Infrastructure as Code

Automating the Automation 2

Create AWS CodePipline to create everything

Cloudforamtion StackSet

CodeDeloy App and Deployment Group

CodeDeploy Application Deployment

Infrastructure as Code Automating the Automation

This is the 2nd part of howto of (Automating the AutomationAWS CodePipeline), in this howto all will be coded and versioned in source control (code, build, infra provision and deployment).

As per AWS DevOps documentation:

A fundamental principle of DevOps is to treat infrastructure the same way developers treat code. Practicing *infrastructure as code* means applying the same rigor of application code development to infrastructure provisioning. All configurations should be defined in a declarative way and stored in a source control system such as AWS CodeCommit, the same as application code. Infrastructure provisioning, orchestration, and deployment should also support the use of the infrastructure as code.

In this howto a single CloudForamtion template will:

1. Create CodeCommit repository (euroApp) and populated it from release in zip format from s3 bucket
2. Create Codepipline (euPipeLine) which will:

    i. Create Source Stage take code from euroApp repository
    ii. Create Cloudformation StackSets to
        - Create CodeDeploy Application (WebApp)
        - Deployment Group (WebServerDGrp)
          in 2 regions *eu-central-1 and me-south-1*.
    iii. Create Cloudformation StackSets to
        - Provision EC2 Instances that will part of Deployments (WebServerDGrp) respectivily in regions *eu-central-1 and me-south-1.*
    iv. Create CodeDeploy stage (DeployMeaAPP)
        - Which deploy application apllication to in 2 regions *eu-central-1 and me-south-1.*

The sampleApp.zip release in s3 bucket contain below:

1. `LICENSE.txt`
2. `WebAppCodeDeploy.yml` *(CloudFormation Template for CodeDeploy to create)*
3. `MyEC2Instance.yml` *(CloudFormation Template for Infrastucuture StackeSet)*
4. `appspec.yml` (deploy instruction for app in final deploy stage)
5. `Scripts` *(scripts)*
6. `index.html`

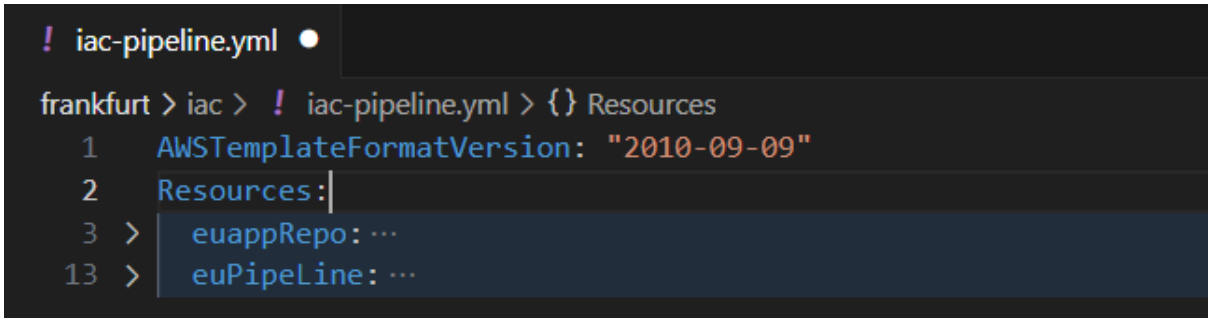
PreRequisite for StackSets to deploy across accounts and AWS Regions: (please read dcocumenation before to follow instruction)

> **Important**
>
> The role in your administrator account must be named **AWSCloudFormationStackSetAdministrationRole**. The role in each of your target accounts must be named **AWSCloudFormationStackSetExecutionRole**.

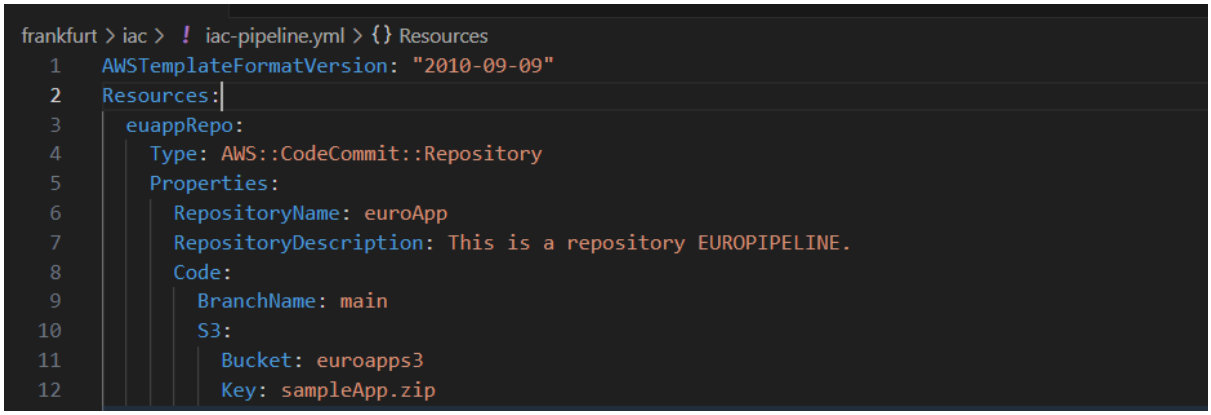
With self-managed permissions, you create the AWS Identity and Access Management (IAM) roles required by StackSets to deploy across accounts and AWS Regions. These roles are necessary to establish a trusted relationship between the account you're administering the stack set from and the account you're deploying stack instances to. Using this permissions model, StackSets can deploy to any AWS account in which you have permissions to create an IAM role.

