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Task: Create a complete sample app CI/CD Pipeline with EC2, CodeBuild, CodeDeploy, Deployment Group, and CodePipeline using CloudFomation script with 2 sources and implement trigger on one repository.

Github Repo:

https://github.com/techdecipher/source-1

https://github.com/techdecipher/source-2

Step 1) Unified IAM Role with Necessary Permissions: Write an IAM role with the necessary permissions for EC2 instance to allow AWS services to interact with each other. Added assume roles and its policy for codebuild, ec2, codedeploy and pipeline (with codestar connection) to consider this role to do their task.

```
UnifiedCICDRole:
  Type: 'AWS::IAM::Role'
  Properties:
    AssumeRolePolicyDocument:
      Version: '2012-10-17'
      Statement:
        - Effect: 'Allow'
          Principal:
            Service:
              - 'ec2.amazonaws.com'
              - 'codebuild.amazonaws.com'
              - 'codedeploy.amazonaws.com'
              - 'codepipeline.amazonaws.com'
          Action: 'sts:AssumeRole'
    Policies:
      - PolicyName: 'UnifiedCICDPolicy'
        PolicyDocument:
          Version: '2012-10-17'
          Statement:
            - Effect: 'Allow'
              Action:
                - 'ec2:Describe*'
                - 'ec2:AuthorizeSecurityGroupIngress'
                - 'ec2:AuthorizeSecurityGroupEgress'
                - 'ec2:RevokeSecurityGroupIngress'
                - 'ec2:RevokeSecurityGroupEgress'
                - 'ec2:CreateSecurityGroup'
                - 'ec2:DeleteSecurityGroup'
                - 'ec2:CreateTags'
                - 'ec2:DeleteTags'
                - 'codebuild:*'
                - 'codedeploy:*'
                - 'codepipeline:*'
                - 's3:GetObject'
                - 's3:PutObject'
                - 's3:ListBucket'
                - 'logs:*'
                - 'iam:PassRole'
                - 'codestar-connections:UseConnection'
              Resource: '*'
```

Step 2) Security Group for EC2: Write Security Group for EC2.

```
InstanceSecurityGroup:
  Type: 'AWS::EC2::SecurityGroup'
  Properties:
    GroupDescription: 'Enable SSH and HTTP access'
    VpcId: 'vpc-08feca1900f25be53'
    SecurityGroupIngress:
      - IpProtocol: 'tcp'
        FromPort: '22'
        ToPort: '22'
        CidrIp: '0.0.0.0/0'
      - IpProtocol: 'tcp'
        FromPort: '80'
        ToPort: '80'
        CidrIp: '0.0.0.0/0'
    SecurityGroupEgress:
      - IpProtocol: '-1'
        FromPort: '-1'
        ToPort: '-1'
        CidrIp: '0.0.0.0/0'
```

Step 3) Instance Profile for EC2: Instance Profile is created to associate the UnifiedCICDRole with the respective EC2 instance.

```
UnifiedInstanceProfile:
  Type: 'AWS::IAM::InstanceProfile'
  Properties:
    Roles:
      - !Ref UnifiedCICDRole
```

Step 4) EC2 Instance: Write script for EC2 instance with httpd preinstalled as soon as it is launched. And CodeDeploy agent too, just so it can facilitate the deployment of application. The dummy index.html is there so it can pass the health check because it was giving me an error for it, so I just added it there which will be replace later once we are good to deploy it in ec2.

```
MyEC2Instance:
  Type: 'AWS::EC2::Instance'
  Properties:
    InstanceType: 't2.micro'
    KeyName: 'sample-app-using-ec2'
    ImageId: 'ami-074be47313f84fa38'
    SecurityGroupIds:
      - !Ref InstanceSecurityGroup
    IamInstanceProfile: !Ref UnifiedInstanceProfile
    UserData: !Base64 |
      #!/bin/bash
      yum update -y
      yum install -y httpd
      systemctl start httpd
      systemctl enable httpd
      # Install CodeDeploy Agent
      yum install -y ruby
      cd /home/ec2-user
      wget https://aws-codedeploy-us-west-2.s3.us-west-2.amazonaws.com/latest/install
      chmod +x ./install
      ./install auto
      service codedeploy-agent start
    AvailabilityZone: us-west-2b
    Tags:
      - Key: Name
        Value: SampleAppEC2
      - Key: Intent
        Value: SampleAppEC2
```

