Project-1

🚀 Automated EC2 Lifecycle Management with CloudFormation and Lambda

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📝 Project Description

This project demonstrates how to automate the lifecycle of AWS EC2 instances using a combination of AWS CloudFormation and AWS Lambda. The goal is to provision infrastructure as code and manage it efficiently by automatically cleaning up unused resources.

📝 Project Overview

This project showcases how to automate the lifecycle of EC2 instances using AWS services:

1. **Create** resources (EC2 + Security Group) using CloudFormation.
2. **Manually stop** the EC2 instances to simulate idle use.
3. **Use a Lambda function** (Python-based) to check which EC2 instances have been stopped for over **5 minutes**, and **automatically delete** them.
4. **Run Lambda manually** (no CloudWatch trigger).

🧱 Step-by-Step Process

✅ Step 1: Create EC2 Instances Using CloudFormation

1. Open AWS Console → Go to CloudFormation

- Click **"Create Stack"** → **With new resources (standard)**

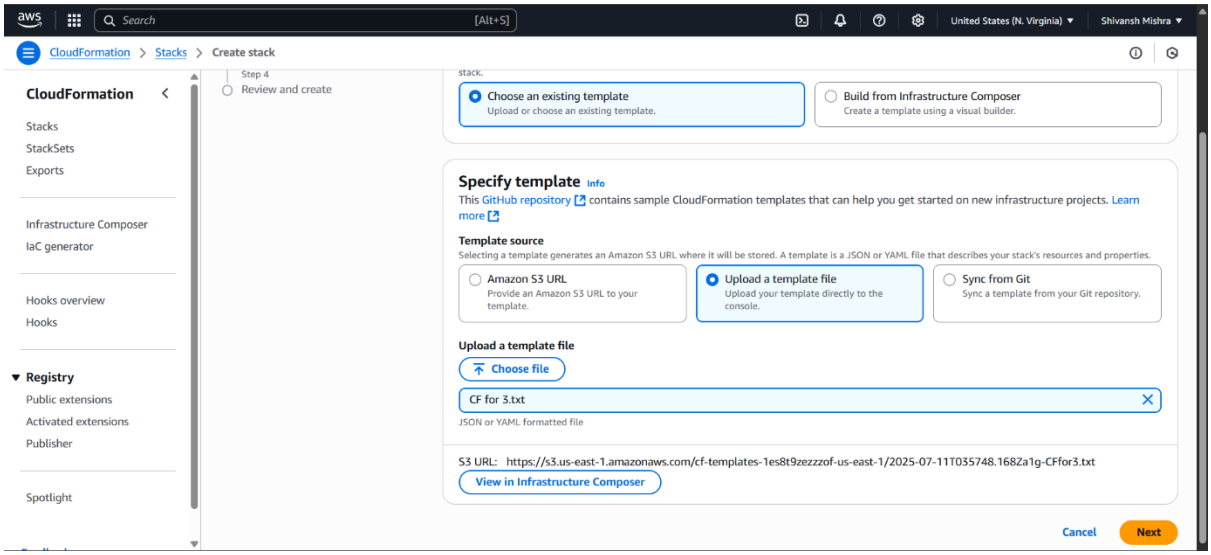
2. Upload or paste this template:

