Setup a CI/CD Pipeline with GitHub Actions and AWS

Solution Overview

1. **GitHub Actions**: Workflow Orchestration tool that will host the Pipeline.
2. **IAM OIDC identity provider**: Federated authentication service to establish trust between GitHub and AWS to allow GitHub Actions to deploy on AWS without maintaining AWS Secrets and credentials
3. **Amazon S3**: Amazon S3 to store the deployment artifacts.
4. **AWS Elastic Beanstalk**: AWS Elastic Beanstalk is an easy-to-use service for deploying and scaling web applications and services developed with Java, .NET, PHP, Node.js, Python, Ruby, Go, and Docker on familiar servers such as Apache, Nginx, Passenger, and IIS.
5. **Slack**: Setting Up Slack Notification after All check are passed or Failed CI/CD Process.

Prerequisites

- An AWS account with permissions to create the necessary resources.
- A Git Client clone the provided source code. In our case we are using creating a fork from following link (https://github.com/alexnm/react-ssr). A baseline for server-side rendering React application
- A GitHub Account with permissions to configure GitHub repositories, create workflows, and configure GitHub secrets.
- A Slack Account with permissions to configure Slack Notification with help of Slack webhook.

Walkthrough

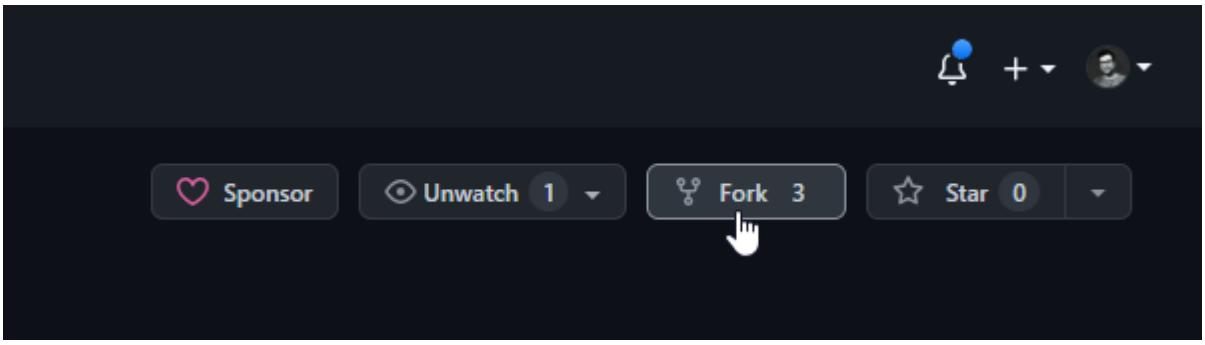
The following steps provide a high-level overview of the walkthrough:

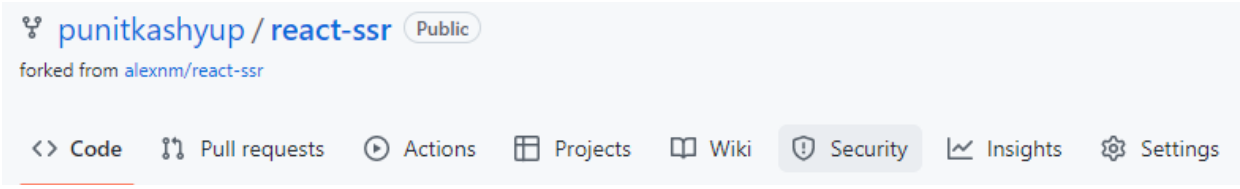
1. Fork the project from the provided git project link.
2. Creating an IAM Role with a full access of S3 & Beanstalk.
3. Creating S3 Bucket to store Source Code.
4. Setting our Elastic Beanstalk environment.
5. Setting Up Slack Webhook.
6. Setup GitHub secrets.

7. Build CI/CD Pipeline in GitHub Action to build and deploy the code.
8. Trigger the GitHub Action to build and deploy the code.
9. Verify the deployment.
10. Clean up: To avoid incurring future changes, you should clean up the resources that you created.