Two respictively S3 bucket for Artifcats should be created for regions in deployment will be performed. Since we are using code instead of AWS console, which autoamticaly create these.

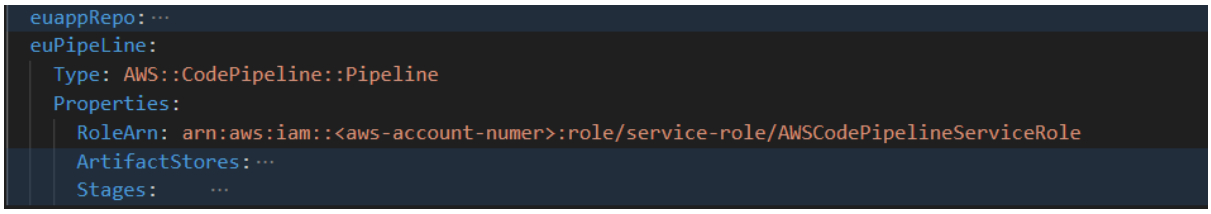
The Code:



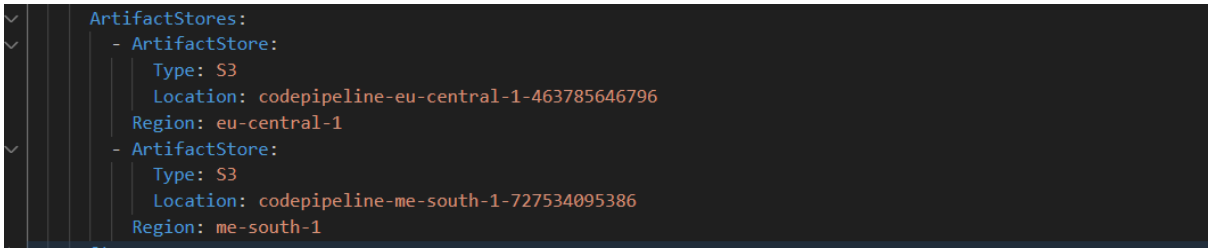
CodeCommit Repository



CodePipeline:



ArtifactStores for CodePipline:



Codepipline stages in a view

```yaml
AWSTemplateFormatVersion: "2010-09-09"
Resources:
  euappRepo: ···
  euPipeLine:
    Type: AWS::CodePipeline::Pipeline
    Properties:
      RoleArn: arn:aws:iam::<aws-account-numer>:role/service-role/AWSCodePipelineServiceRole
      ArtifactStores: ···
      Stages:
        - Name: SourceStage ···
        - Name: CreateCodeDeployStackSet ···

        - Name: CreateStackSet ···
        - Name: DeployMeaAPP ···
```

Codepipline Source stage:

```yaml
Stages:
  - Name: SourceStage
    Actions:
      - Name: SourceAction
        ActionTypeId:
          Category: Source
          Owner: AWS
          Provider: CodeCommit
          Version: "1"
        OutputArtifacts:
          - Name: SourceArtifact
        Configuration:
          RepositoryName: euroApp
          BranchName: main
          PollForSourceChanges: 'false'
        RunOrder: 1
```