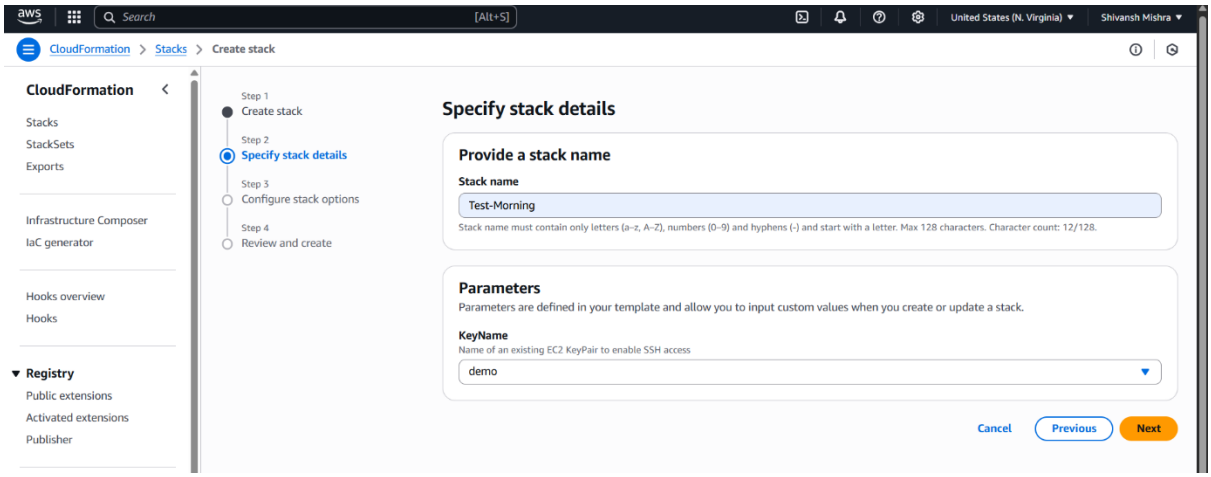
```yaml
AWSTemplateFormatVersion: "2010-09-09"
Description: Launch an EC2 instance using CloudFormation

Parameters:
  KeyName:
    Description: Name of an existing EC2 KeyPair to enable SSH access
    Type: AWS::EC2::KeyPair::KeyName

Resources:
  MyEC2SecurityGroup:
    Type: AWS::EC2::SecurityGroup
    Properties:
      GroupDescription: Enable SSH access
      SecurityGroupIngress:
        - IpProtocol: tcp
          FromPort: 22
          ToPort: 22
          CidrIp: 0.0.0.0/0

  MyEC2Instance1:
    Type: AWS::EC2::Instance
    Properties:
      InstanceType: t2.micro
      KeyName: !Ref KeyName
      ImageId: ami-0ff8a91507f77f867
      SubnetId: subnet-082759e4f2285b7b2
      SecurityGroupIds:
        - !GetAtt MyEC2SecurityGroup.GroupId
      Tags:
        - Key: Name
          Value: MyEC2Instance1

  MyEC2Instance2:
    Type: AWS::EC2::Instance
    Properties:
      InstanceType: t2.micro
      KeyName: !Ref KeyName
      ImageId: ami-0ff8a91507f77f867
      SubnetId: subnet-082759e4f2285b7b2
      SecurityGroupIds:
        - !GetAtt MyEC2SecurityGroup.GroupId
      Tags:
        - Key: Name
          Value: MyEC2Instance2

  MyEC2Instance3:
    Type: AWS::EC2::Instance
    Properties:
      InstanceType: t2.micro
      KeyName: !Ref KeyName
      ImageId: ami-0ff8a91507f77f867
      SubnetId: subnet-082759e4f2285b7b2
      SecurityGroupIds:
        - !GetAtt MyEC2SecurityGroup.GroupId
      Tags:
        - Key: Name
          Value: MyEC2Instance3

Outputs:
  Instance1Id:
    Description: ID of EC2 instance 1
    Value: !Ref MyEC2Instance1

  Instance2Id:
    Description: ID of EC2 instance 2
    Value: !Ref MyEC2Instance2

  Instance3Id:
    Description: ID of EC2 instance 3
    Value: !Ref MyEC2Instance3
```

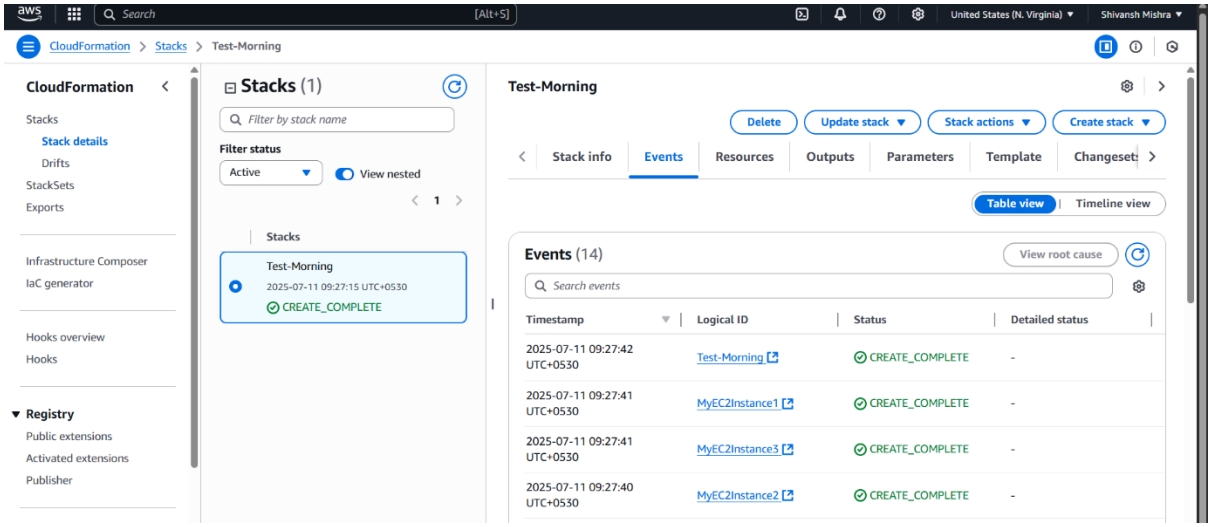
🔁 Replace subnet-xxxxxxxx with a valid subnet ID in your VPC.