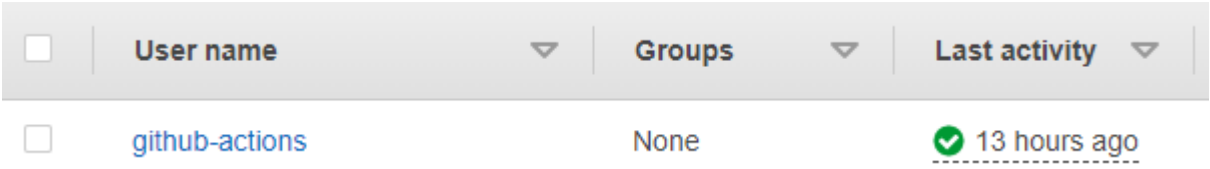
Fork the source code

Browse to a project repository for fork. At the top right of the page, you will find the Fork button. Click on the button and wait for a few seconds. You will see that the newly forked repository gets created under your GitHub account.





Creating an IAM Role with a full access of S3 & Beanstalk.
Now, Creating an IAM role user name will be github-actions with full permission S3 & Beanstalk
After creating IAM role save credentials (Access key ID, Secret access key) in notepad we will going to use it as authentication in between AWS & GitHub.



	Policy name	Policy type
Attached directly		
	AmazonS3FullAccess	AWS managed policy
	AdministratorAccess-AWSElasticBeanstalk	AWS managed policy

Creating S3 Bucket to store Source Code.

Bucket name

git-cicd-nodejs

Bucket name must be unique and must not contain spaces or uppercase letters. **See rules for bucket naming**

AWS Region

Asia Pacific (Mumbai) ap-south-1

Setting our Elastic Beanstalk environment.

Now Creating a Elastic Beanstalk environment platform going to Nodejs version as per your requirement in our case we will going to use latest version. Application name will be Node-js

Create a web app

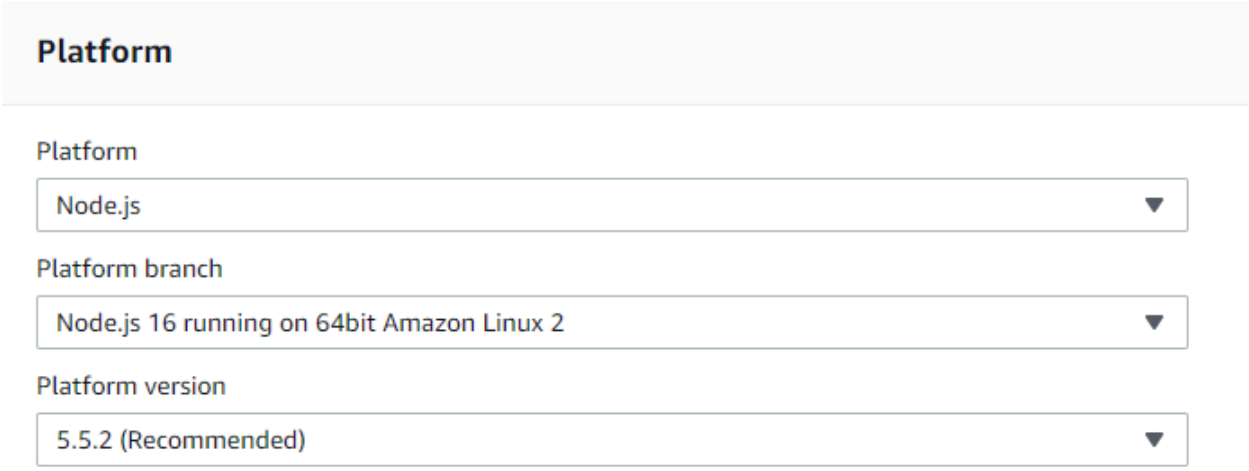
Create a new application and environment with a sample application or your own code. By creating an environment, you allow Amazon Elastic Beanstalk to manage Amazon Web Services resources and permissions on your behalf. Learn more