Codepipline Deploy stage to create StackeSet for CodeDeploy Application and Deployment Group creation:

```yaml
Stages:
  - Name: SourceStage ···
  - Name: CreateCodeDeployStackSet
    Actions:
      - Name: CodeDeployStackSet
        ActionTypeId:
          Category: Deploy
          Owner: AWS
          Provider: CloudFormationStackSet
          Version: '1'
        RunOrder: 1
        Configuration:
          AdministrationRoleArn: arn:aws:iam::<aws-account-numer>:role/AWSCloudFormationStackSetAdministrationRole
          ExecutionRoleName: AWSCloudFormationStackSetExecutionRole
          DeploymentTargets: '<aws-account-numer>'
          FailureTolerancePercentage: '20'
          MaxConcurrentPercentage: '25'
          PermissionModel: SELF_MANAGED
          Regions: eu-central-1,me-south-1
          StackSetName: CemeaCodeDeployStackSet
          TemplatePath: 'SourceArtifact::WebAppCodeDeploy.yml'
        OutputArtifacts: []
        InputArtifacts:
          - Name: SourceArtifact
        Region: eu-central-1
        Namespace: DeployWebApp
```

Codepipline Deploy stage to create StackeSet for Infratructue:

```yaml
Stages:
  - Name: SourceStage···
  - Name: CreateCodeDeployStackSet···

  - Name: CreateStackSet
    Actions:
      - Name: StackSet
        ActionTypeId:
          Category: Deploy
          Owner: AWS
          Provider: CloudFormationStackSet
          Version: '1'
        RunOrder: 1
        Configuration:
          AdministrationRoleArn: arn:aws:iam::<aws-account-numer>:role/AWSCloudFormationStackSetAdministrationRole
          ExecutionRoleName: AWSCloudFormationStackSetExecutionRole
          DeploymentTargets: '<aws-account-numer>'
          FailureTolerancePercentage: '20'
          MaxConcurrentPercentage: '25'
          PermissionModel: SELF_MANAGED
          Regions: eu-central-1,me-south-1
          StackSetName: CemeaStackSet
          TemplatePath: 'SourceArtifact::MyEC2Instance.yml'
        OutputArtifacts: []
        InputArtifacts:
          - Name: SourceArtifact
        Region: eu-central-1
        Namespace: DeployVariables
```

Codepipline Deploy final stage to deploy application:

```yaml
  Stages:
    - Name: SourceStage···
    - Name: CreateCodeDeployStackSet
      Actions:        ···

    - Name: CreateStackSet···
    - Name: DeployMeaAPP
      Actions:
        - Name: DeployEU
          ActionTypeId:
            Category: Deploy
            Owner: AWS
            Provider: CodeDeploy
            Version: '1'
          RunOrder: 1
          Configuration:
            ApplicationName: WebApp
            DeploymentGroupName: WebServerDGrp
          OutputArtifacts: []
          InputArtifacts:
            - Name: SourceArtifact
          Region: eu-central-1
          Namespace: DeployAppVars
        - Name: DeployME
          ActionTypeId:
            Category: Deploy
            Owner: AWS
            Provider: CodeDeploy
            Version: '1'
          RunOrder: 1
          Configuration:
            ApplicationName: WebApp
            DeploymentGroupName: WebServerDGrp
          OutputArtifacts: []
          InputArtifacts:
            - Name: SourceArtifact
          Region: me-south-1
```

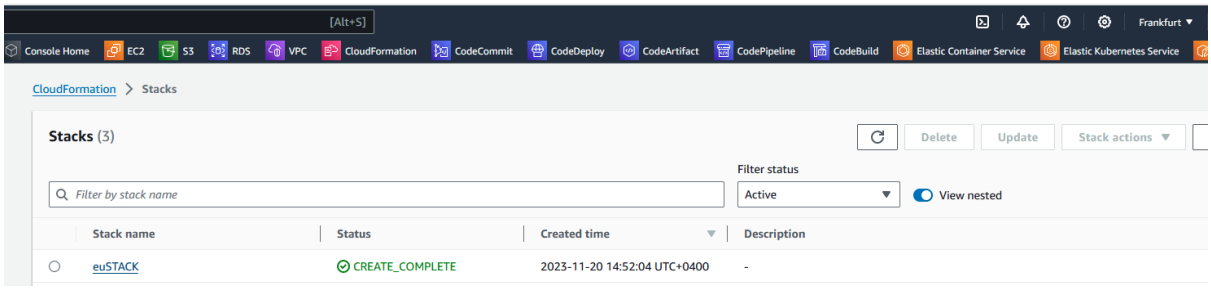
The Execution:

Repository link https://github.com/neamanahmed/codepiplineall

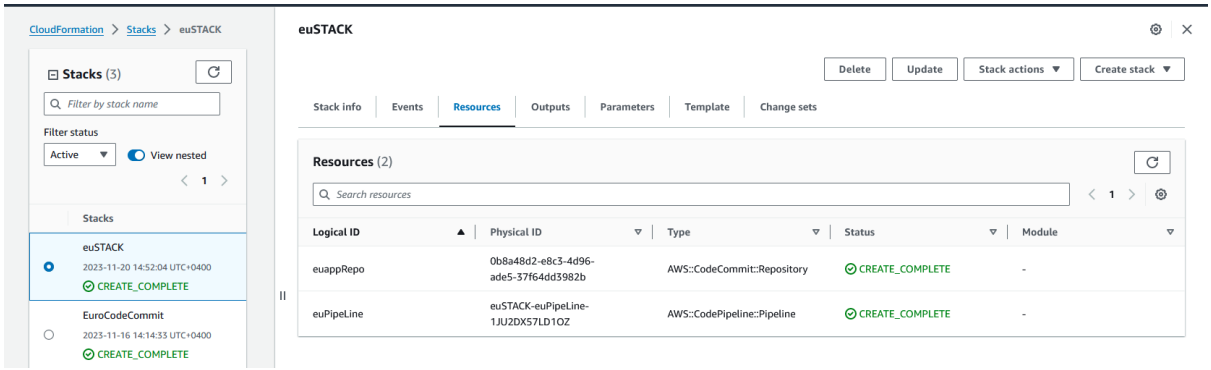
The code is for Franfurt and Bahrain region Franfurt as primary region.

```
[ansible@papa iac]$ aws cloudformation create-stack --stack-name euSTACK  --template-body file://frankie.yml  --region eu-central-1
```