Step 5) IAM Role for CodeBuild: Write roles for CodeBuild which I am going to use next.

```
CodeBuildServiceRole:
  Type: 'AWS::IAM::Role'
  Properties:
    AssumeRolePolicyDocument:
      Version: '2012-10-17'
      Statement:
        - Effect: 'Allow'
          Principal:
            Service: 'codebuild.amazonaws.com'
          Action: 'sts:AssumeRole'
    Policies:
      - PolicyName: 'CodeBuildPolicy'
        PolicyDocument:
          Version: '2012-10-17'
          Statement:
            - Effect: 'Allow'
              Action:
                - 'logs:CreateLogGroup'
                - 'logs:CreateLogStream'
                - 'logs:PutLogEvents'
                - 's3:GetObject'
                - 's3:PutObject'
                - 's3:ListBucket'
                - 'ec2:Describe*'
                - 'codedeploy:*'
                - 'codepipeline:*'
              Resource: '*'
```

Step 6) CodeBuild Project: write the script for codeBuild

```
MyCodeBuildProject:
  Type: 'AWS::CodeBuild::Project'
  Properties:
    Name: 'SampleCB'
    ServiceRole: !GetAtt CodeBuildServiceRole.Arn
    Artifacts:
      Type: 'CODEPIPELINE'
    Environment:
      ComputeType: 'BUILD_GENERAL1_SMALL'
      Image: 'aws/codebuild/standard:4.0'
      Type: 'LINUX_CONTAINER'
    Source:
      Type: 'CODEPIPELINE'
    TimeoutInMinutes: 10
```

Step 7) CodeDeploy Application & Deployment Group: Write script for CodeDeploy application that serves as a container for the deployment configurations and resources and Deployment group which specifies the Ec2 instance where it will deploy.

```
CodeDeployApplication:
  Type: 'AWS::CodeDeploy::Application'
  Properties:
    ApplicationName: 'SampleCDApp'

 CodeDeployDeploymentGroup:
  Type: 'AWS::CodeDeploy::DeploymentGroup'
  Properties:
    ApplicationName: !Ref CodeDeployApplication
    DeploymentGroupName: 'SampleDG'
    ServiceRoleArn: 'arn:aws:iam::363010889649:role/CodeDeploy-custom-roles'
    DeploymentConfigName: CodeDeployDefault.OneAtATime
    Ec2TagFilters:
      - Key: Name
        Value: SampleAppEC2
        Type: KEY_AND_VALUE
```

Step 8) S3 Bucket: This s3 bucket is for CodePipeline to store and reference the Artifacts from.

```
ArtifactBucket:
  Type: 'AWS::S3::Bucket'
  Properties:
    BucketName: 'sample-cicd-artifacts-bucket-62'
```

Step 9) IAM Role for CodePipeline: write IAM role this role is used by CodePipeline to manage all stages.

```
CodePipelineServiceRole:
  Type: 'AWS::IAM::Role'
  Properties:
    AssumeRolePolicyDocument:
      Version: '2012-10-17'
      Statement:
        - Effect: 'Allow'
          Principal:
            Service: 'codepipeline.amazonaws.com'
          Action: 'sts:AssumeRole'
    Policies:
      - PolicyName: 'CodePipelinePolicy'
        PolicyDocument:
          Version: '2012-10-17'
          Statement:
            - Effect: 'Allow'
              Action:
                - 's3:GetObject'
                - 's3:PutObject'
                - 's3:ListBucket'
                - 'codedeploy:CreateDeployment'
                - 'codedeploy:GetApplication'
                - 'codedeploy:GetApplicationRevision'
                - 'codedeploy:GetDeployment'
                - 'codedeploy:GetDeploymentConfig'
                - 'codedeploy:RegisterApplicationRevision'
                - 'codebuild:BatchGetBuilds'
                - 'codebuild:StartBuild'
                - 'codebuild:BatchGetProjects'
                - 'codestar-connections:UseConnection'
              Resource: '*'
```

