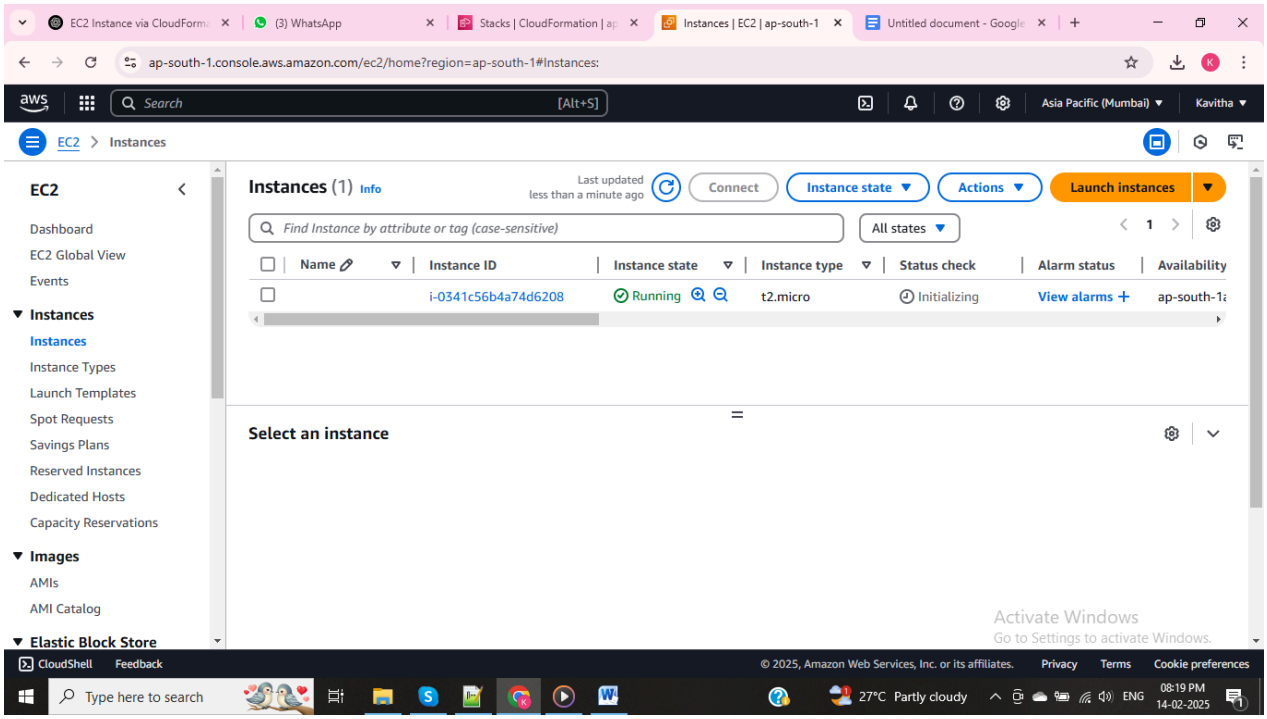
Creating Template for EC2 Instance and validated



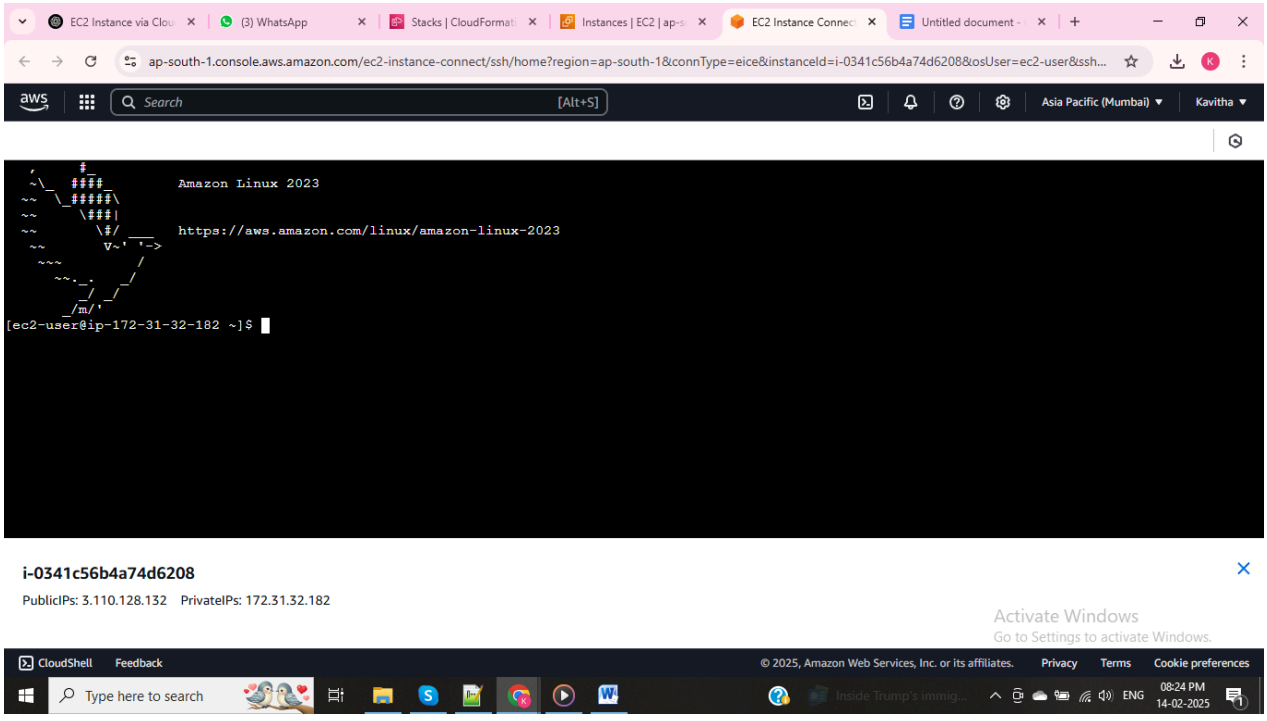
Stack was created successfully



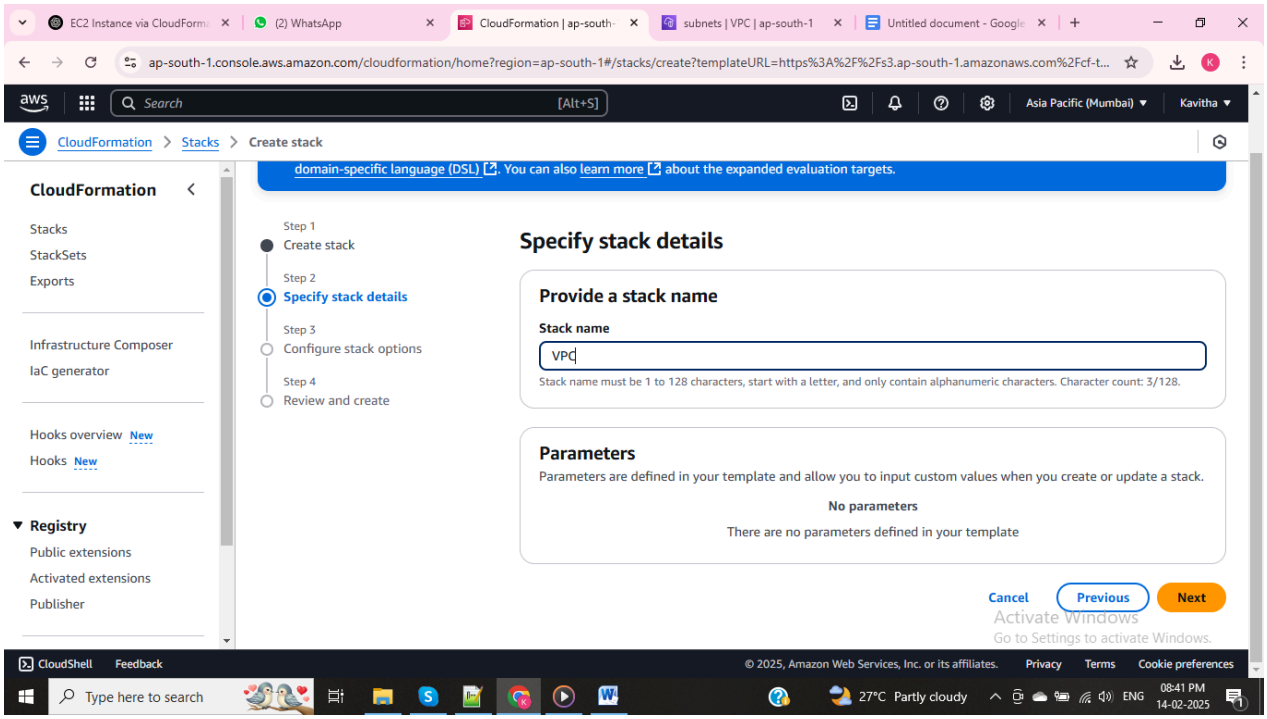
Now, Go to EC2 Instance dashboard and check Instance was created & **OUTPUT**



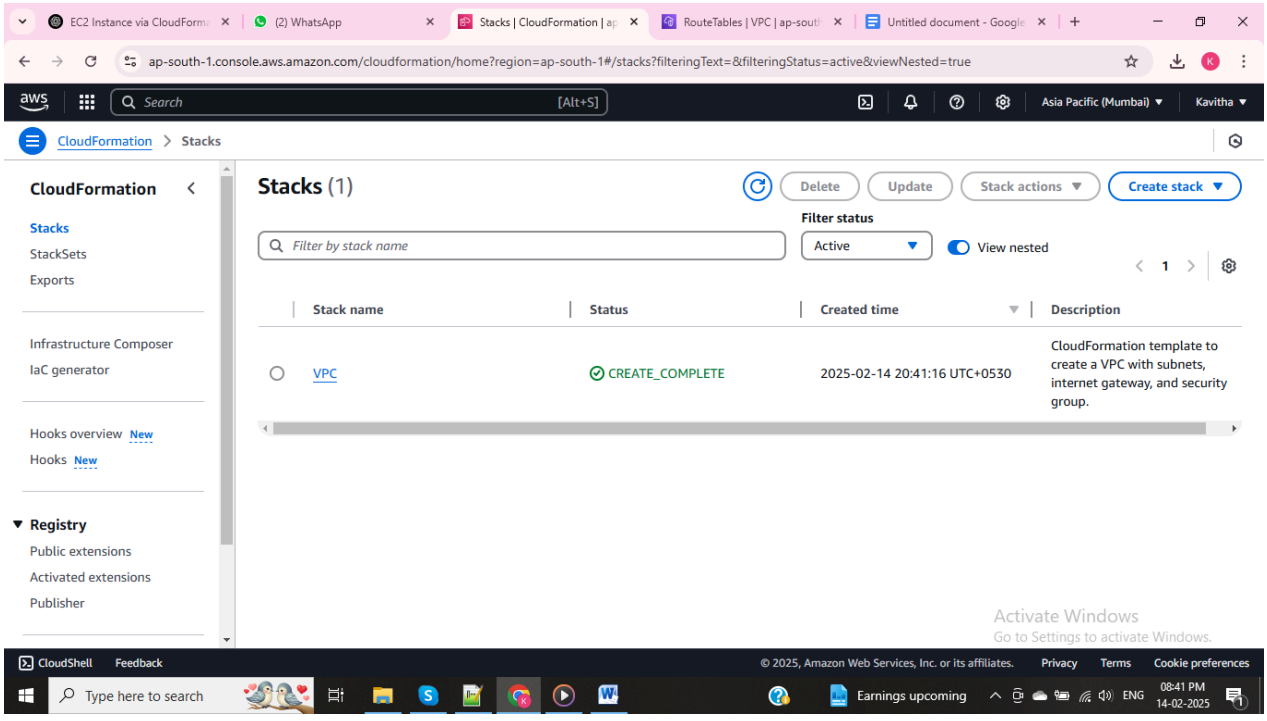
Connecting the EC2 Instance



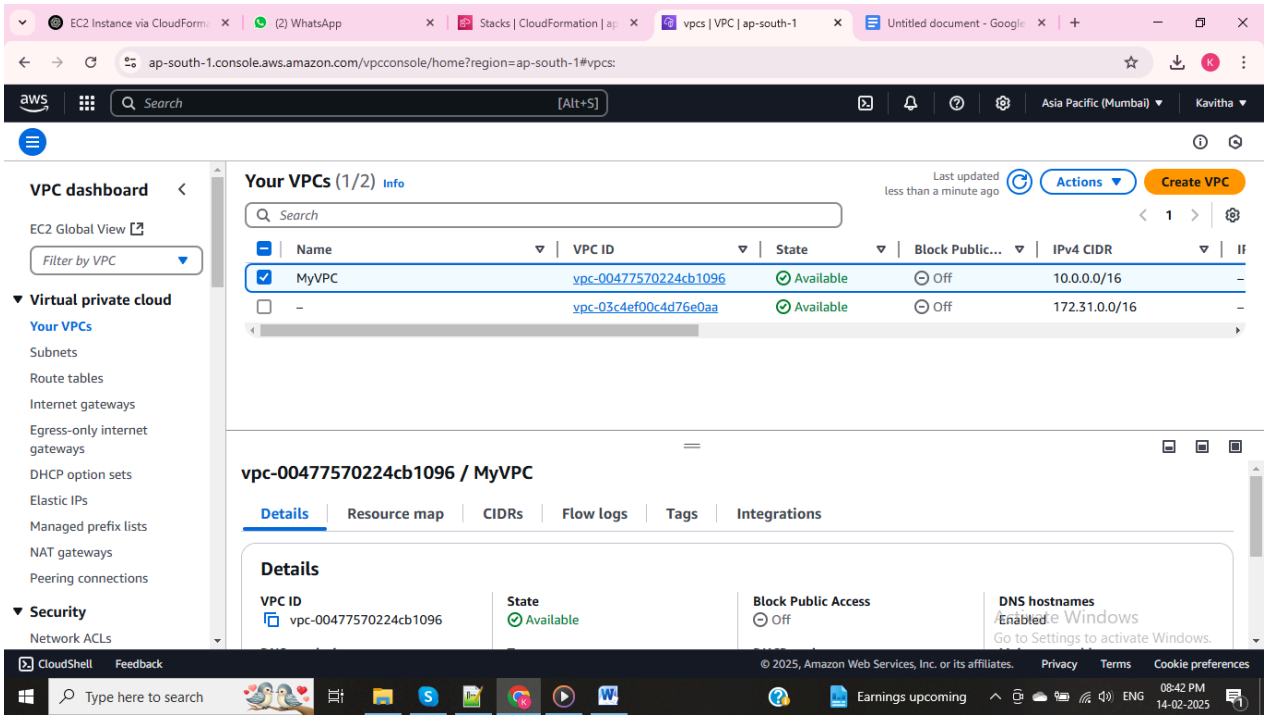
TASK 3: Creating CloudFormation Template for Virtual Private Cloud (VPC)



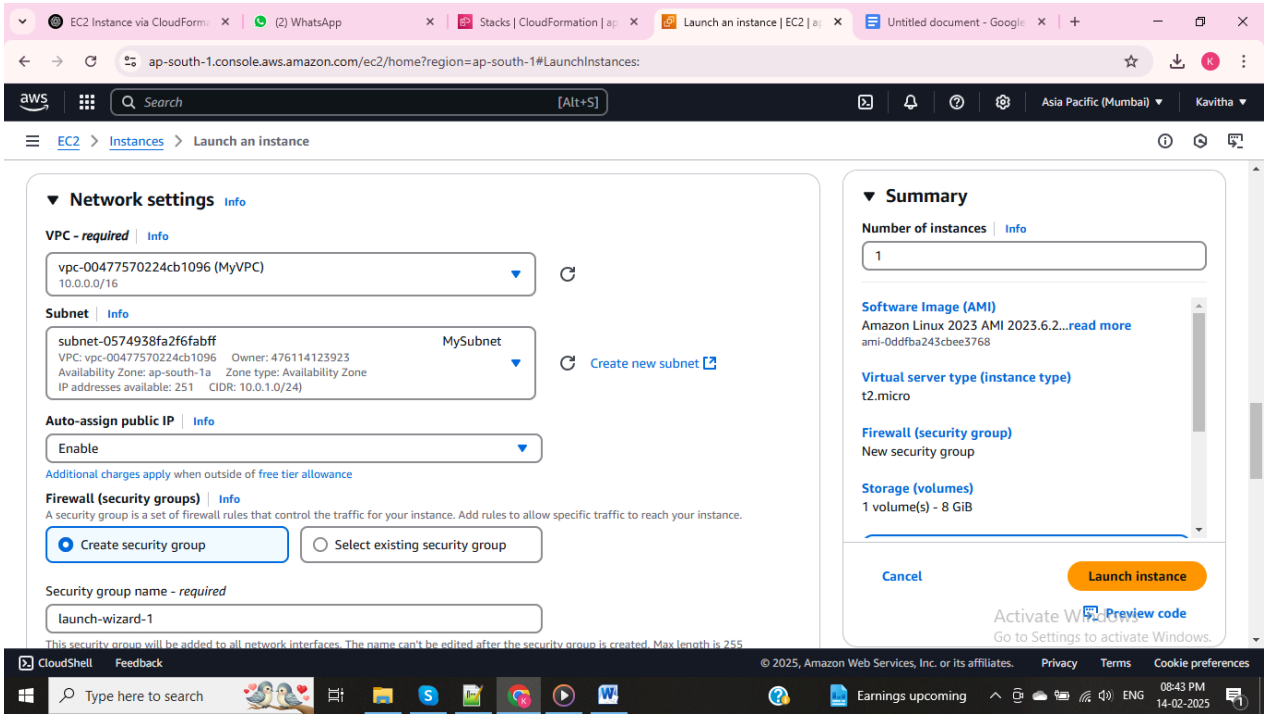
Stack created successfully