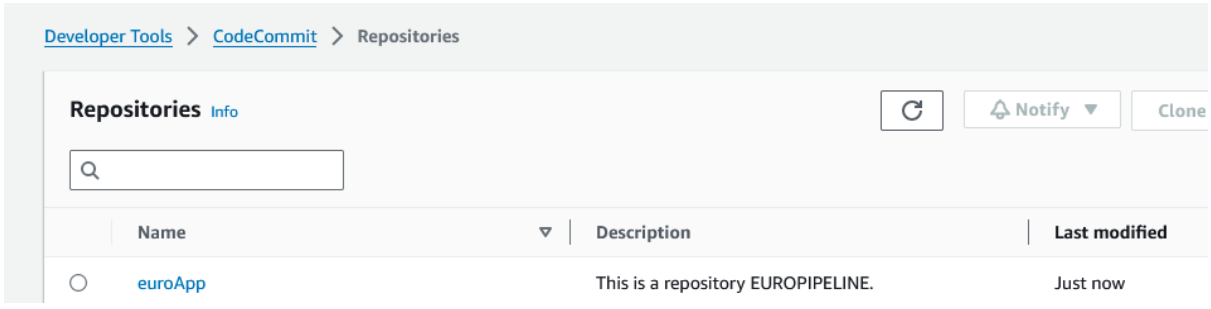
Go to cloudformation > Stacks

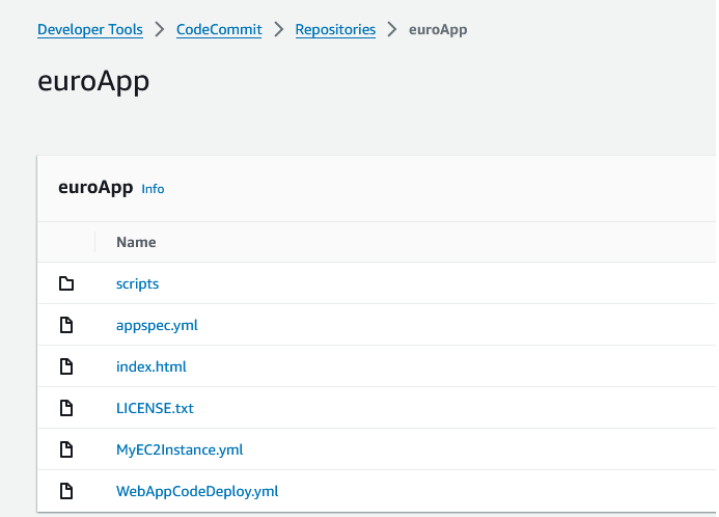


Click on euSTACK



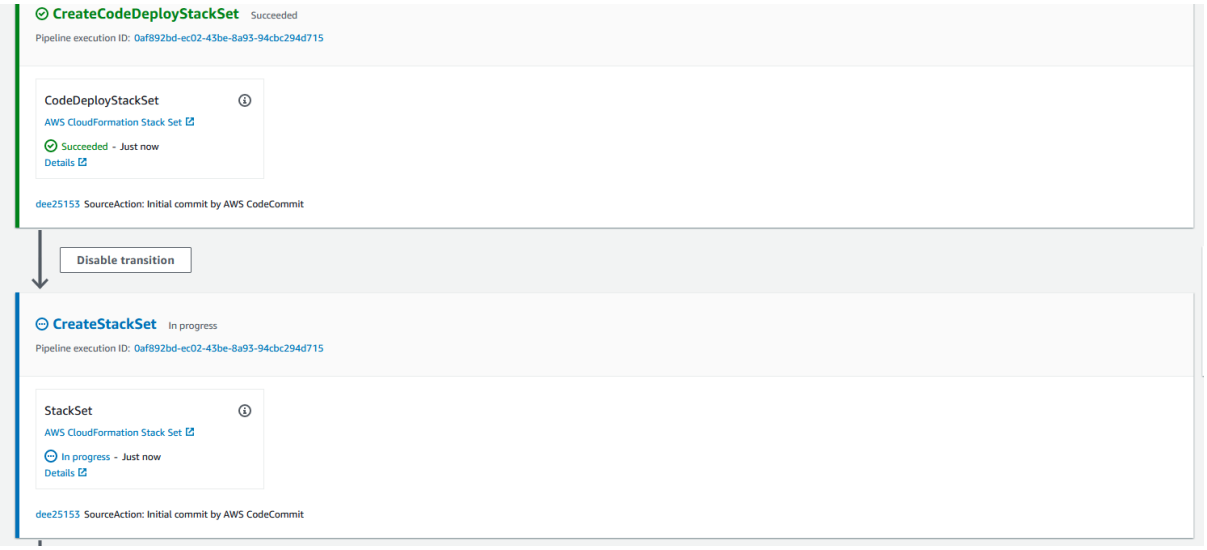
Go to Developer Tools > CodeCommit > Repositories click on euroApp

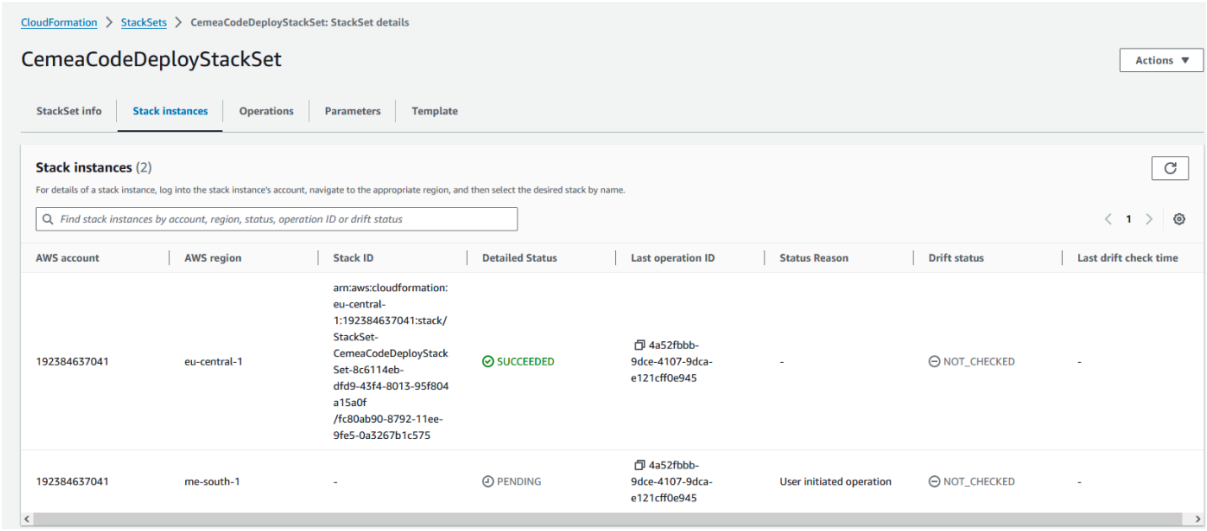




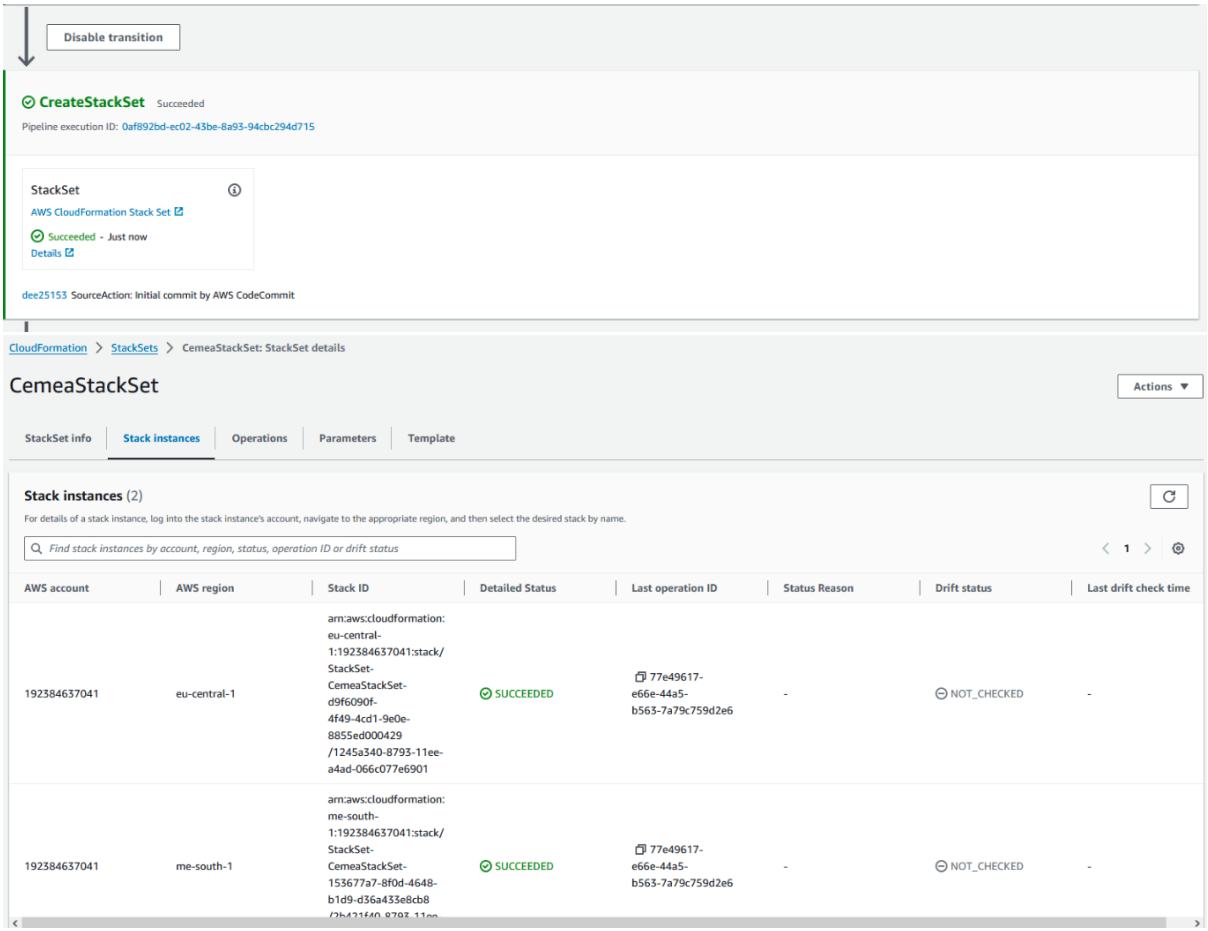
Got to as can bee seen the repsitroty is being crated and populated from s3 bucket.

First stage completed and completed (CodeDeploy Application and Deployment Group), and 3rd stage of stackset to provision Infrastructure in both region (EC2 Instance being provisioned).



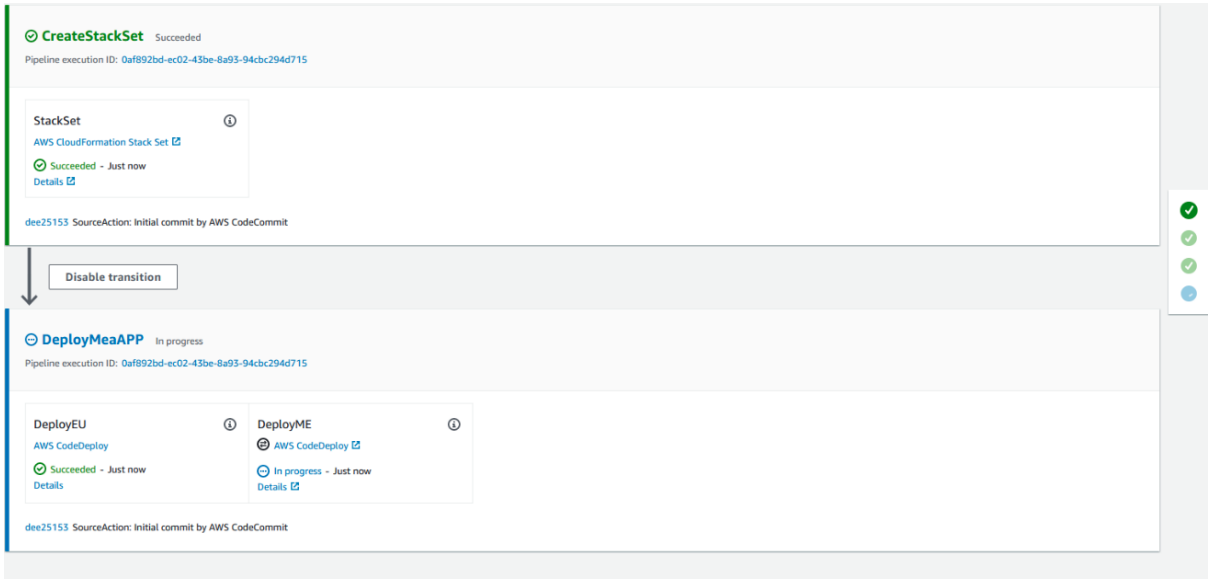


3rd stage of stackset to provision Infrastructure in both region (EC2 Instance being provisioned) Completed.

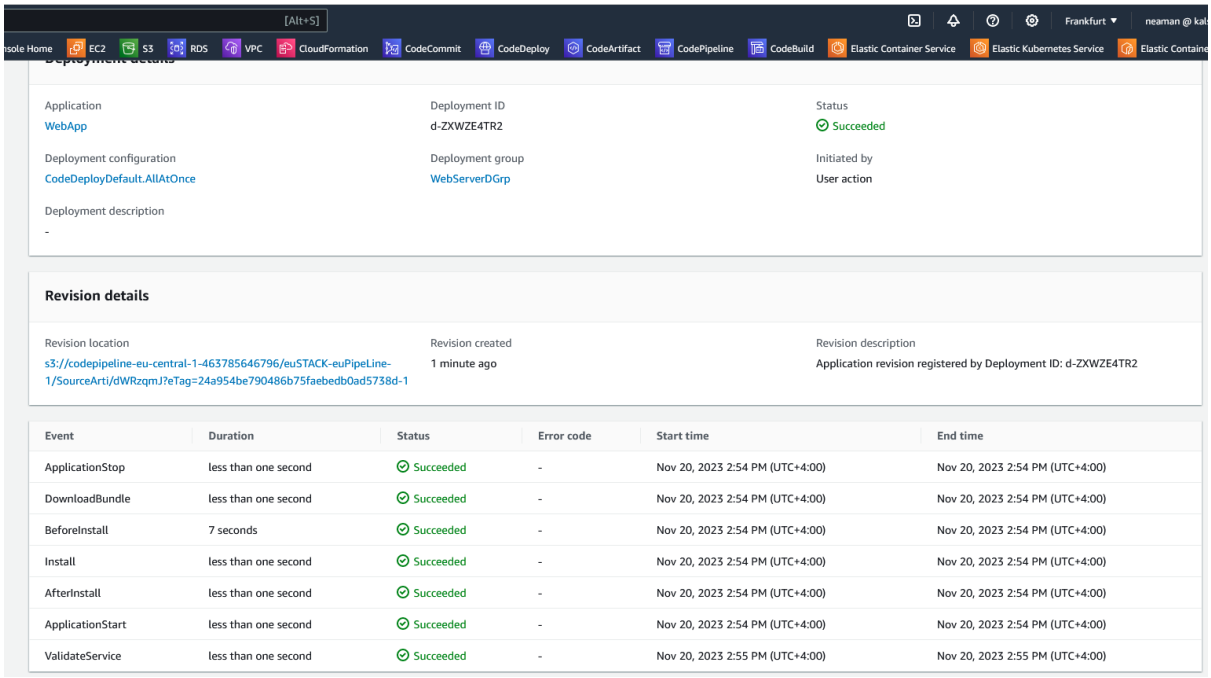


```
[ansible@papa iac]$ aws cloudformation create-stack --stack-name euSTACK  --template-body file://frankie.yml  --region eu-central-1
StackId: arn:aws:cloudformation:eu-central-1:192384637041:stack/euSTACK/d7a47b80-8792-11ee-9a60-020da3fb637f
[ansible@papa iac]$ ec2_running
-----------------------------------------------------------------------------------------------------
|                                          DescribeInstances                                        |
+-------------+---------------------+---------------+---------------+-----------------+-----------+
|     AZ      |     InstanceID      |     Name      |   PrivateIP   |    PublicIP     |  Status   |
+-------------+---------------------+---------------+---------------+-----------------+-----------+
|  me-south-1a|  i-04da8f1ee9842122a |  MyEC2Instance |  172.31.12.237 |  15.185.210.217  |  running  |
+-------------+---------------------+---------------+---------------+-----------------+-----------+
[ansible@papa iac]$ ec2_running eu-central-1
-----------------------------------------------------------------------------------------------------
|                                          DescribeInstances                                        |
+-------------+---------------------+---------------+---------------+-----------------+-----------+
|     AZ      |     InstanceID      |     Name      |   PrivateIP   |    PublicIP     |  Status   |
+-------------+---------------------+---------------+---------------+-----------------+-----------+
|  eu-central-1a|  i-0807629854 4e32168 |  MyEC2Instance |  172.31.22.234 |  3.125.51.115  |  running  |
+-------------+---------------------+---------------+---------------+-----------------+-----------+
```

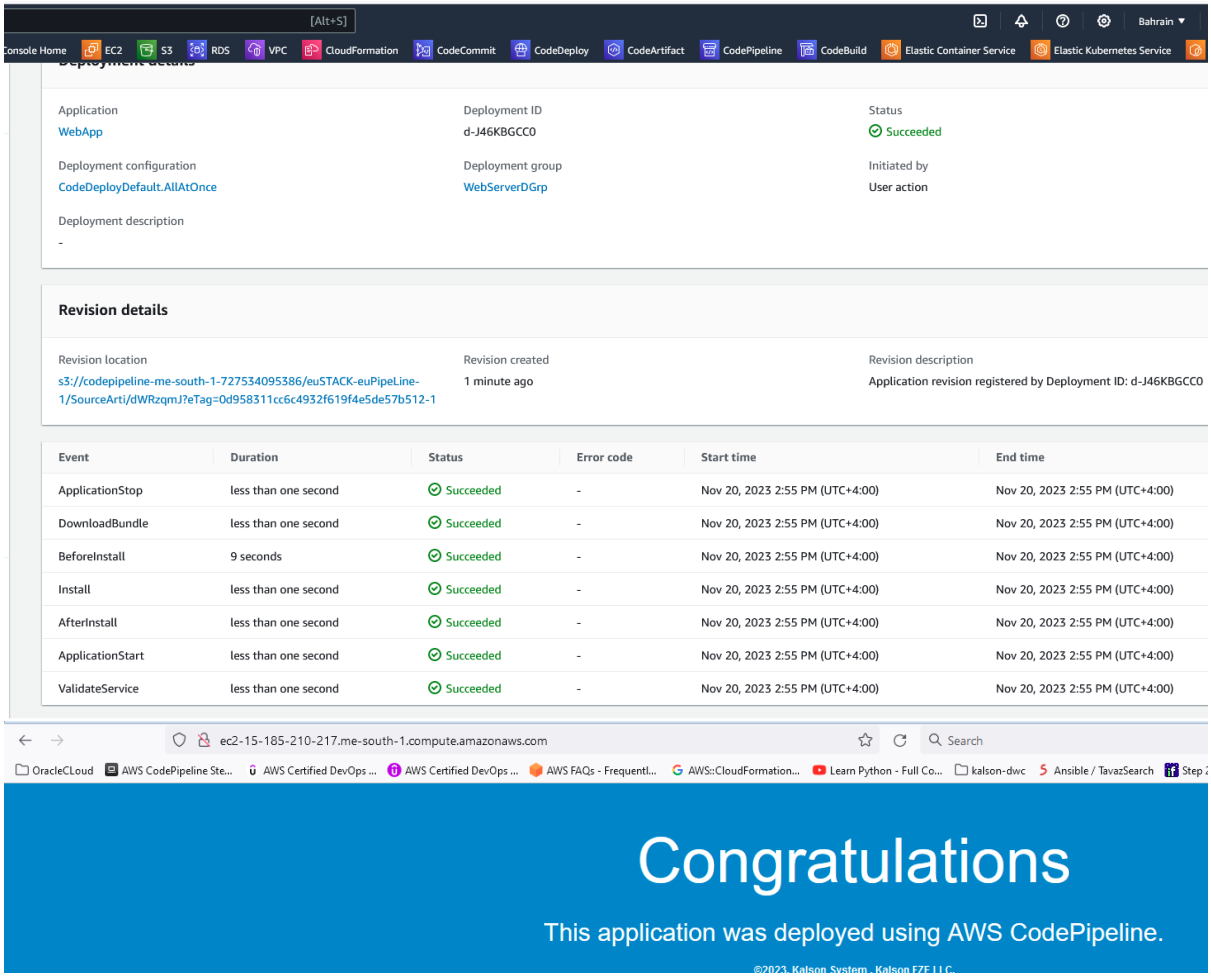
Deployment in both region is EC2 Instance being going on



Application in Frankfurt eu-central-1 is finsished sucessfully.



In Bahrain region me-south-1 finsiehd sucessfully



Clean Up:

Remember the deleteling euSTACK staack only delete CodeComit repository and CodePipeline the 2 stackset CemeaCodeDeployStackSet and CemeaStackSet must manualy be deleted otherwise the resources will not removed and will be charged.