Application information

Application name

Node-js

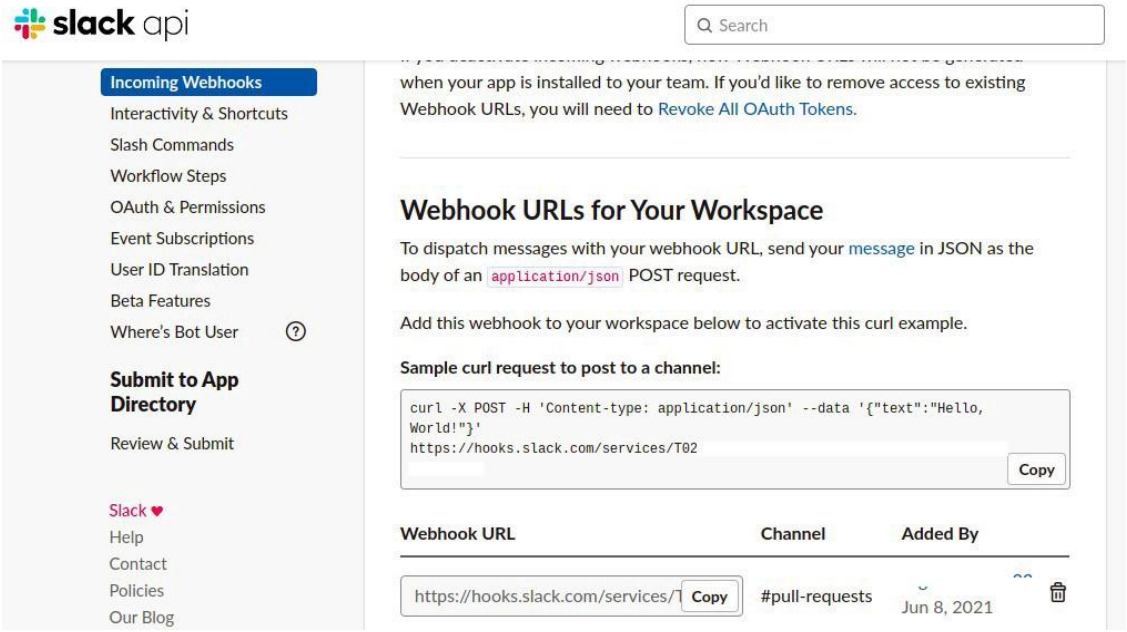
Up to 100 Unicode characters, not including forward slash (/).



Setting Up Slack Webhook

To get Slack notification on job status we need to configure two things First need to create webhook URL.

Create Incoming Webhook URL on slack. Incoming webhooks are a simple way to post messages from external sources into Slack. You will get the below page at the end where you will find the Webhook URL.



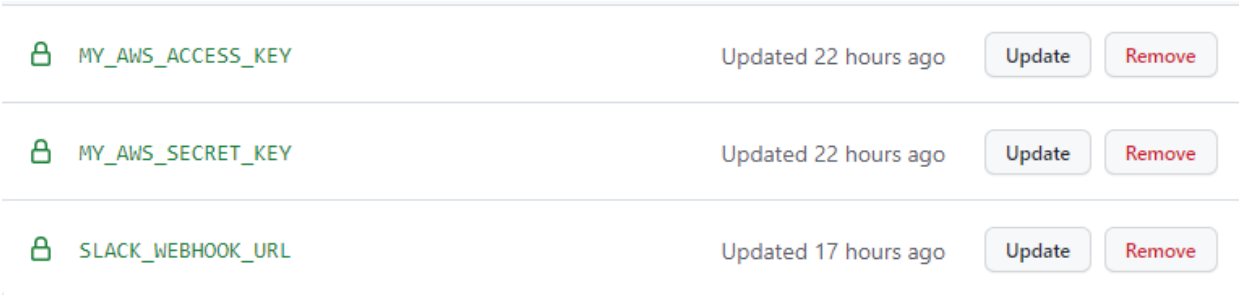
Save the Slack Webhook URL in your github secrets. Settings->Secrets under the name SLACK_WEBHOOK_URL.

Now later we need to Setup Job in Github Actions Workflow.