3. Create the stack

- Give a name like EC2AutoDeleteStack
- Select your **Key Pair**
- Click **Next** → Leave options default → **Create Stack**



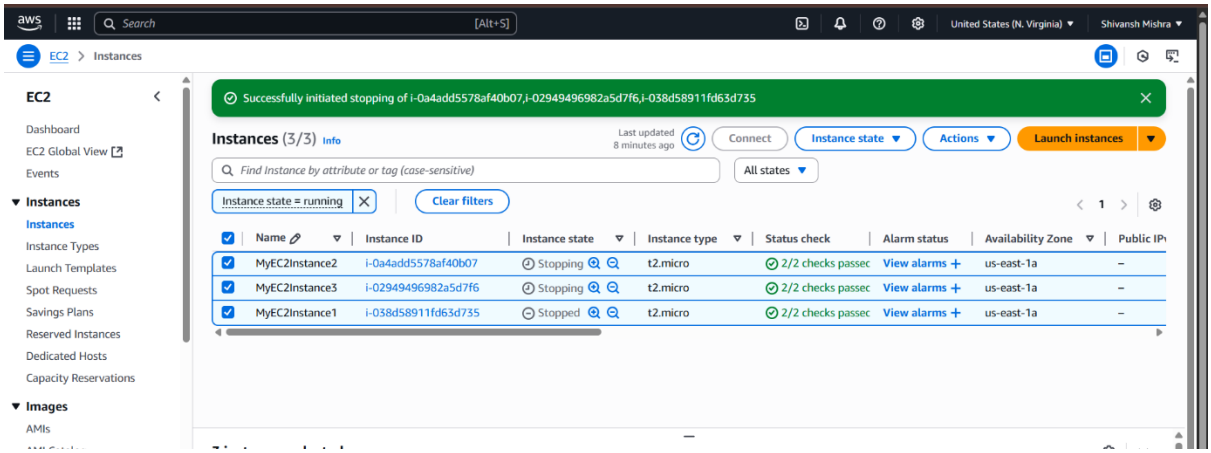




✅ Step 2: Stop the EC2 Instances

After the stack is created:

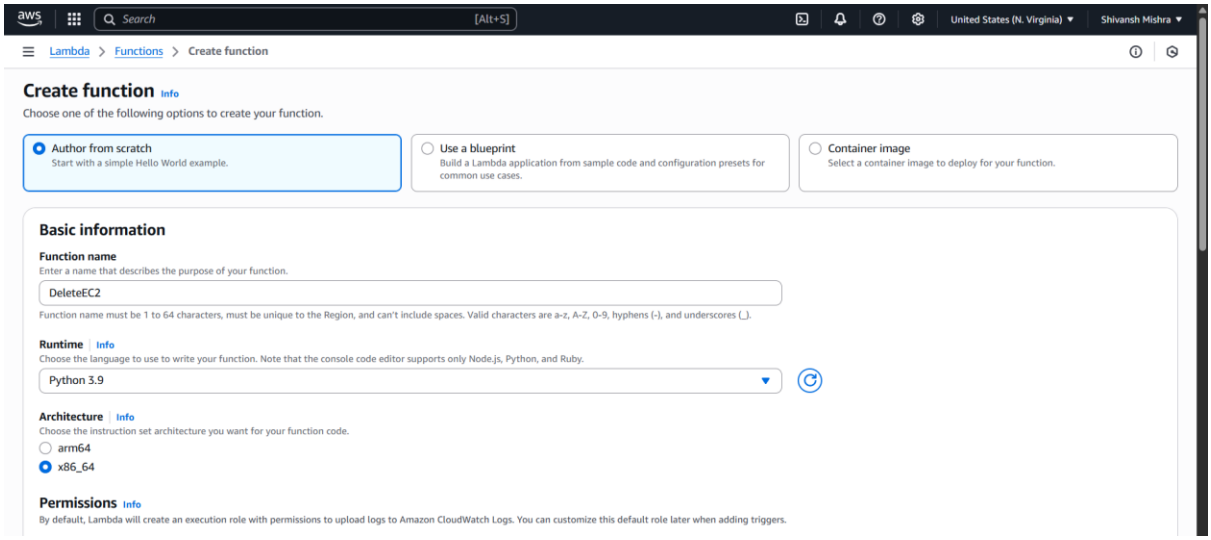
1. Go to **EC2 Console**.
2. Select all 3 instances → Click **"Instance State"** → **Stop instance**.
3. Wait for them to fully enter the **"stopped"** state.