Step 11) CodePipeline: write codepipeline with source, built and deploy stages. I am using codestarconnection arn. Creating 2 sources, 1 is where buildspec file is, and other is where index and appspec file is. And combine its O/P.

```
MyPipeline:
  Type: 'AWS::CodePipeline::Pipeline'
  Properties:
    PipelineType: 'V2'
    RoleArn: !GetAtt CodePipelineServiceRole.Arn
    ArtifactStore:
      Type: 'S3'
      Location: !Ref ArtifactBucket
    Stages:
      - Name: Source
        Actions:
          - Name: SourceAction1  #this is source 1 where buildspec file taken from
            ActionTypeId:
              Category: Source
              Owner: AWS
              Provider: CodeStarSourceConnection
              Version: 1
            OutputArtifacts:
              - Name: SourceArtifact1
            Configuration:
              ConnectionArn: 'arn:aws:codeconnections:us-east-1:363010889649:connection/d5c3dd1b-637f-485c-bd2c-c48def2b1fa7'
              FullRepositoryId: 'techdecipher/source-1' #source-1 repository
              BranchName: 'main'
          - Name: SourceAction2  #this is source 2 where appspec, index file and other relates files are taken from
            ActionTypeId:
              Category: Source
              Owner: AWS
              Provider: CodeStarSourceConnection
              Version: 1
            OutputArtifacts:
              - Name: SourceArtifact2
            Configuration:
              ConnectionArn: 'arn:aws:codeconnections:us-east-1:363010889649:connection/d5c3dd1b-637f-485c-bd2c-c48def2b1fa7'
              FullRepositoryId: 'techdecipher/source-2' #source-2 repository
              BranchName: 'main'
      - Name: Build
        Actions:
          - Name: BuildAction
            ActionTypeId:
              Category: Build
              Owner: AWS
              Provider: CodeBuild
              Version: 1
            InputArtifacts:   #combining artifact from the 2 seperate sources
              - Name: SourceArtifact1
              - Name: SourceArtifact2
            OutputArtifacts:
              - Name: BuildOutput
            Configuration:
              ProjectName: !Ref MyCodeBuildProject
              PrimarySource: SourceArtifact1
      - Name: Deploy
        Actions:
          - Name: DeployAction
            ActionTypeId:
              Category: Deploy
              Owner: AWS
              Provider: CodeDeploy
              Version: 1
            InputArtifacts:
              - Name: BuildOutput
            Configuration:
              ApplicationName: !Ref CodeDeployApplication
              DeploymentGroupName: !Ref CodeDeployDeploymentGroup
```