Setup GitHub secrets

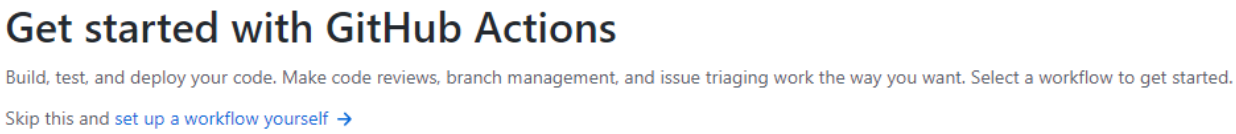
As we save Slack Webhook URL in our github secrets. Settings->Secrets under the name SLACK_WEBHOOK_URL.

Now, also we need to save our AWS credentials (Access key ID, Secret access key) in github secrets. Settings->Secrets under the name MY_AWS_ACCESS_KEY as well as MY_AWS_SECRET_KEY



Build CI/CD Pipeline in GitHub Action to build and deploy the code

Now for creating CI/CD Pipeline in GitHub Action firstly we need to setup a workflow by our self as per shown in image



Let's create our first workflow that will contain our build and test jobs. We do that by creating a file with a .yml extension. Let's name this file main.yml

Add the content below in the yaml file you just created:

```
#-----------------------------------------------------------------------
# GitHub Action Workflow to Deploy Nodejs to AWS ElasticBeanstalk
#
# Version        Date          Info
# 1.0            2022          Initial Version
#
# Made by Punit Kumar Copyright
#-----------------------------------------------------------------------
name: CI-CD-Pipeline-to-AWS-ElasticBeanstalk
env:
  SLACK_WEBHOOK_URL              : ${{ secrets.SLACK_WEBHOOK_URL }}
  EB_PACKAGE_S3_BUCKET_NAME : "git-cicd-nodejs"
  EB_APPLICATION_NAME            : "Node-js"
  EB_ENVIRONMENT_NAME            : "Nodejs-env"
  DEPLOY_PACKAGE_NAME            : "nodejs-app-${{ github.sha }}.zip"
```

```
  AWS_REGION_NAME                    : "ap-south-1"

on:
  push:
    branches:
      - master

jobs:
    my_ci_pipeline:
        runs-on: ubuntu-latest

        steps:
          - name: Git clone our repository
            uses: actions/checkout@v1

          - name: Create ZIP deployment package
            run : zip -r ${{ env.DEPLOY_PACKAGE_NAME }} ./    -x    *.git*

          - name: Configure my AWS Credentils
            uses: aws-actions/configure-aws-credentials@v1
            with:
              aws-access-key-id        : ${{ secrets.MY_AWS_ACCESS_KEY }}
              aws-secret-access-key: ${{ secrets.MY_AWS_SECRET_KEY }}
              aws-region                    : ${{ env.AWS_REGION_NAME }}

          - name: Copy our Deployment package to S3 bucket
            run : aws s3 cp ${{ env.DEPLOY_PACKAGE_NAME }} s3://${{
env.EB_PACKAGE_S3_BUCKET_NAME}}/

          - name: Notify Slack
            uses: act10ns/slack@v1.2.2
            with:
                status: ${{ job.status }}
                steps: ${{ toJson(steps) }}
                channel: '#git_action_notification'
                message: Integration {{ env.GITHUB_REF_NAME }} branch Successfully
            if: always()

    my_cd_pipeline:
        runs-on: ubuntu-latest
        needs: [my_ci_pipeline]

        steps:
          - name: Configure my AWS Credentils
            uses: aws-actions/configure-aws-credentials@v1
            with:
```

```
                aws-access-key-id        : ${{ secrets.MY_AWS_ACCESS_KEY }}
                aws-secret-access-key: ${{ secrets.MY_AWS_SECRET_KEY }}
                aws-region                    : ${{ env.AWS_REGION_NAME }}

            - name: Create new ElasticBeanstalk Applicaiton Version
              run : |
                aws elasticbeanstalk create-application-version \
                --application-name ${{ env.EB_APPLICATION_NAME }} \
                --source-bundle S3Bucket="${{ env.EB_PACKAGE_S3_BUCKET_NAME }}",S3Key="${{
env.DEPLOY_PACKAGE_NAME }}" \
                --version-label "Ver-${{ github.sha }}" \
                --description "CommitSHA-${{ github.sha }}"
            - name: Deploy our new Application Version
              run : aws elasticbeanstalk update-environment --environment-name ${{
env.EB_ENVIRONMENT_NAME }} --version-label "Ver-${{ github.sha }}"

            - name: Notify Slack
              uses: act10ns/slack@v1.2.2
              with:
                    status: ${{ job.status }}
                    steps: ${{ toJson(steps) }}
                    channel: '#git_action_notification'
                    message: Deployed {{ env.GITHUB_REF_NAME }} branch Successfully
              if: always()
```

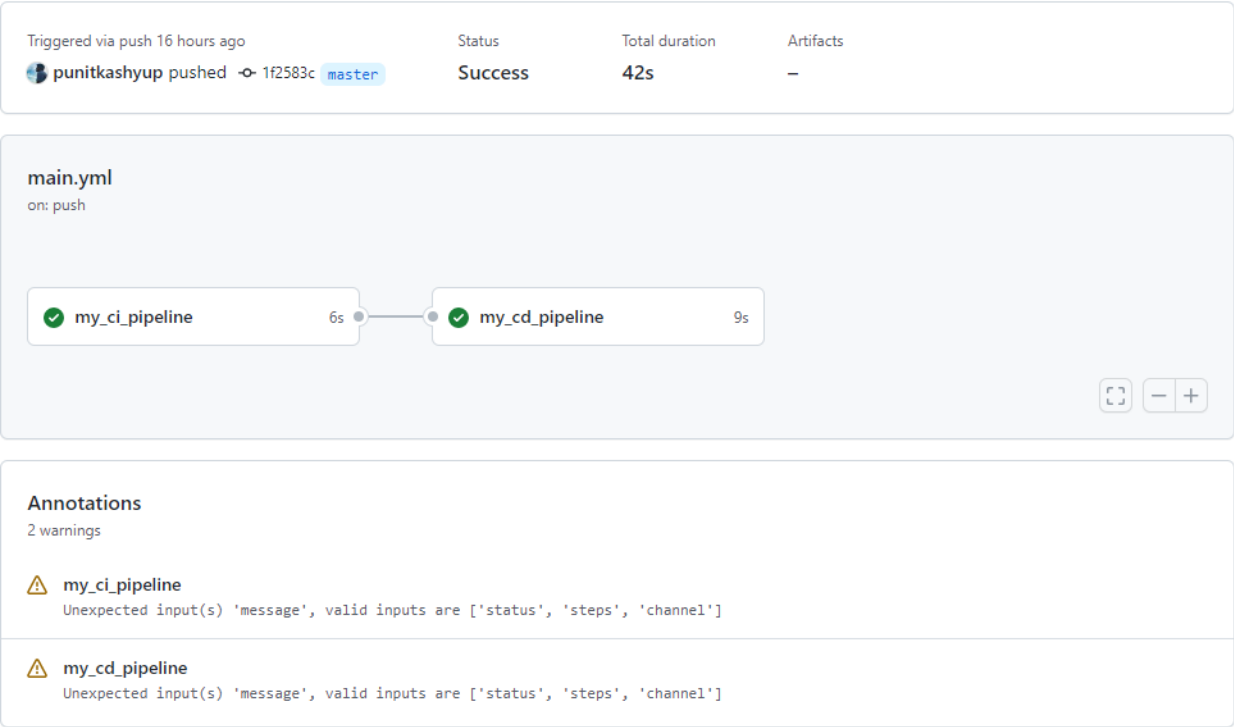
Let's make sense of each line in the file above.

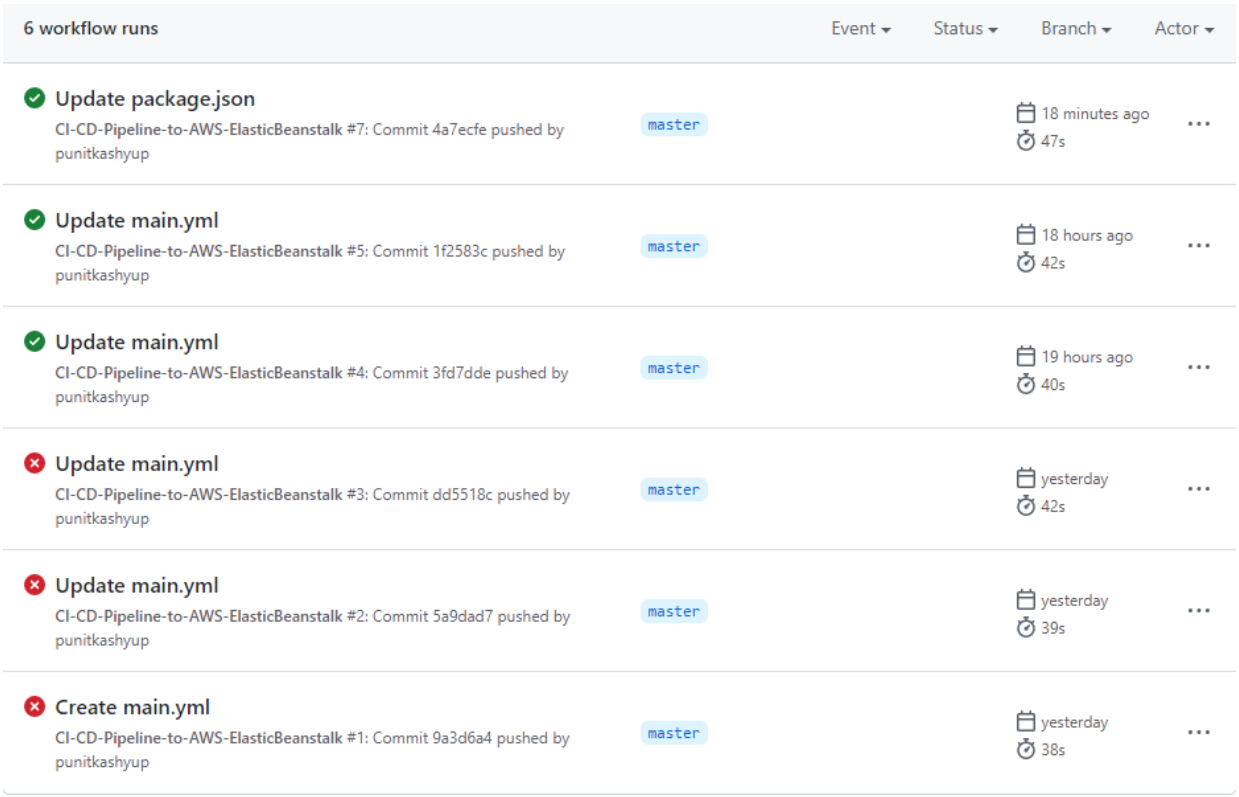
name: Build and Test This is the name of our workflow. When you navigate to the actions tab, each workflow you define will be identified by the name you give it here on that list.
on: This is where you specify the events that should trigger the execution of our workflow. In our config file we passed it two events. We specified the main branch as the target branch.
jobs: Remember, a workflow is just a collection of jobs.
test: This is the name of the job we've defined in this workflow. You could name it anything really. Notice it's the only job and the build job isn't there? Well, it's Python code so no build step is required. This is why we didn't define the build job.
runs-on GitHub provides Ubuntu Linux, Microsoft Windows, and macOS runners to run your workflows. This where you specify the type of runner you want to use. In our case, we are using the Ubuntu Linux runner.
A job is made up of a series of steps that are usually executed sequentially on the same runner. In our file above, each step is marked by a hyphen. name represents the name of the step. Each step could either be a shell script that is being executed or an

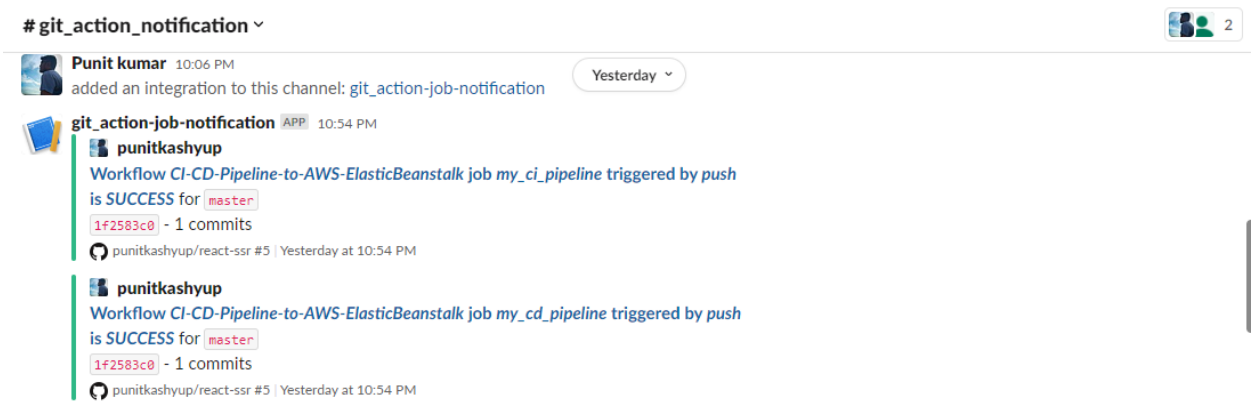
action . You define a step with uses if it's executing an action or you define a step with run if it's executing a shell script.
Now that you've defined a workflow by adding the config file in the designated folder, you can commit and push your change to your remote repo.

If you navigate to the Actions tab of your remote repo, you should see a workflow with the name Build and Test (the name which we've given it) listed there.

Trigger the GitHub Action to build and deploy the code
Now, After any commit changes in code the workflow automatically going to be trigger & job will be start and also we will get slack notification in our channel of CI/CD process. As we can see below Ref_Image3