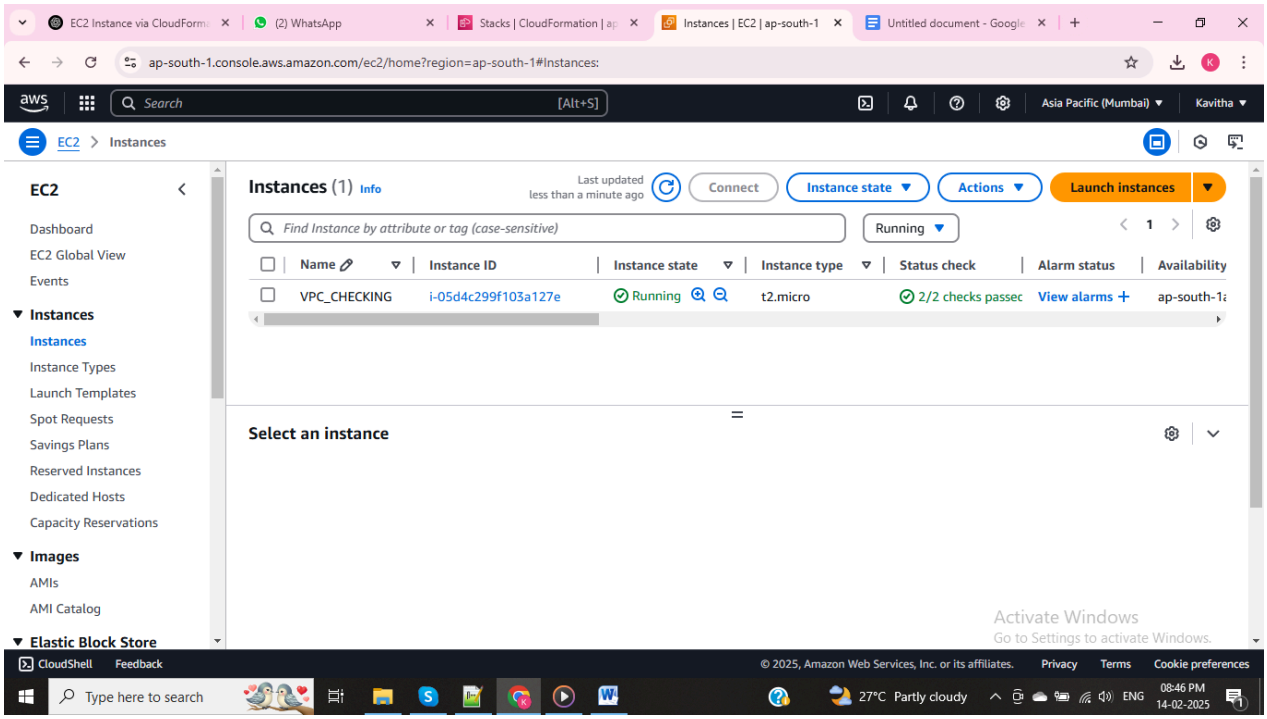
OUTPUT



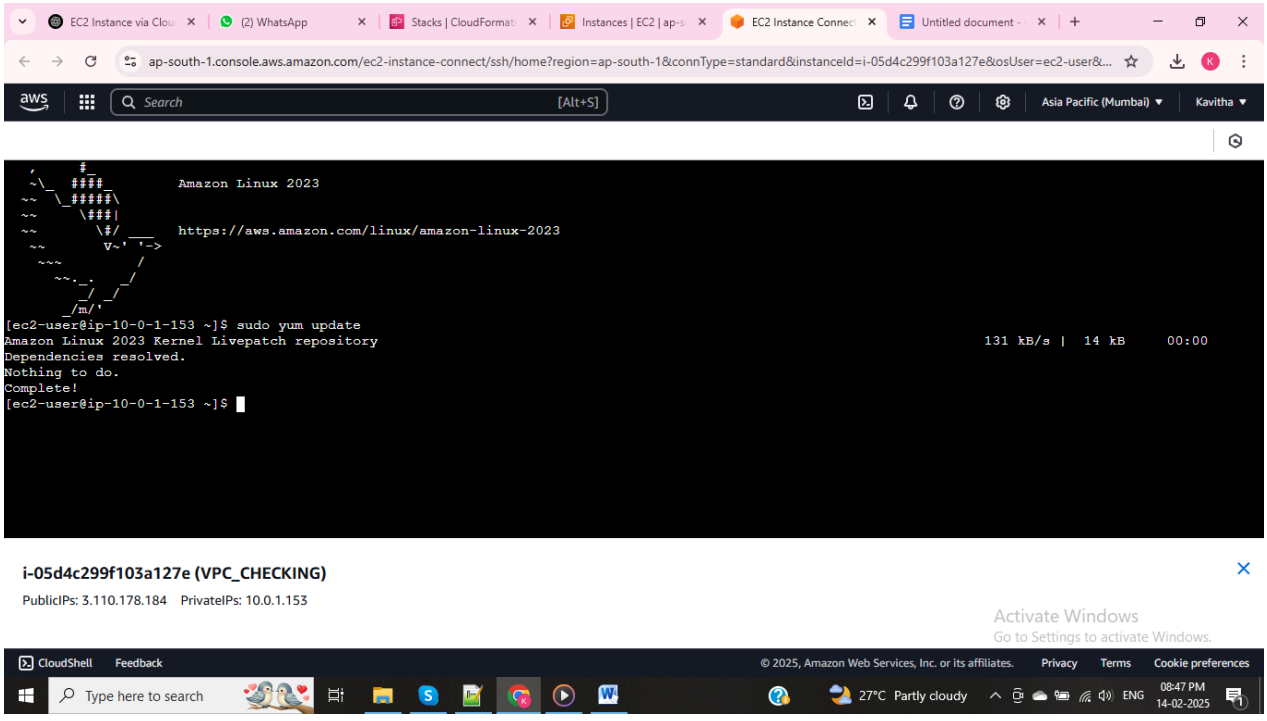
VPC created through CFT and checking the VPC is working, For this have to create EC2 Instance and attach created VPC



Instance created



OUTPUT



TEMPLATE for EC2 Instance

```
AWSTemplateFormatVersion: '2010-09-09'

Description: CloudFormation Template to launch an EC2 Instance


Resources:

  MyEC2Instance:

    Type: AWS::EC2::Instance

    Properties:

      InstanceType: t2.micro

      ImageId: ami-0ddfba243cbee3768

      KeyName: demo

      SecurityGroupIds:

        - sg-08fd6899f3584e120

      SubnetId: subnet-069adf10dc45d03f2


  MySecurityGroup:

    Type: AWS::EC2::SecurityGroup

    Properties:

      GroupDescription: Enable SSH and HTTP access

      VpcId: vpc-03c4ef00c4d76e0aa
```

```
    SecurityGroupIngress:
      - IpProtocol: tcp
        FromPort: 22
        ToPort: 22
        CidrIp: 0.0.0.0/0   # Allows SSH from anywhere (restrict for production)
      - IpProtocol: tcp
        FromPort: 80
        ToPort: 80
        CidrIp: 0.0.0.0/0   # Allows HTTP traffic from anywhere

Outputs:
  InstanceId:
    Description: Instance ID of the newly created EC2 instance
    Value: !Ref MyEC2Instance
```

VPC TEMPLATE

```
AWSTemplateFormatVersion: '2010-09-09'
Description: CloudFormation template to create a VPC with subnets, internet gateway, and security group.
```

```
Resources:
  MyVPC:
    Type: AWS::EC2::VPC
    Properties:
      CidrBlock: 10.0.0.0/16
      EnableDnsSupport: true
      EnableDnsHostnames: true
      Tags:
        - Key: Name
          Value: MyVPC

  MySubnet:
    Type: AWS::EC2::Subnet
    Properties:
      VpcId: !Ref MyVPC
      CidrBlock: 10.0.1.0/24