✅ Step 3: Create the Lambda Function

1. Go to AWS Console → Search Lambda → Click “Create Function”

- **Name**: DeleteStoppedEC2
- **Runtime**: Python 3.9
- **Permissions**: Choose **Create a new role with basic Lambda permissions**



2. After function is created, open the Code tab and paste this:

import boto3

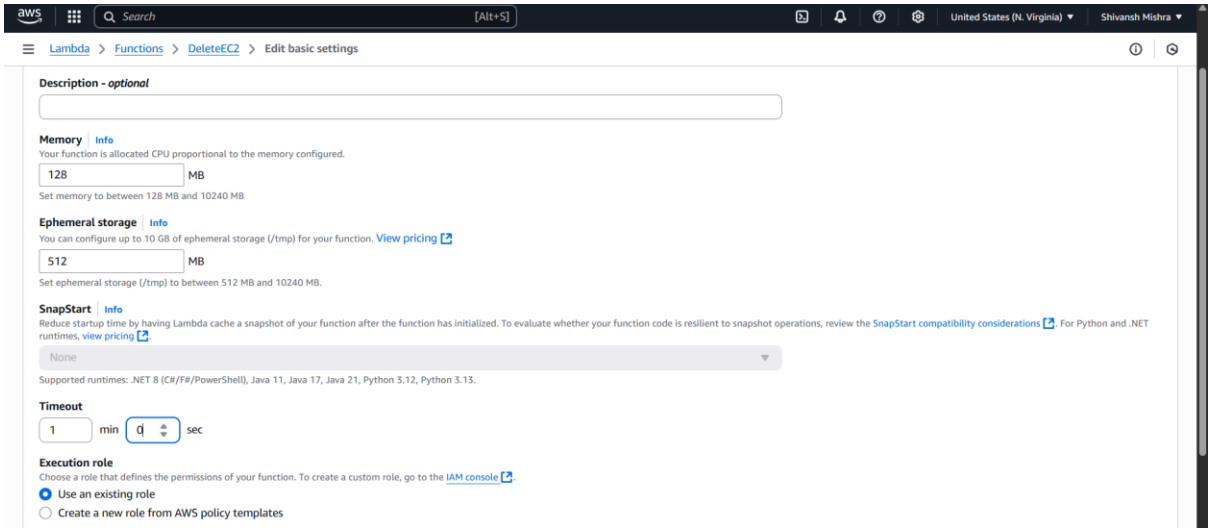
File Edit View H1

```
import boto3
from datetime import datetime, timezone, timedelta

def lambda_handler(event, context):
    ec2 = boto3.client('ec2')

    # Get all stopped EC2 instances
    response = ec2.describe_instances(
        Filters=[{'Name': 'instance-state-name', 'Values': ['stopped']}]
    )

    instances_to_terminate = []

    for reservation in response['Reservations']:
        for instance in reservation['Instances']:
            instance_id = instance['InstanceId']
            state_transition_reason = instance.get('StateTransitionReason', '')

            # Format: 'User initiated (2025-07-11 05:10:45 GMT)'
            if 'User initiated' in state_transition_reason:
                try:
                    timestamp_str = state_transition_reason.split('(')[-1].strip(')')
                    stopped_time = datetime.strptime(timestamp_str, '%Y-%m-%d %H:%M:%S %Z').replace(tzinfo=timezone.utc)
                    current_time = datetime.now(timezone.utc)

                    if current_time - stopped_time > timedelta(minutes=3):
                        instances_to_terminate.append(instance_id)
                except Exception as e:
                    print(f"Error parsing time for instance {instance_id}: {e}")

    if instances_to_terminate:
        print(f"Terminating instances: {instances_to_terminate}")
        ec2.terminate_instances(InstanceIds=instances_to_terminate)
    else:
        print("No stopped instances older than 5 minutes.")
```