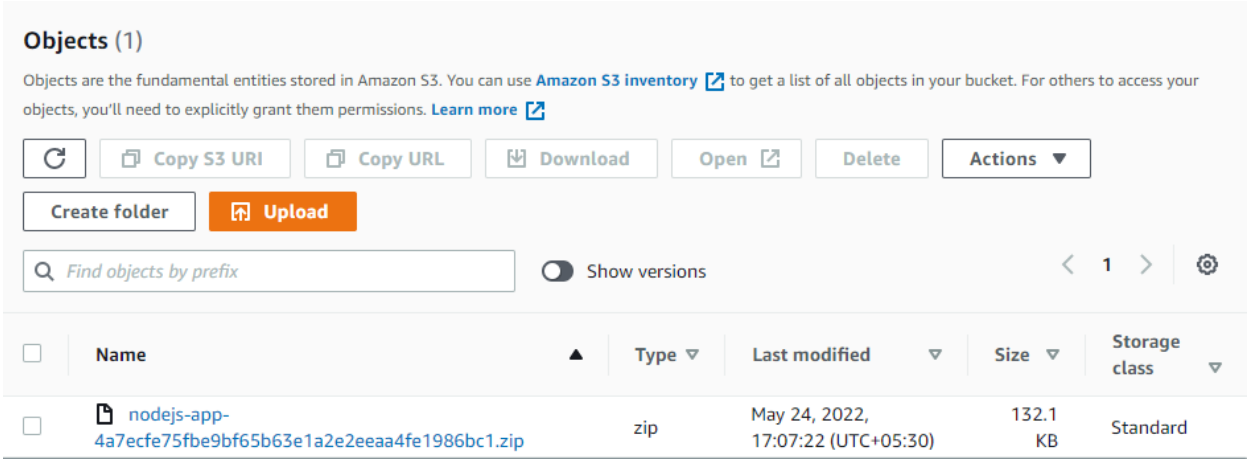




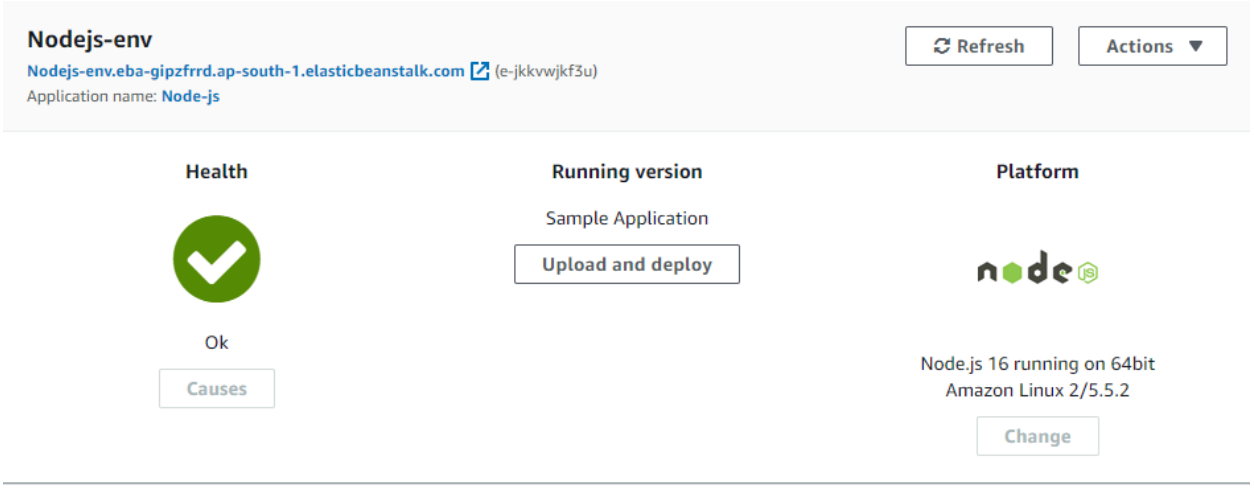


Verify the deployment

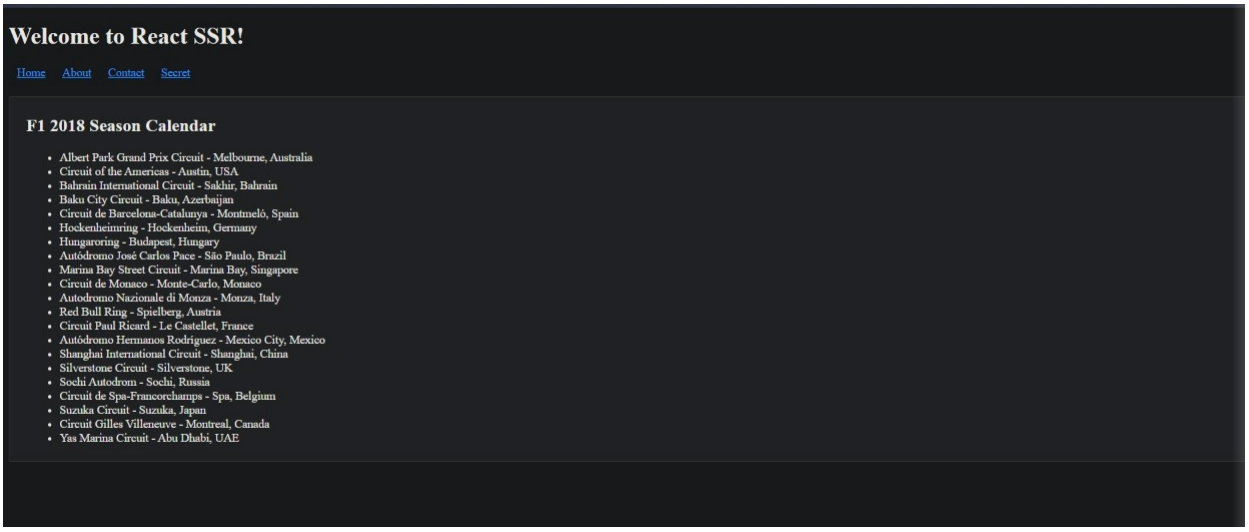
Code zip successfully uploaded in S3 Bucket



Application is in Healthy State. We can visit app with help of link



App is sucessfully up runing. And as we deploy our app on Beanstalk so it take care of all Health check as well traffic handaling & Sacalibity.



Clean up

To avoid incurring future changes, you should clean up the resources that you created in Aws (Elastic Bean Stalk,S3 Bucket)