      AvailabilityZone: !Select [ 0, !GetAZs '' ]
      MapPublicIpOnLaunch: true
      Tags:
        - Key: Name
```

```
      Value: MySubnet

  MyInternetGateway:
    Type: AWS::EC2::InternetGateway
    Properties:
      Tags:
       - Key: Name
         Value: MyInternetGateway

  AttachGateway:
    Type: AWS::EC2::VPCGatewayAttachment
    Properties:
      VpcId: !Ref MyVPC
      InternetGatewayId: !Ref MyInternetGateway

  MyRouteTable:
    Type: AWS::EC2::RouteTable
    Properties:
      VpcId: !Ref MyVPC
      Tags:
```

```
      - Key: Name
        Value: MyRouteTable

  MyRoute:
    Type: AWS::EC2::Route
    DependsOn: AttachGateway
    Properties:
      RouteTableId: !Ref MyRouteTable
      DestinationCidrBlock: 0.0.0.0/0
      GatewayId: !Ref MyInternetGateway

  SubnetRouteTableAssociation:
    Type: AWS::EC2::SubnetRouteTableAssociation
    Properties:
      SubnetId: !Ref MySubnet
      RouteTableId: !Ref MyRouteTable

  MySecurityGroup:
    Type: AWS::EC2::SecurityGroup
    Properties:
```

```
      GroupDescription: Enable SSH and HTTP access
      VpcId: !Ref MyVPC
      SecurityGroupIngress:
        - IpProtocol: tcp
          FromPort: 22
          ToPort: 22
          CidrIp: 0.0.0.0/0  # Allows SSH from anywhere
        - IpProtocol: tcp
          FromPort: 80
          ToPort: 80
          CidrIp: 0.0.0.0/0  # Allows HTTP from anywhere

Outputs:
  VPCId:
    Description: VPC ID
    Value: !Ref MyVPC
  SubnetId:
    Description: Subnet ID
    Value: !Ref MySubnet
  InternetGatewayId:
```

```
  Description: Internet Gateway ID
  Value: !Ref MyInternetGateway
SecurityGroupId:
  Description: Security Group ID
  Value: !Ref MySecurityGroup
```