3. Click Deploy

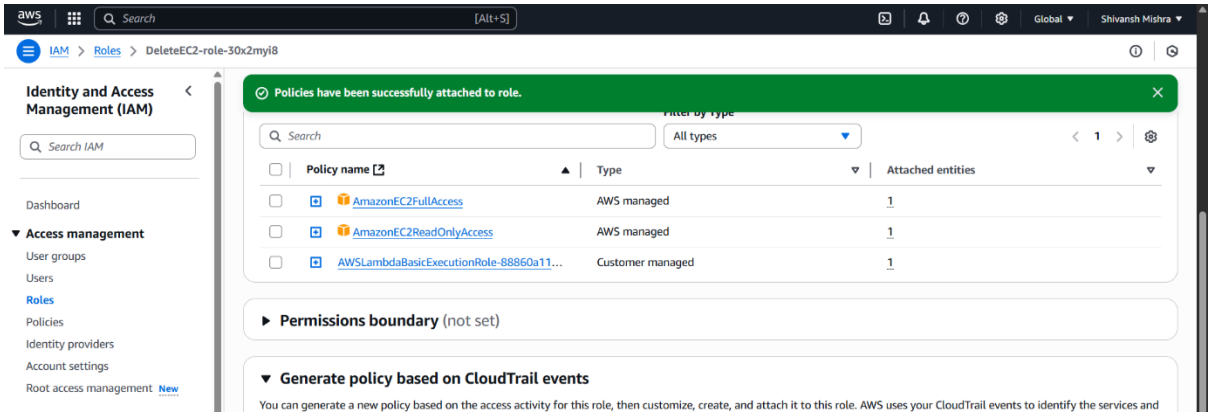
✅ Step 4: Increase Timeout

1. **Go to Configuration → General configuration**
2. **Click Edit → Set Timeout = 1 minute**
3. **Click Save**



✅ Step 5: Add EC2 Permissions to Lambda

1. **Go to Permissions tab → Click IAM Role name**
2. **Click Attach policies**
3. **Search and attach:**
    - **AmazonEC2ReadOnlyAccess**
    - **AmazonEC2FullAccess *(or create custom policy)***

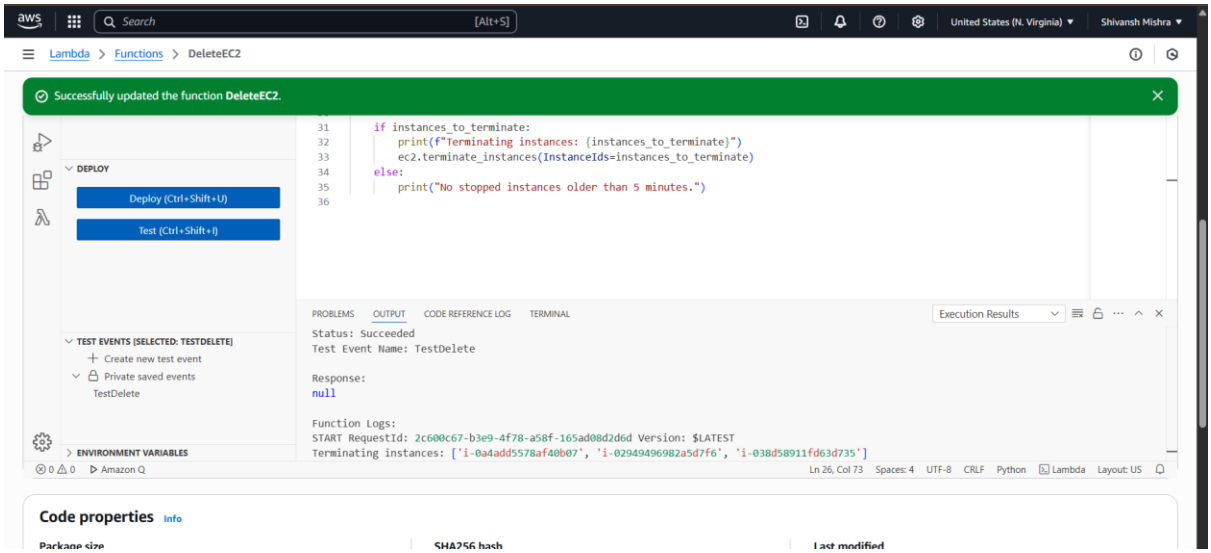


✅ Step 6: Manually Test the Lambda Function

1. **Go to Code tab → Click Test**
2. **Configure a new test event (leave JSON empty {})**
3. **Click Test**

You will see:

- **Terminated: ['i-xxxx'] if any instance is older than 5 mins**
- **Or “No instances found for termination.”**



📸 Output

- **All EC2s that were stopped for more than 5 minutes will be automatically deleted.**
- **Logs show which were terminated.**
- **You save cost and keep your environment clean!**