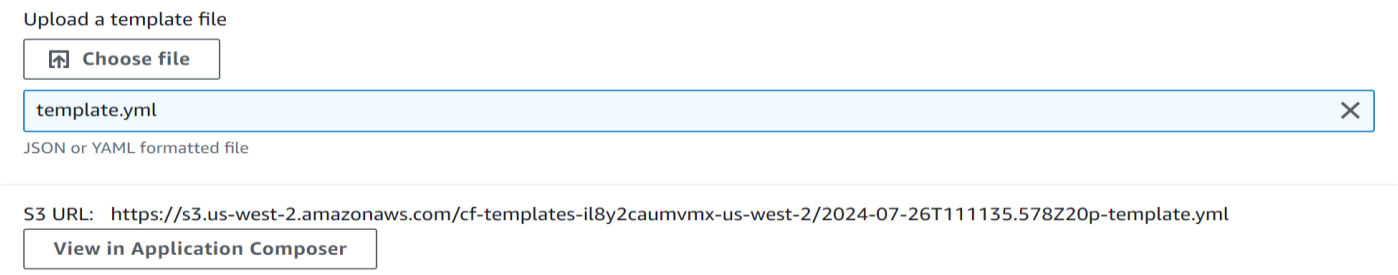
Step 12) Add Triggers: adding trigger after stages so it does not trigger the pipeline when made changes to Source 1.

```
Triggers:
    - ProviderType: CodeStarSourceConnection
      GitConfiguration:
        Push:
          - Branches:
              Excludes:
                - main
            FilePaths:
              Excludes:
                - '**/*'
        SourceActionName: SourceAction1
```

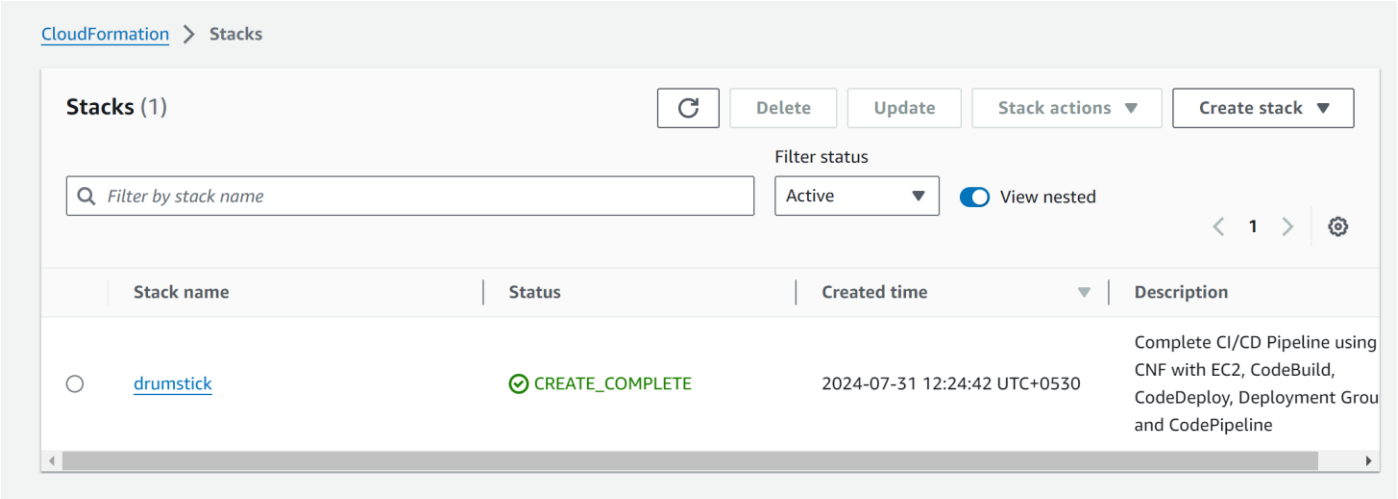
Step 13) Final Script:

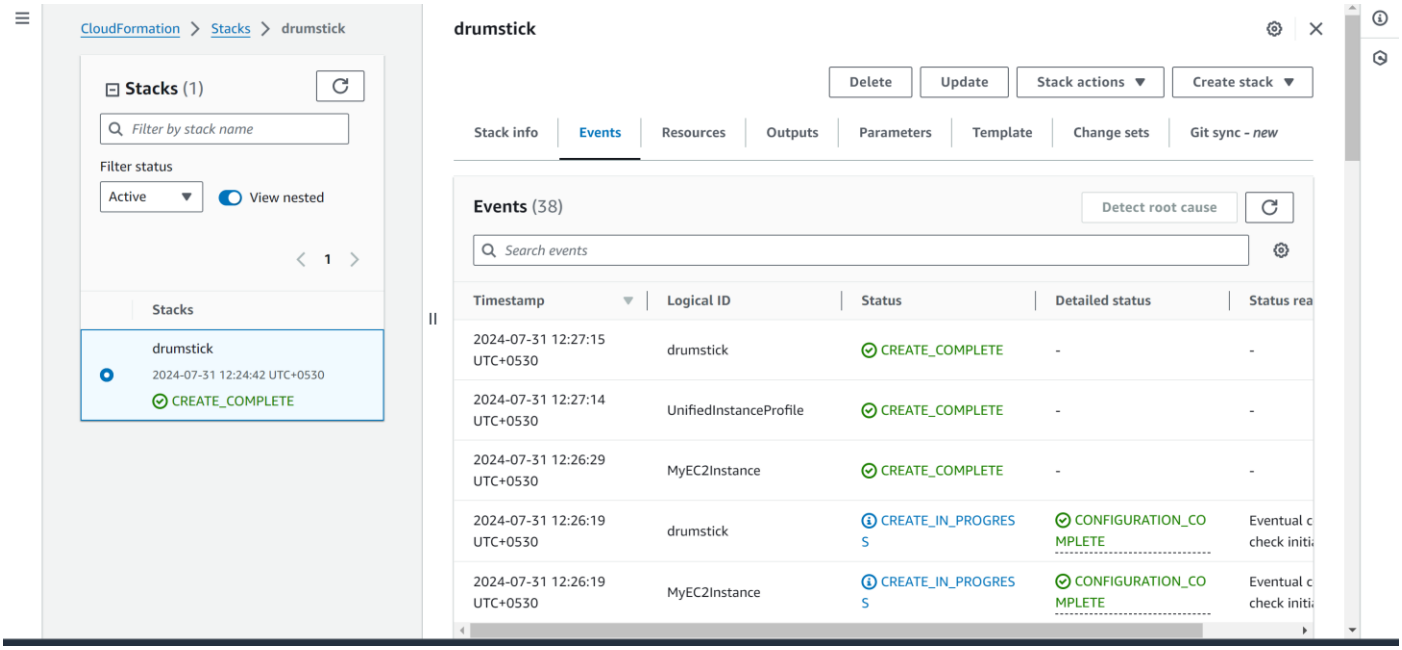
https://github.com/techdecipher/cloudformation-templates/blob/main/template2.yml

Step 14) Upload on Cloudformation: Goto Cloudformation > Create Stack > Upload a template file >

