



Infrastructure as Code with CloudFormation

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Harish madhavan J U

Resources (12)						
<input type="text"/> Search resources						
Logical ID	▲ ▼	Physical ID	▼	Type	▼	Status
devops-hm	▲	arn:aws:codeartifact:ap-south-1:467866448490:repository/devops-hm/maven-central-store [2]		AWS::CodeArtifact::Repository	CREATE_COMPLETE	-
CodeArtifactRepositoryMaven		arn:aws:codeartifact:ap-south-1:467866448490:repository/devops-hm/maven-central-store [2]		AWS::CodeArtifact::Repository	CREATE_COMPLETE	-
CodeArtifactRepositoryNextwork		arn:aws:codeartifact:ap-south-1:467866448490:repository/devops-hm/nextwork-devops-cicd [2]		AWS::CodeArtifact::Repository	CREATE_COMPLETE	-
CodeBuildProject		nextwork-devops-cicd		AWS::CodeBuild::Project	CREATE_COMPLETE	-
CodeDeployApplication		nextwork-devops-cicd [2]		AWS::CodeDeploy::Application	CREATE_COMPLETE	-
CodeDeployDeploymentGroup		nextwork-devops-cicd-deploymentgroup		AWS::CodeDeploy::DeploymentGroup	CREATE_COMPLETE	-
CodeStarConnectionsConnection		arn:aws:codestar-connections:ap-south-1:467866448490:connection/6e3ea173-6819-459fa811-00f1d497b9ea [2]		AWS::CodeStarConnections::Connection	CREATE_COMPLETE	-
IAMRoleCodebuild		codebuild-nextwork- [2]		AWS::IAM::Role	CREATE_COMPLETE	-

Introducing Today's Project!

In this project, I will demonstrate how to convert our infrastructure into code using CloudFormation. I'm doing this project to learn how to scale our infrastructure without any human errors.

Key tools and concepts

Services I used were AWS Cloudformation, IAM, CodeDeploy and CodeBuild. Key concepts I learnt include generating IaC using Cloudformation, manually add resources to .yaml file and troubleshoot errors.

Project reflection

This project took me approximately 4 hours . The most challenging part was to troubleshoot CodeConnection error. It was most rewarding to see the resources created using a template.

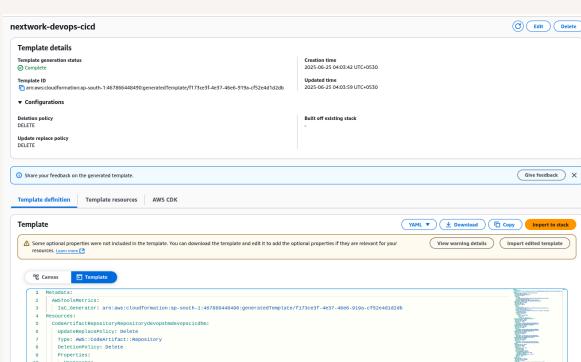
This project is part six of a series of DevOps projects where I'm building a CI/CD pipeline! I'll be working on the next project tomorrow

Generating a CloudFormation Template

The IaC generator is responsible for creating a template of the infrastructure that can be deployed in seconds. It works in a three step process where initially scans for resources in AWS account and then It creates a template by bundling all the resources that are required by the infrastructure , then we can import the same and deploy our infrastructure.

A CloudFormation template is a list of available resources in the AWS account using which an infrastructure can be deployed. The resources that I could add to my template include the resources created by the user but not everything

The resources I couldn't add to my template were CodeBuild project and CodeDeploy deployment group because they require information about the environment settings and permissions required to deploy , which can't be handled by IaC generator.



Template Testing

Before testing my template, I had to delete all the resources mentioned in it to avoid any error due to both resources having the same name.

I tested my template by creating a stack in cloudformation service. The result of my first test was ROLLBACK_INITIATED because the service role was not found.



DependsOn

To resolve the error, I added an attribute called DependsOn. The DependsOn attribute is used to ensure one resource is created before another

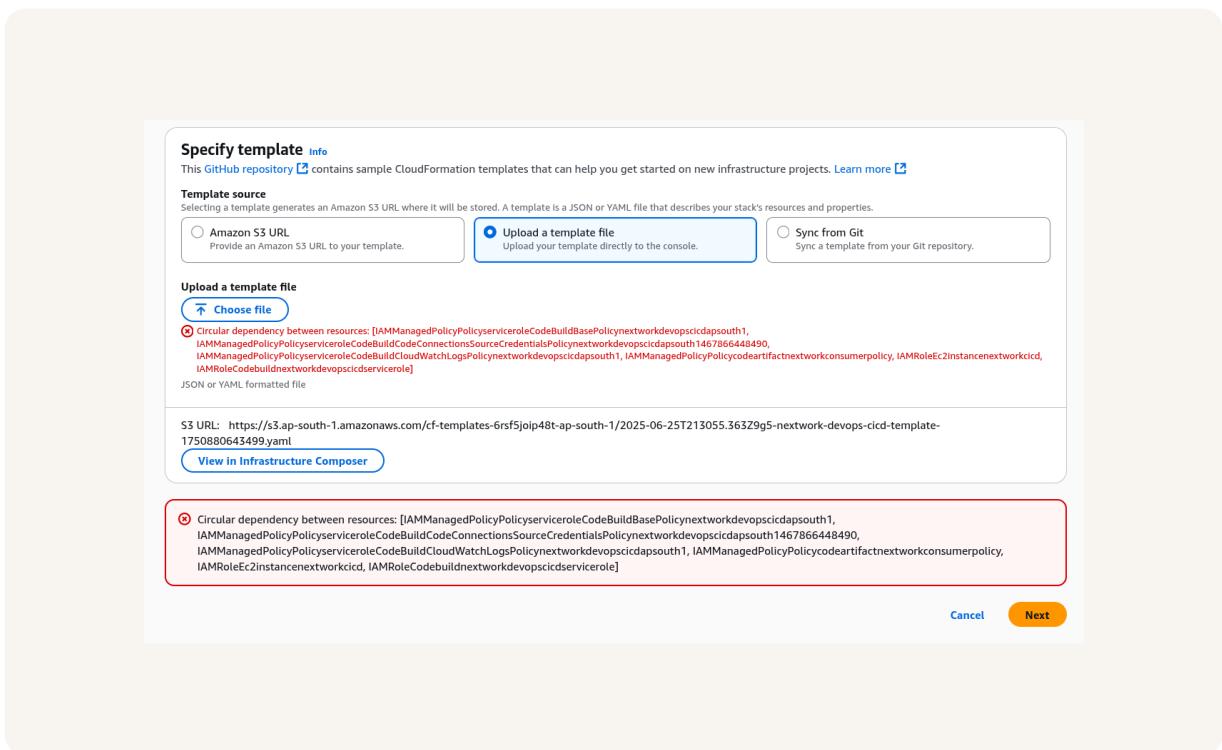
The DependsOn line was added to four different parts of my template such as CodeBuild, CodeConnections, CloudWatch For CodeArtifact policy I had to grant CodeArtifact access to EC2 instance.

```
| Ref: "LogsLogGroupawscodebuilddevopscicd"
IAMManagedPolicyPolicyServiceRoleCodeBuildCodeConnectionsSourceCredentialsPolicydevopscicdapsouth1467866448490:
  UpdateReplacePolicy: "Delete"
  Type: "AWS::IAM::ManagedPolicy"
  DeletionPolicy: "Delete"
  DependsOn: "IAMRole00codebuildnextwork-web-buildservicerole006v0vu"
Properties:
  ManagedPolicyName: "CodeBuildCodeConnectionsSourceCredentialsPolicy-devops-cicd-ap-south-1-467866448490"
  Path: "/service-role/"
  Description: "Policy used in trust relationship with CodeBuild"
  Groups: []
  PolicyDocument:
```

Circular Dependencies

I gave my CloudFormation template another test, But this time I got a Circular dependency error which signifies that there is a deadlock between roles and policies .

To fix this error, I had to remove ManagedPolicyArns attribute which was responsible for circular dependency because they try to attach the policies to the role at the same time they are created so we have to use DependsOn attribute which breaks the loop



Manual Additions

In a project extension, I manually defined two more resources that creates a codebuild project and codedeploy application

I also had to make sure the references were consistent in this template, so I edited the value of S3 bucket ID, codedeploy application ID and IAM role IDS to match the ID in the template.

I also introduced Parameters, which are reusable and flexible. They help replace hard-coded values, allowing changes to be made in a single place. It's always a best practice to use Parameters so the same template can be adapted for different environments.

```
CodeBuildExtensionContainerInformation:#  
Type: AWS::CodeBuild::Project  
DependsOn:  
    - <codebuild>.codebuildServiceRole.ID  
Properties:  
    Name: nextwork-devops-cld  
    Description: Build project for Network web application  
    Source:  
        Type: GITHASH  
        Uri: https://github.com/501trialsDeployer/501trialsDeploy  
        Buildspec: buildspec.yml  
    Artifacts:  
        Type: S3  
        Location: s3://<YOUR_S3_BUCKET_ID>  
    Packaging: ZIP  
    Environment:  
        Path: /codebuild/output/src/<YOUR_S3_BUCKET_ID>  
        EnvNames:  
            Environment:  
                Name: LINUX_CONTAINER  
                ComputeType: BUILD_GENERAL_1_SMALL  
                Image: <YOUR_CODEBUILD_IMAGE_ID>-64-standard-coresettled  
                ServiceRole: <iamrole ><YOUR_CODEBUILD_SERVICE_ROLE_ID>-Arn  
                ImageType: LATEST  
                EnvironmentName: /codebuild/output/src/<YOUR_S3_BUCKET_ID>/nextwork-devops-cld  
                Status: ENABLED  
            StreamName: webapp  
        # CodeDeploy Environment  
        CodeDeployDeploymentGroup: nextworkDeploymentGroupCloudFormation:  
            Deployment: codeDeployDeploymentGroup  
            DeploymentGroup:  
                - <codeDeploy>.codeDeployApplication.ID  
            Properties:  
                EnvironmentName: !Ref <YOUR_CODEDEPLOY_APPLICATION_ID>  
                ServiceRoleArn: !GetAtt <YOUR_CODEBUILD_SERVICE_ROLE_ID>.Arn  
                DeploymentConfig: !Ref <YOUR_CODEDEPLOY_DEPLOYMENT_CONFIG_ID>  
                DeploymentConfigName: codeDeployDefault_Ellasticache  
                KeyPair:  
                    Key: role  
                    Value: <YOUR_CODEBUILD_SERVICE_ROLE_ID>  
                    Value: secured  
                AutoScalingGroups: []
```

Success!

I could verify all the deployed resources by visiting the resources tab which lists down the resources created with a shortcut link to access those.

Resources (12)					
<input type="text"/> Search resources					
Logical ID	Physical ID	Type	Status	Mod	
CodeArtifactRepositoryMaven	arn:aws:codeartifact:ap-south-1:467866448490:repository/devops-hm/maven-central-store	AWS::CodeArtifact::Repository	CREATE_COMPLETE	-	
CodeArtifactRepositoryNextwork	arn:aws:codeartifact:ap-south-1:467866448490:repository/devops-hm/nextwork-devops-cicd	AWS::CodeArtifact::Repository	CREATE_COMPLETE	-	
CodeBuildProject	nextwork-devops-cicd	AWS::CodeBuild::Project	CREATE_COMPLETE	-	
CodeDeployApplication	nextwork-devops-cicd	AWS::CodeDeploy::Application	CREATE_COMPLETE	-	
CodeDeployDeploymentGroup	nextwork-devops-cicd-deploymentgroup	AWS::CodeDeploy::DeploymentGroup	CREATE_COMPLETE	-	
CodeStarConnectionsConnection	arn:aws:codestar-connections:ap-south-1:467866448490:connection/6e3ea173-6819-459fa11-00fd1d497b9ea	AWS::CodeStarConnections::Connection	CREATE_COMPLETE	-	
IAMRoleCodebuild	codebuild-nextwork-	AWS::IAM::Role	CREATE_COMPLETE	-	



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