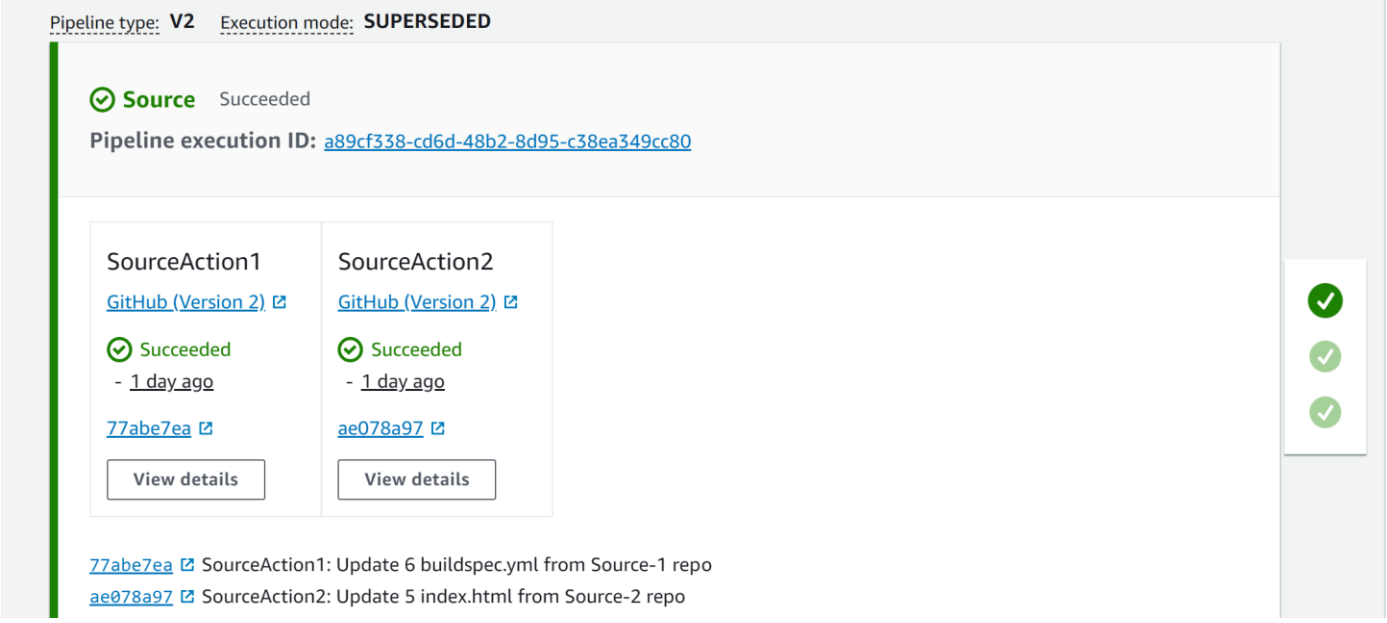


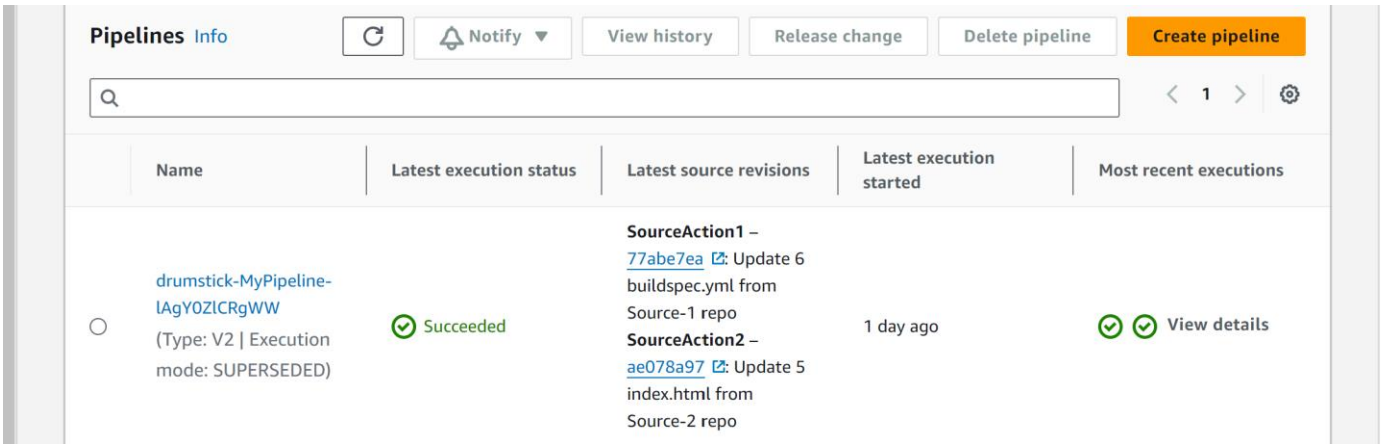
Step 15) Stack and its Stages:





Step 15) Pipeline Creation: All the stages have been successful and also whenever we hit any change on Source-1 repository, it does not trigger the pipeline, and when we make changes to the repo2 that is source-2 repo, we get to see the pipeline triggered and in action to follow its stages one after the other, finally deploying the artifact.





Step 16) Final output: