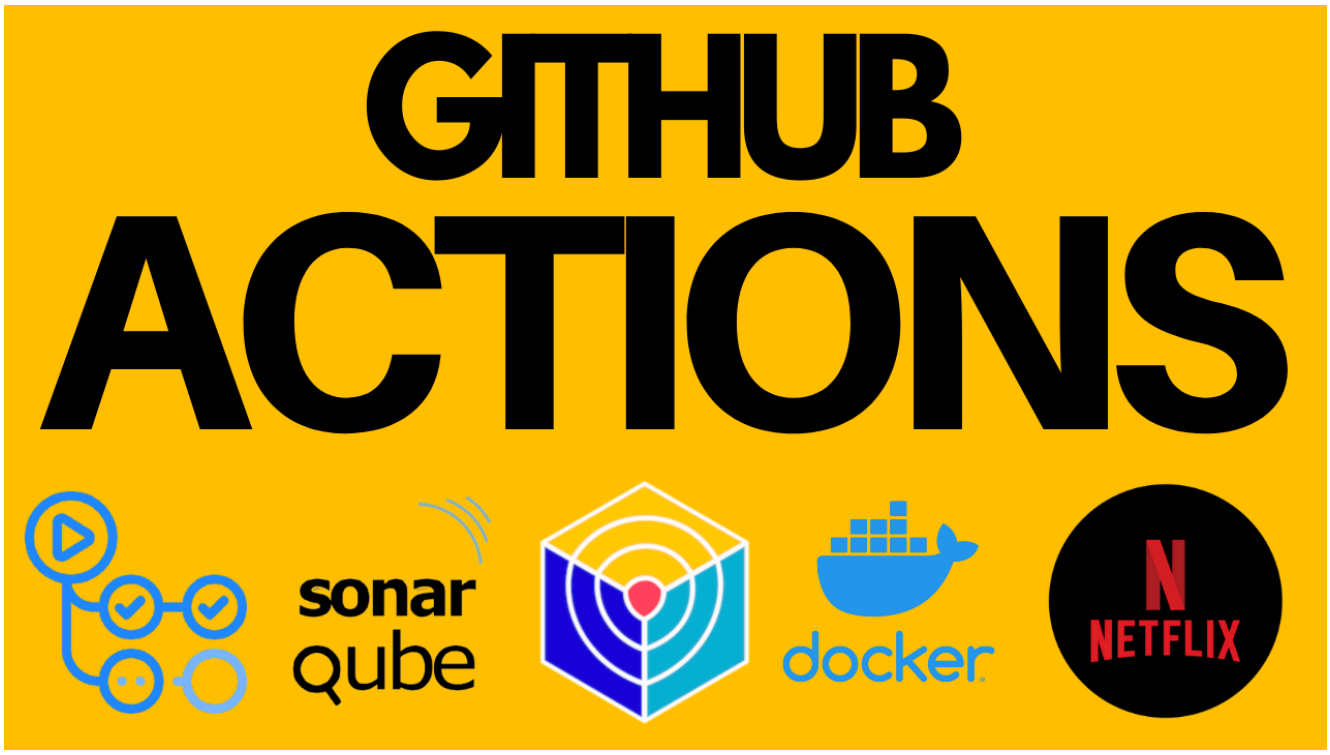
DevOps

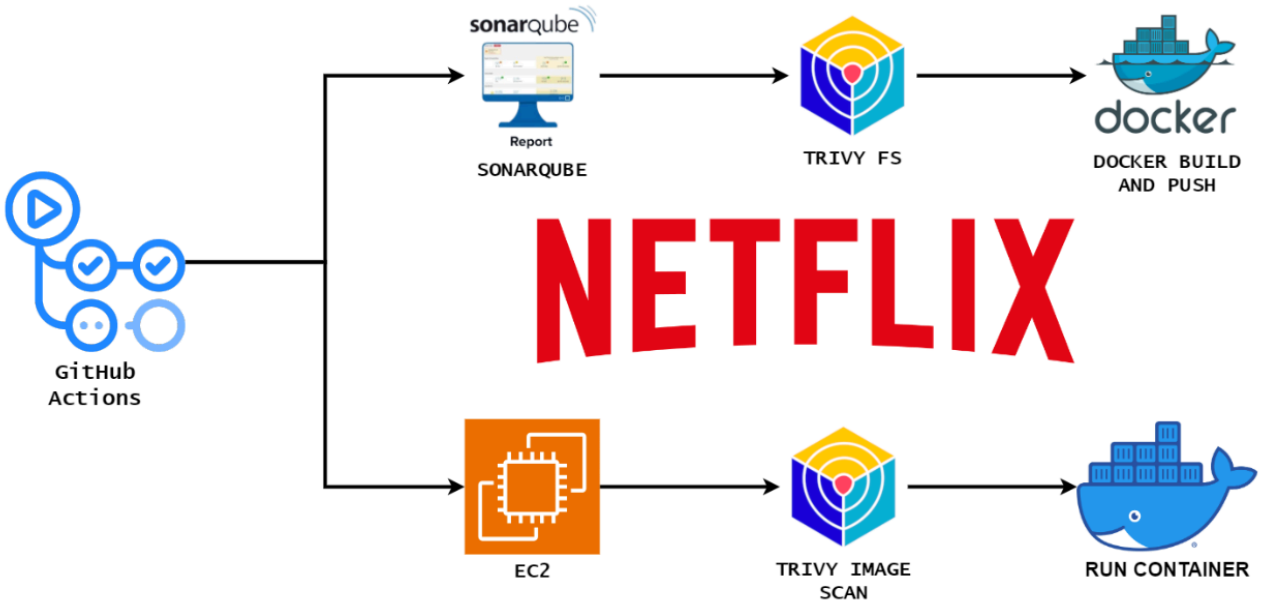
GitHub Actions: Netflix Deployment Powered by DevSecOps

mrcloudbook.com · 8 January 2024



In today's fast-paced world of software development, automation is the name of the game. GitHub Actions is the ace up the sleeve of modern developers, enabling them to streamline their daily workflows in practical and impactful ways. In this article, we'll explore how GitHub Actions is making a real difference in real-life scenarios.

From Continuous Integration (CI) and Continuous Deployment (CD) to code quality assurance and security scanning, GitHub Actions brings automation to every aspect of the development process. With custom workflows, enhanced collaboration, and release management, this tool empowers developers to be more efficient, reliable, and productive. Discover how GitHub Actions is not just a concept but a transformative solution in the daily lives of developers.



Contents [hide]

Step1: Launch an Ec2 Instance

To launch an AWS EC2 instance with Ubuntu 22.04 using the AWS Management Console, sign in to your AWS account, access the EC2 dashboard, and click "Launch Instances." In "Step 1," select "Ubuntu 22.04" as the AMI, and in "Step 2," choose "t2.medium" as the instance type. Configure the instance details, storage,

tags, and security group settings according to your requirements. Review the settings, create or select a key pair for secure access, and launch the instance. Once launched, you can connect to it via SSH using the associated key pair.

Step2A: Install Docker and Run Sonarqube Container

Connect to your Ec2 instance using Putty, Mobaxtreme or Git bash and install docker on it.

```
sudo apt-get update
sudo apt install docker.io -y
sudo usermod -aG docker ubuntu
newgrp docker
sudo chmod 777 /var/run/docker.sock
```

Pull the SonarQube Docker image and run it.

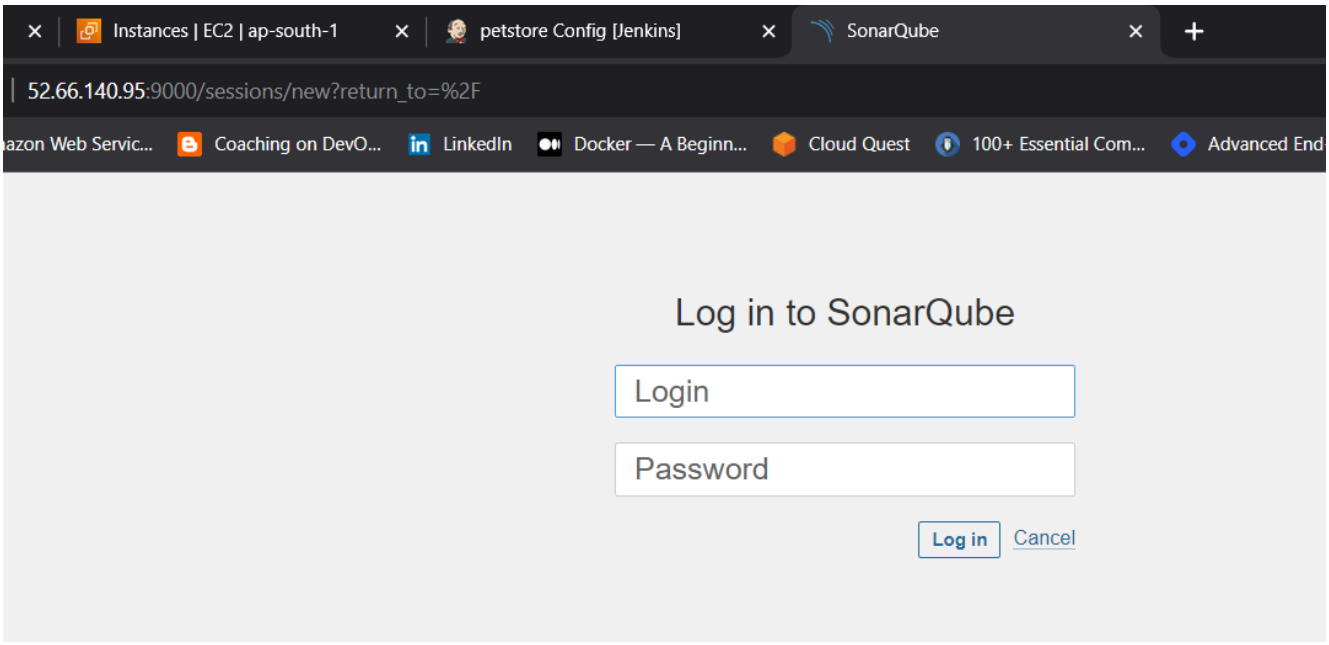
After the docker installation, we will create a Sonarqube container (Remember to add 9000 ports in the security group).

```
docker run -d --name sonar -p 9000:9000 sonarqube:lts-community
```

```
ubuntu@ip-172-31-42-253:~$ sudo chmod 777 /var/run/docker.sock
ubuntu@ip-172-31-42-253:~$ docker run -d --name sonar -p 9000:9000 sonarqube:lts-community
Unable to find image 'sonarqube:lts-community' locally
lts-community: Pulling from library/sonarqube
44ba2882f8eb: Pull complete
2cabec57fa36: Pull complete
c20481384b6a: Pull complete
bf7b17ee74f8: Pull complete
38617faac714: Pull complete
706f20f58f5e: Pull complete
65a29568c257: Pull complete
Digest: sha256:1a118f8ab960d6c3d4ea8b4455a5a6560654511c88a6816f1603f764d5dcc77c
Status: Downloaded newer image for sonarqube:lts-community
4b60c96bf9ad3d62289436af7f752fdb04993092d0ca3065e2f2e32301b50139
ubuntu@ip-172-31-42-253:~$ docker ps
CONTAINER ID   IMAGE                       COMMAND                  CREATED         STATUS         PORTS                                                NAMES
4b60c96bf9ad   sonarqube:lts-community   "/opt/sonarqube/dock…"   9 seconds ago   Up 5 seconds   0.0.0.0:9000->9000/tcp, :::9000->9000/tcp   sonar
ubuntu@ip-172-31-42-253:~$
```

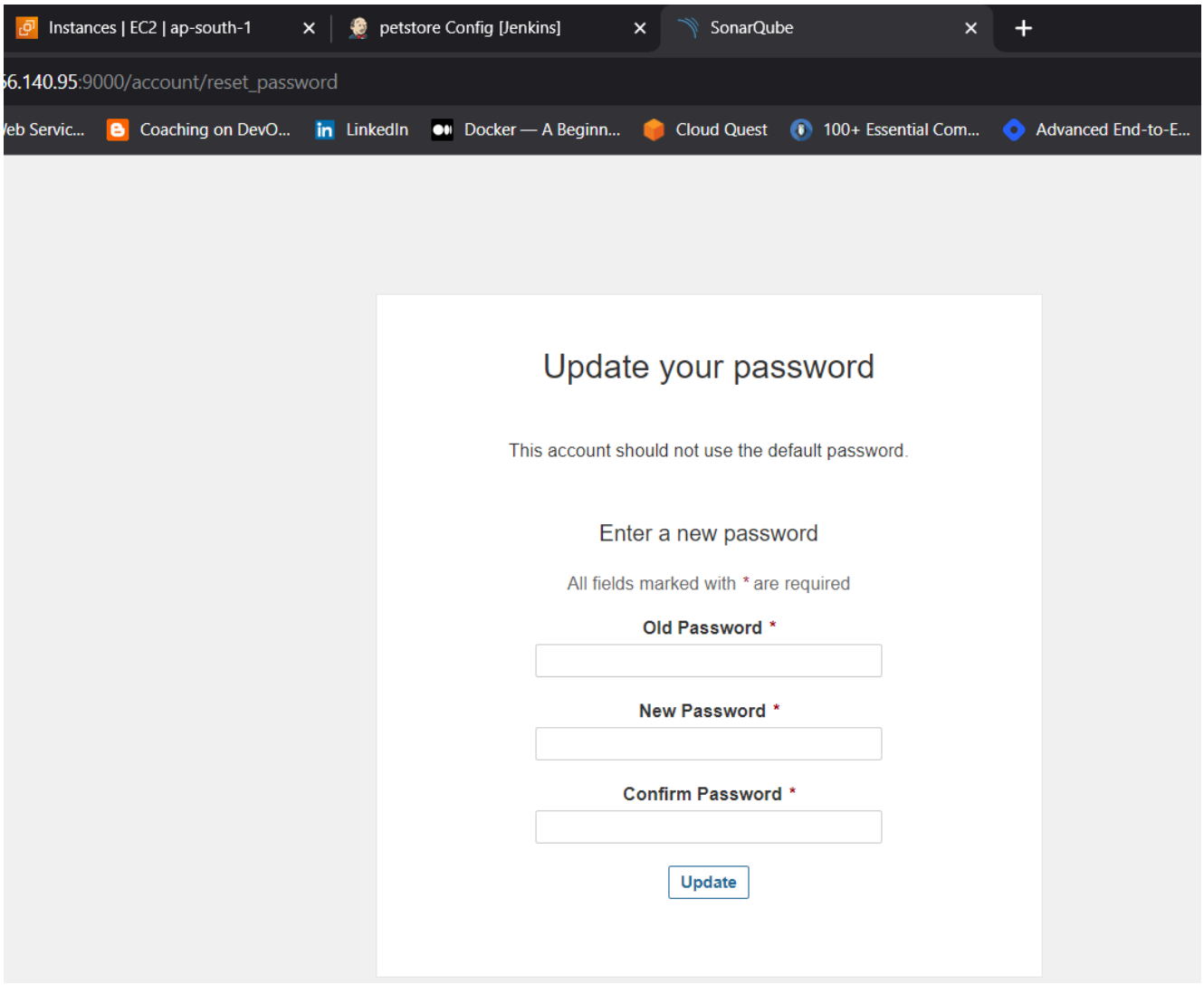
Now copy the IP address of the ec2 instance

```
ec2-public-ip:9000
```

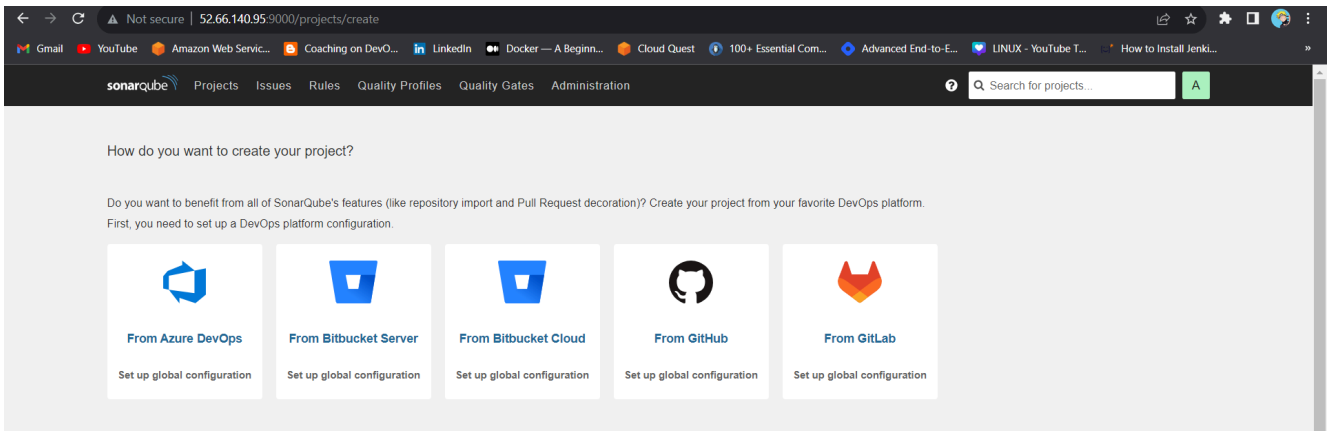


Provide Login and password

```
login admin
password admin
```



Update your Sonarqube password & This is the Sonarqube dashboard

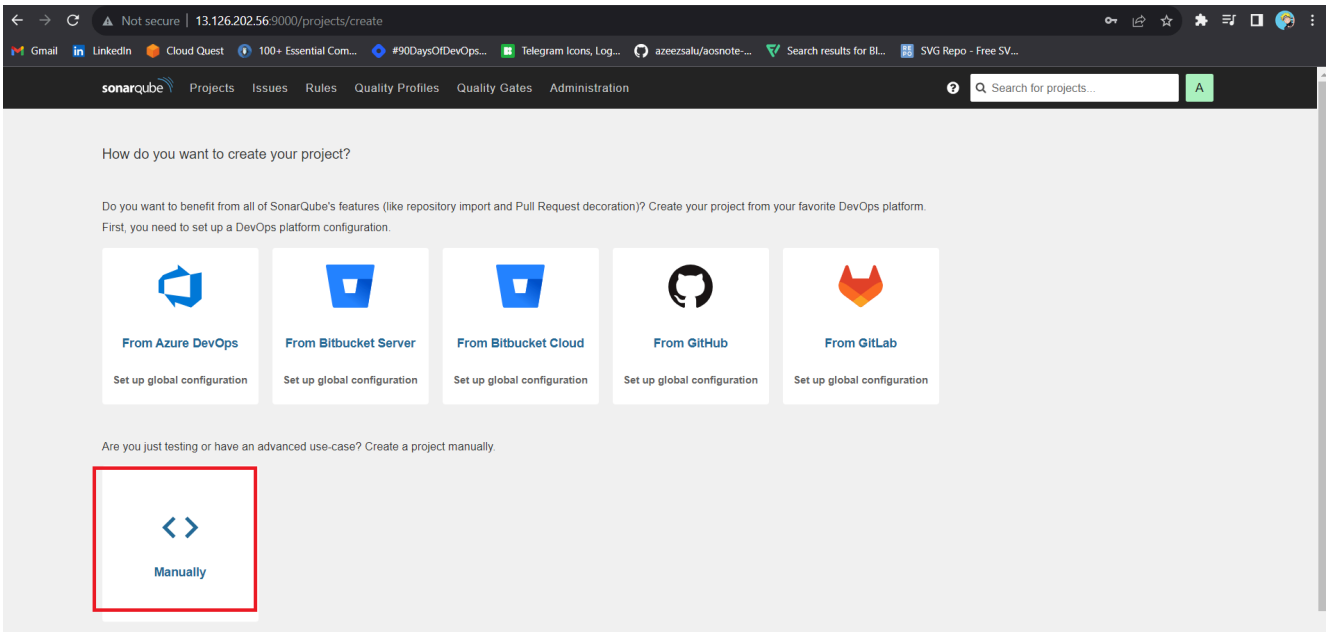


Step2B: Integrating SonarQube with GitHub Actions

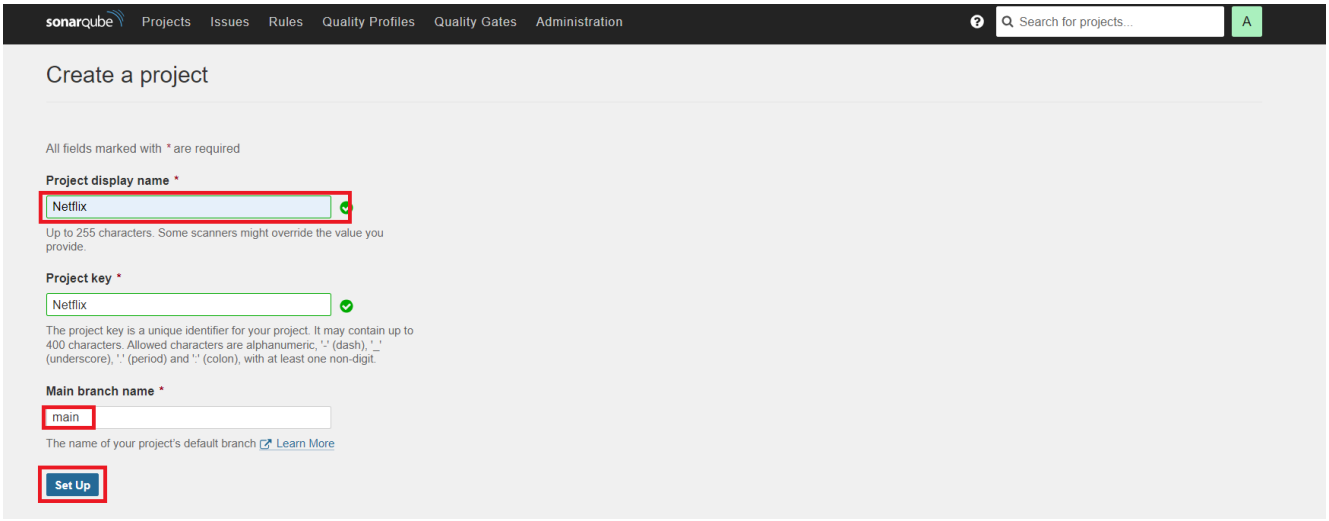
Integrating SonarQube with GitHub Actions allows you to automatically analyze your code for quality and security as part of your continuous integration pipeline.

We already have Sonarqube up and running

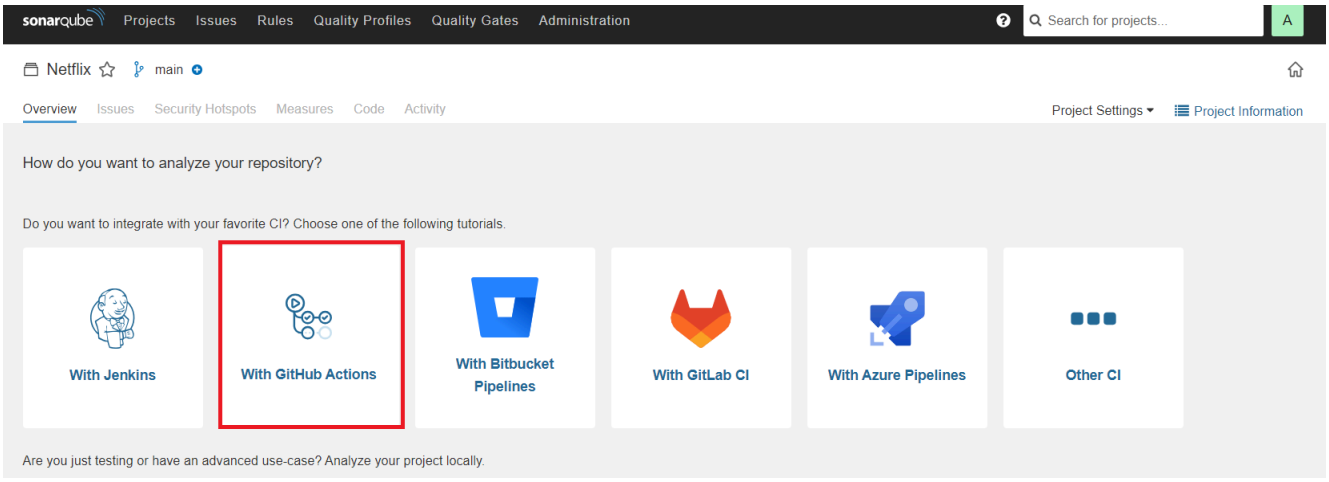
On Sonarqube Dashboard click on Manually



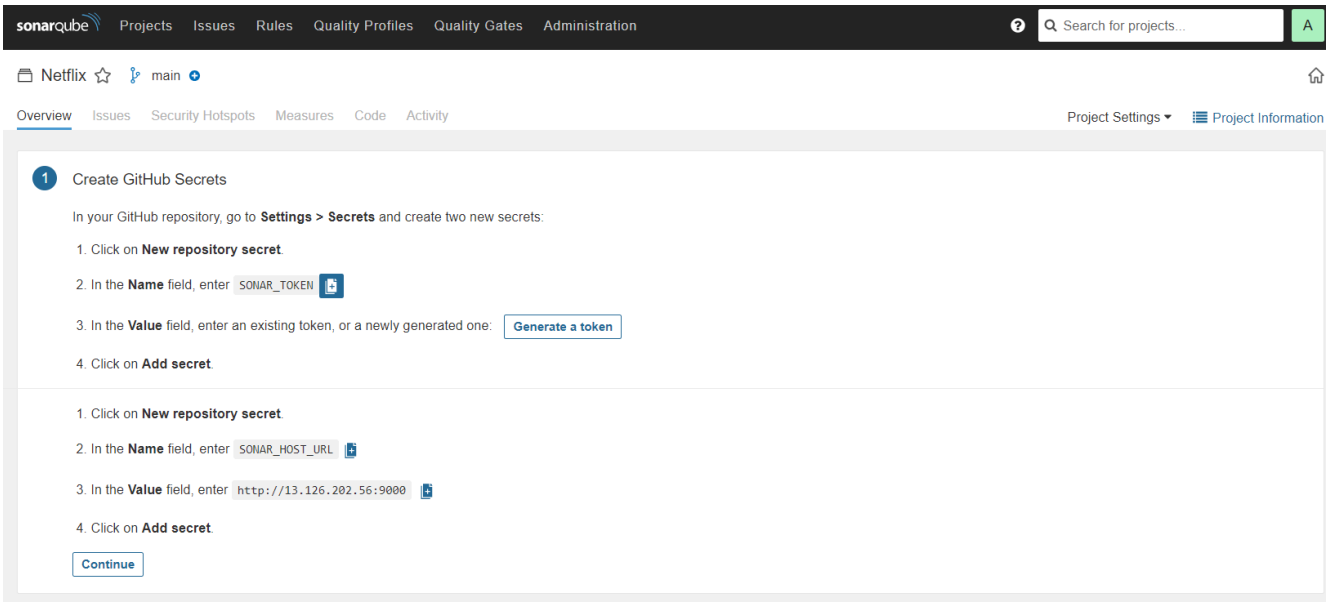
Next, provide a name for your project and provide a Branch name and click on setup



On the next page click on With GitHub actions

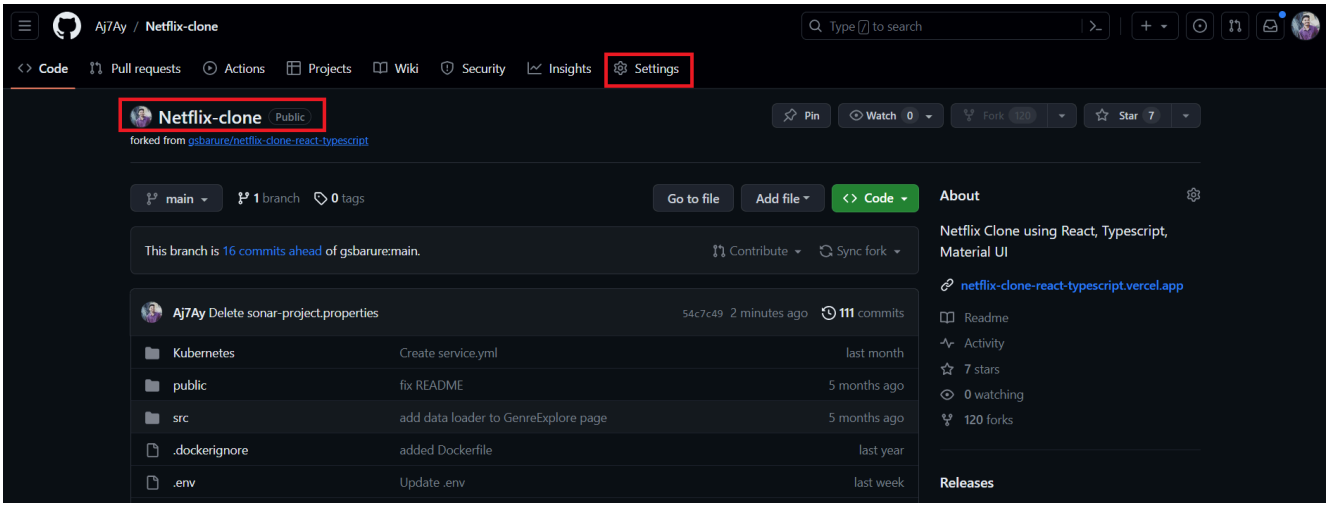


This will Generate an overview of the Project and provide some instructions to integrate

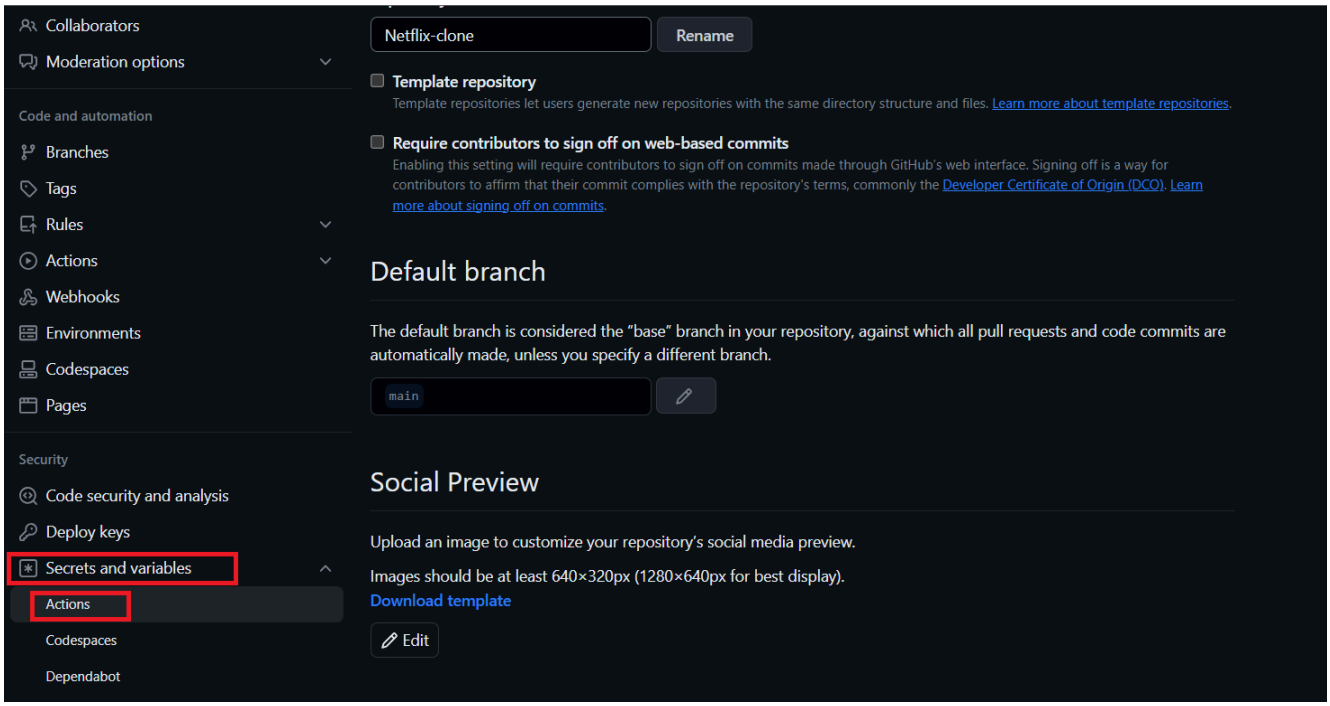


Let's Open your GitHub and select your Repository

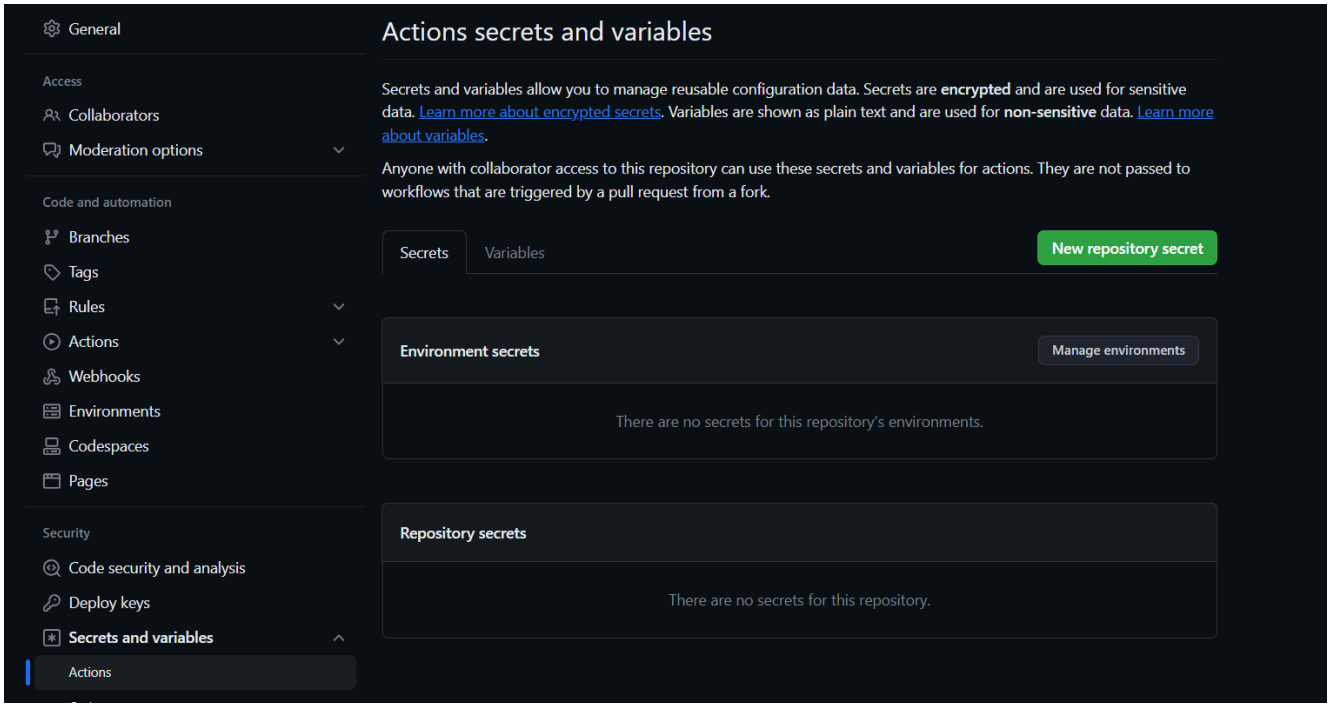
In my case it is Netflix-clone and Click on Settings



Search for Secrets and variables and click on and again click on actions

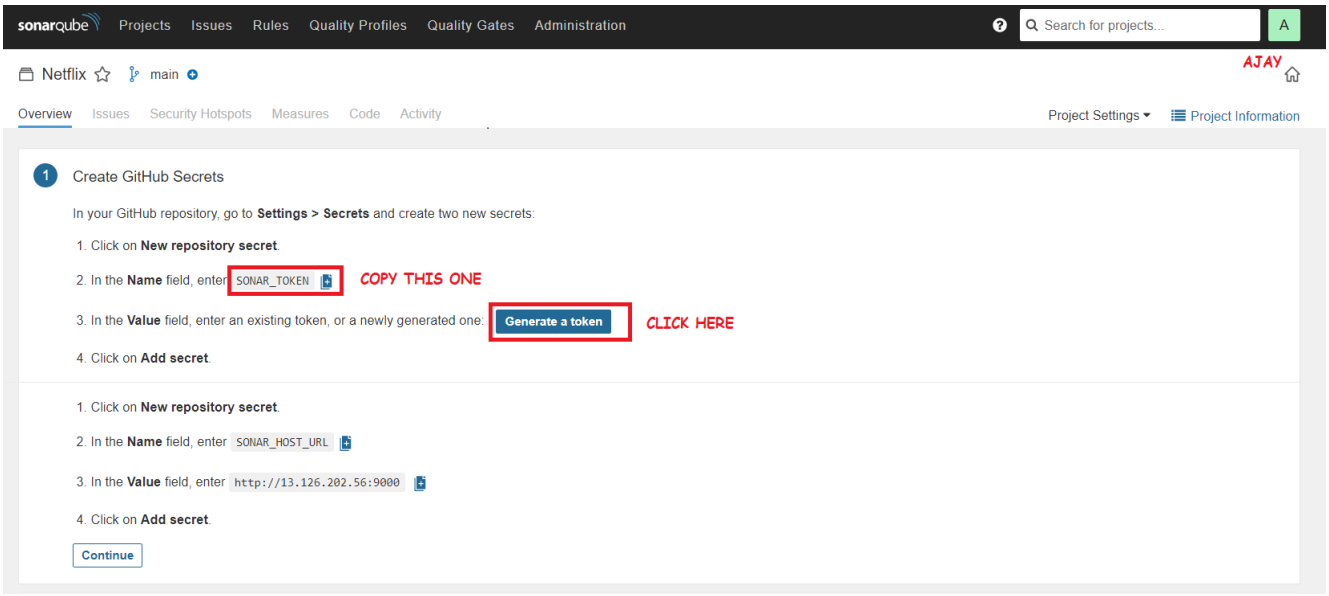


It will open a page like this click on New Repository secret

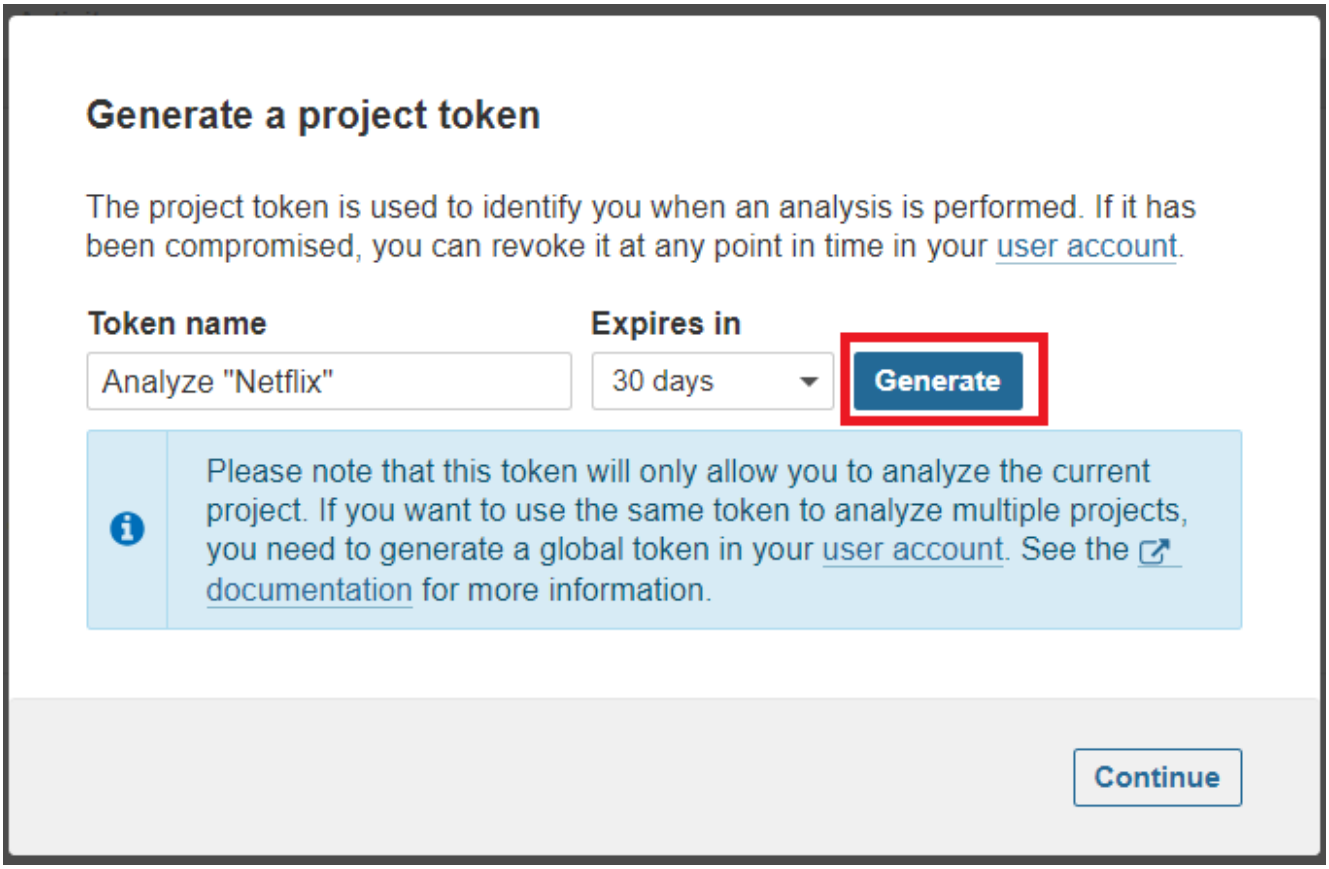


Now go back to Your Sonarqube Dashboard

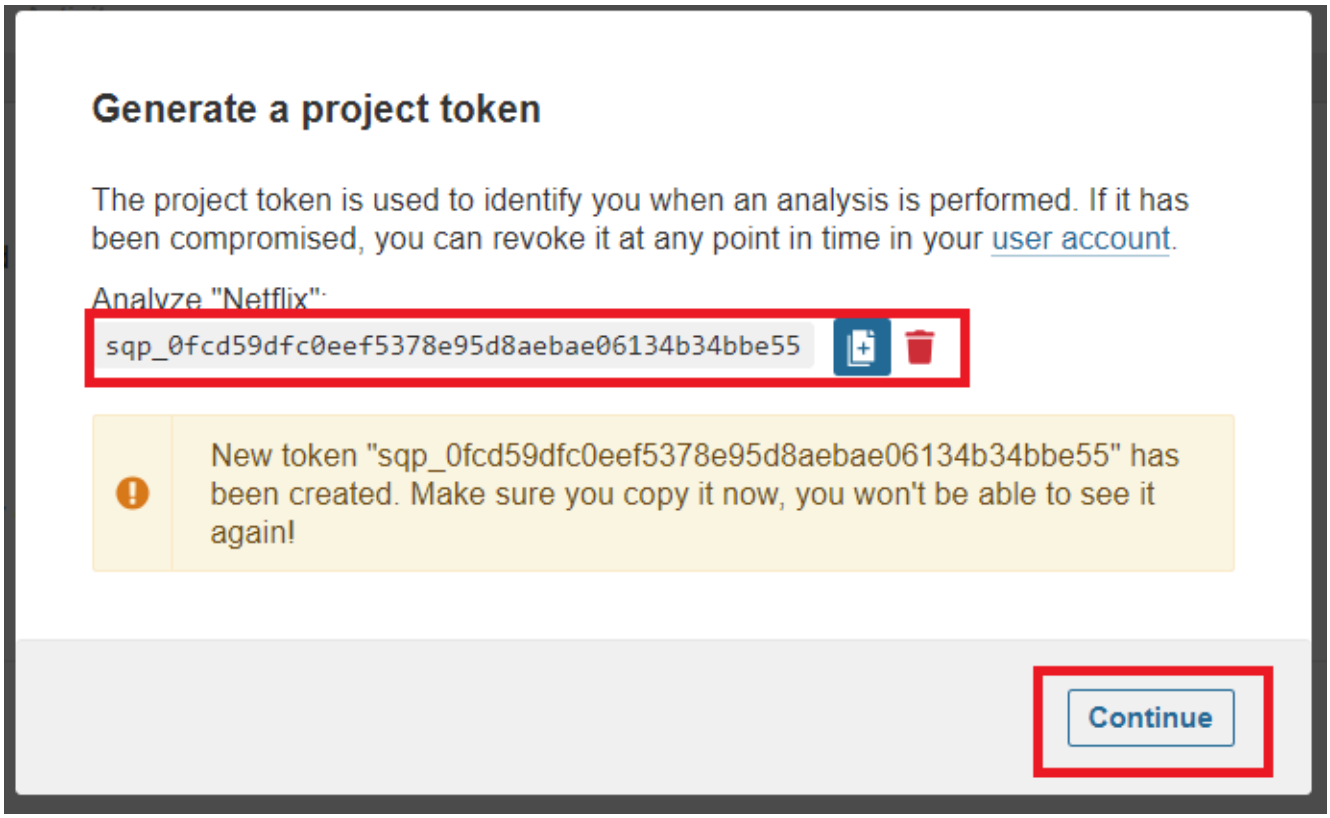
Copy SONAR_TOKEN and click on Generate Token



Click on Generate



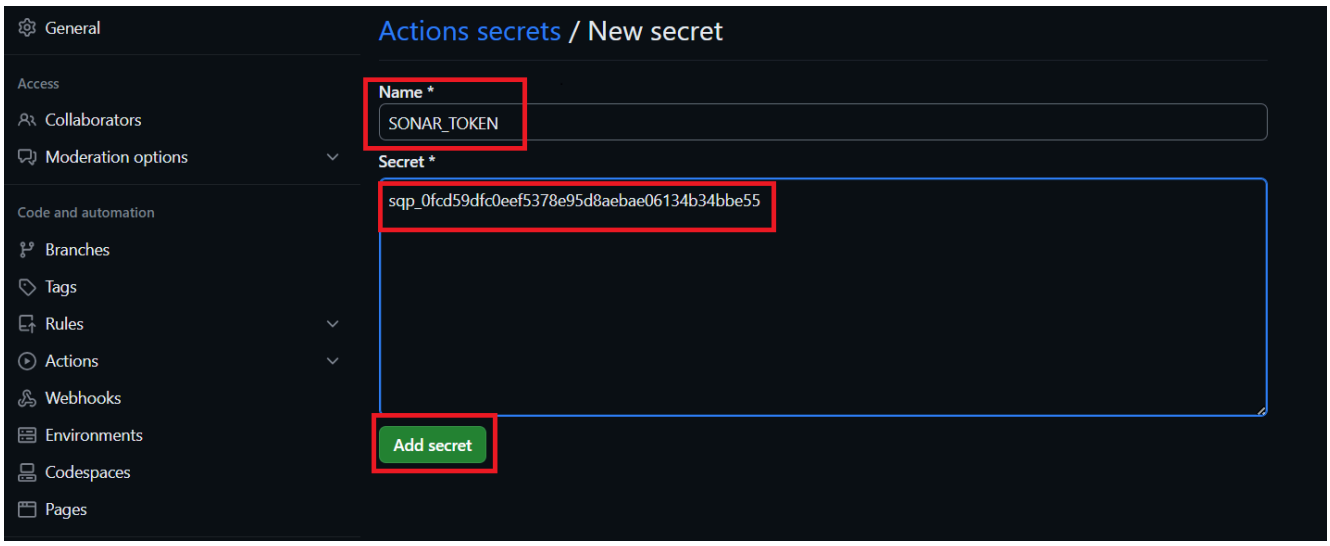
Let's copy the Token and add it to GitHub secrets



Now go back to GitHub and Paste the copied name for the secret and token

Name: SONAR_TOKEN

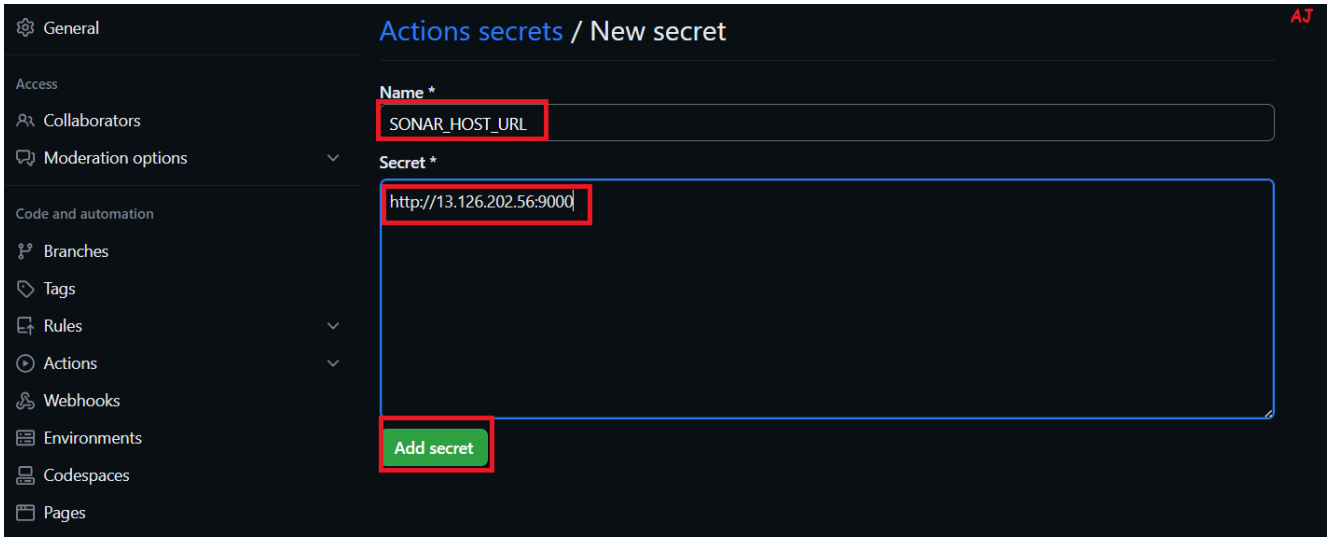
Secret: Paste Your Token and click on Add secret



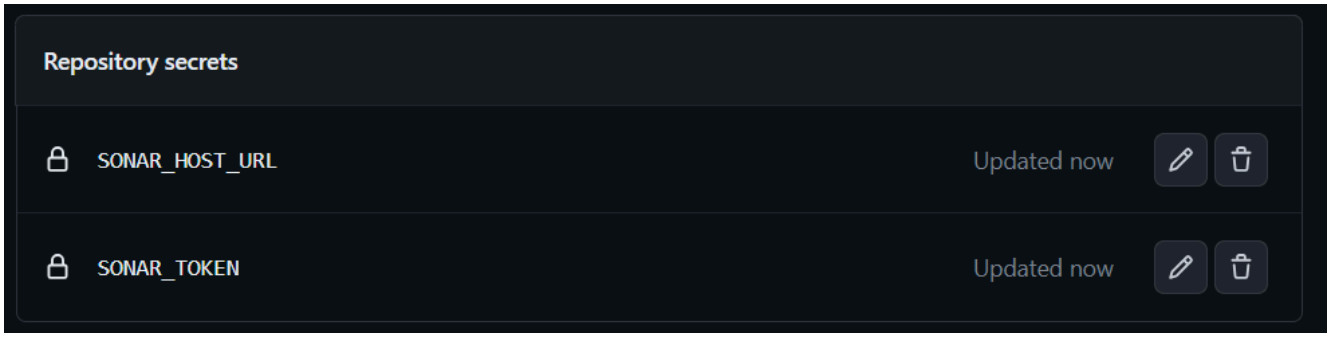
Now go back to the Sonarqube Dashboard

Copy the Name and Value

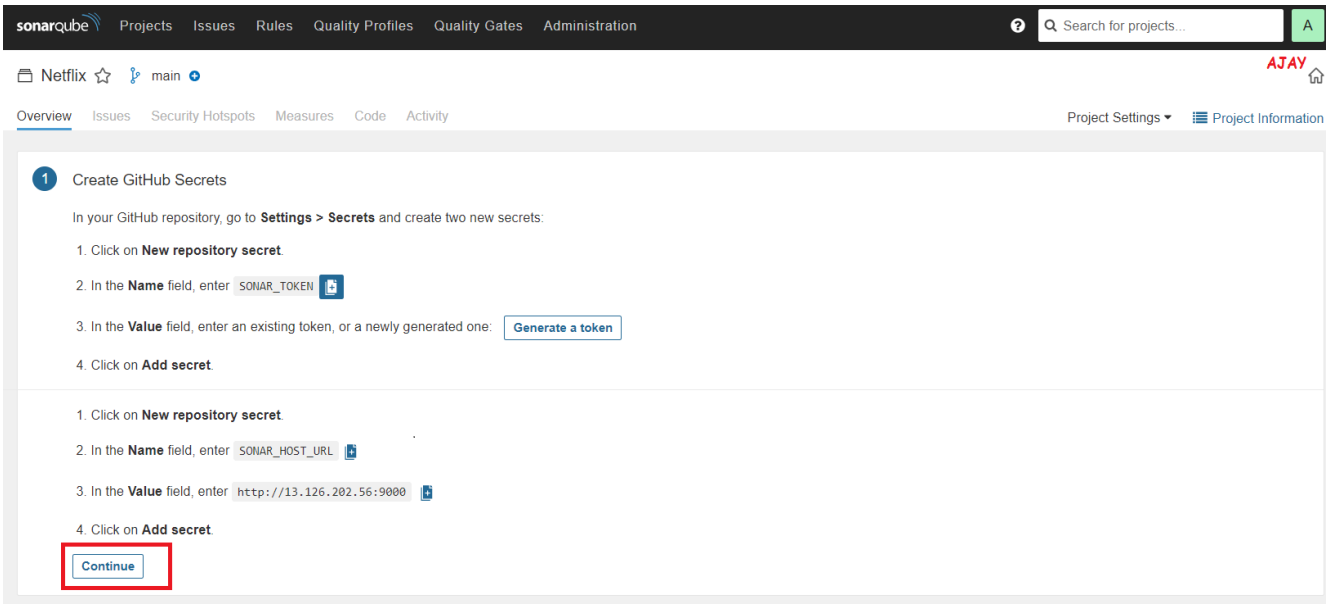
Go to GitHub now and paste-like this and click on add secret



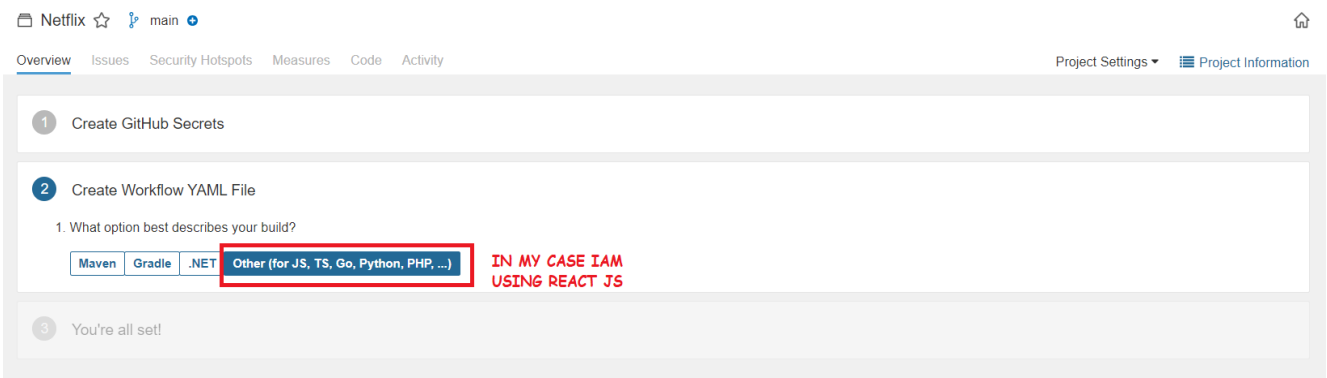
Our Sonarqube secrets are added and you can see



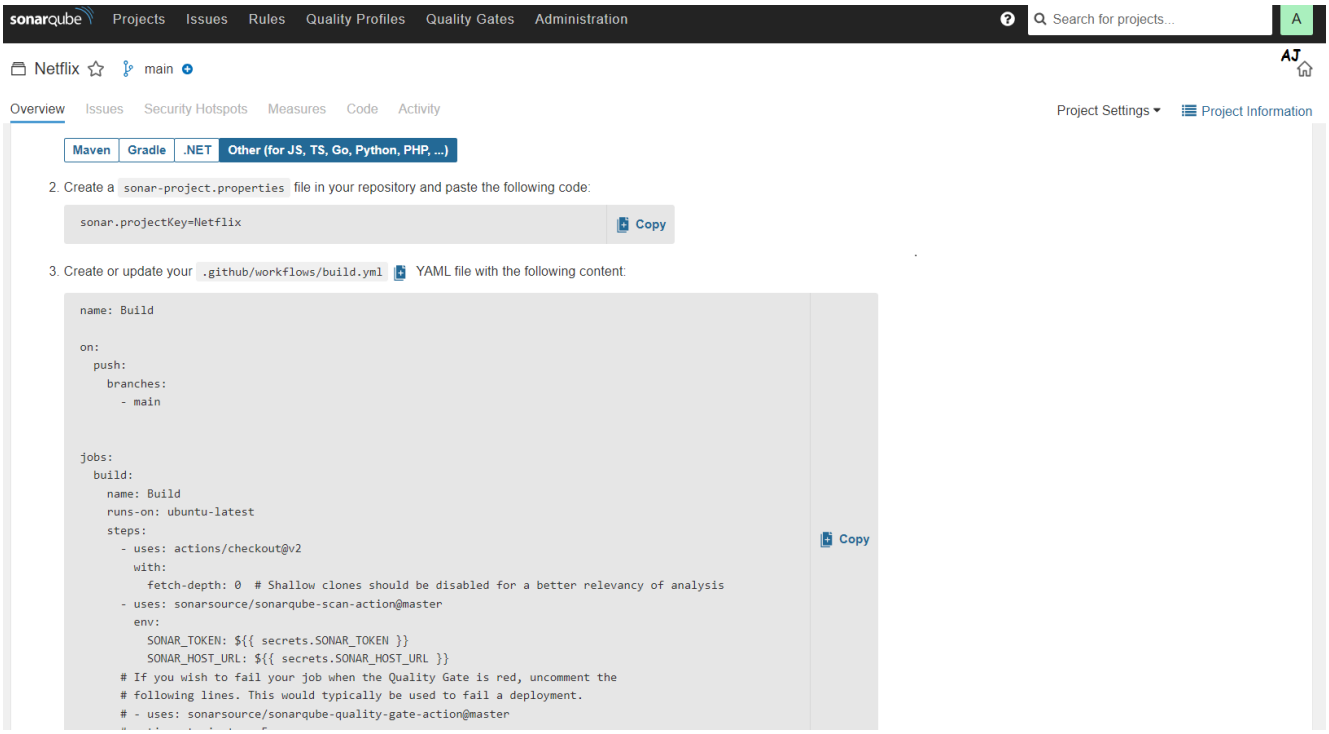
Go to Sonarqube Dashboard and click on continue



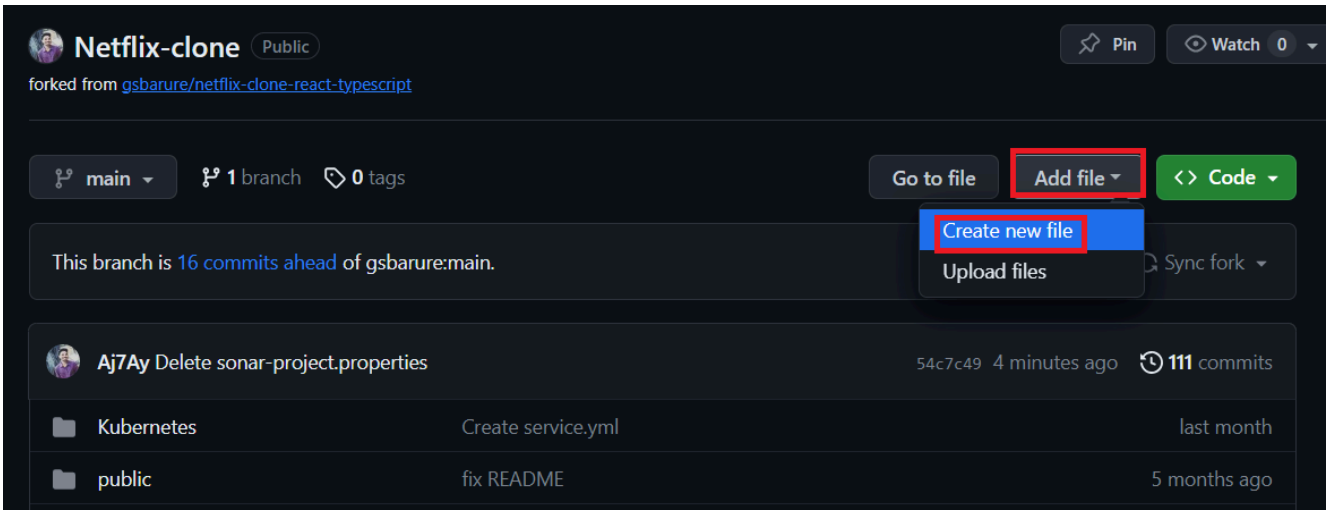
Now create your Workflow for your Project. In my case, the Netflix project is built using React Js. That's why I am selecting Other



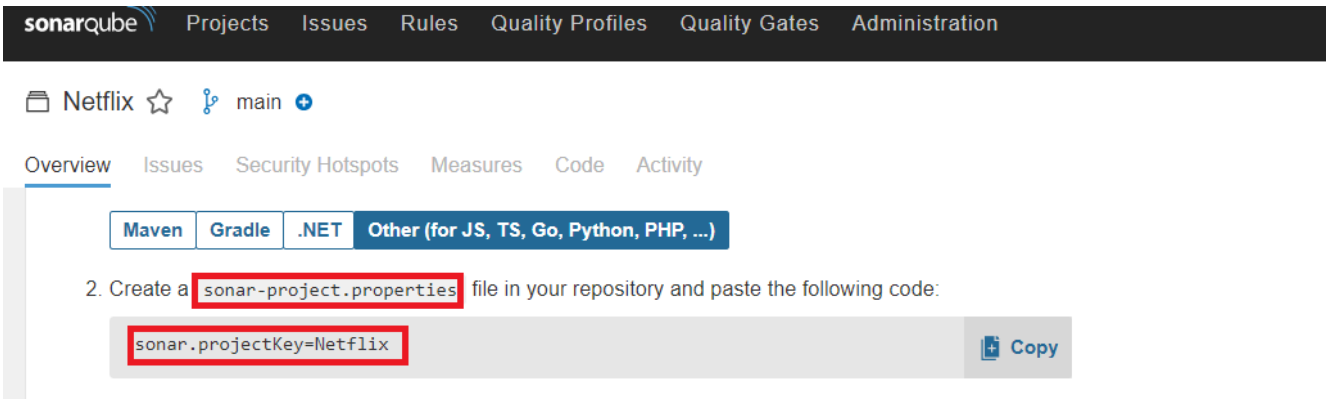
Now it Generates and workflow for my Project



Go back to GitHub. click on Add file and then create a new file



Go back to the Sonarqube dashboard and copy the file name and content



Here file name (in my case only)

```
sonar-project.properties
```

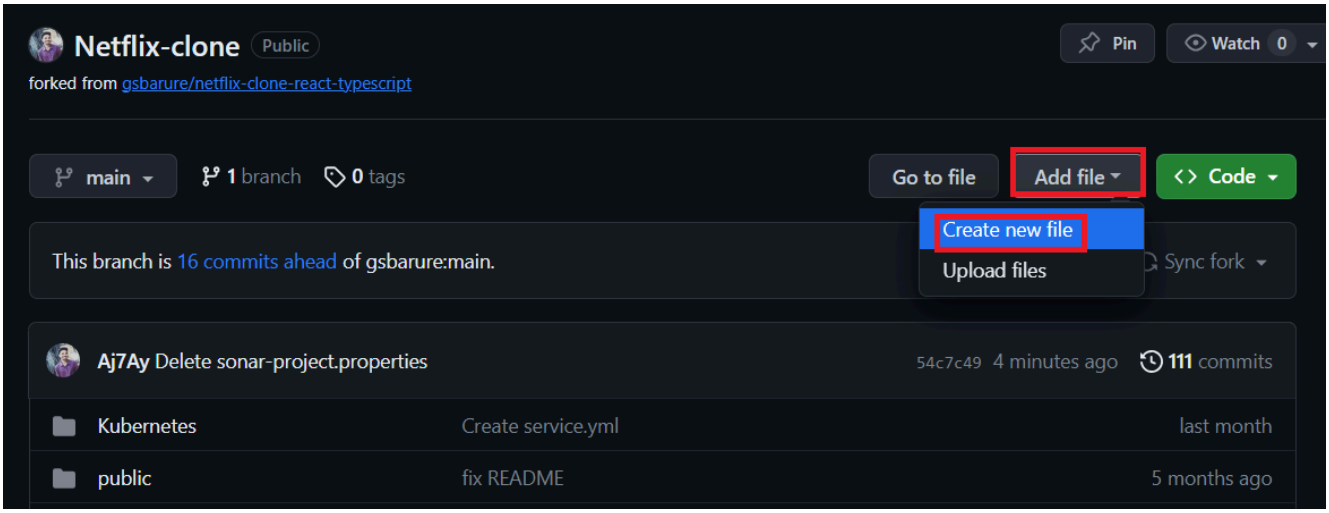
The content to add to the file is (copied from the above image)

```
sonar.projectKey=Netflix
```

Add in GitHub like this

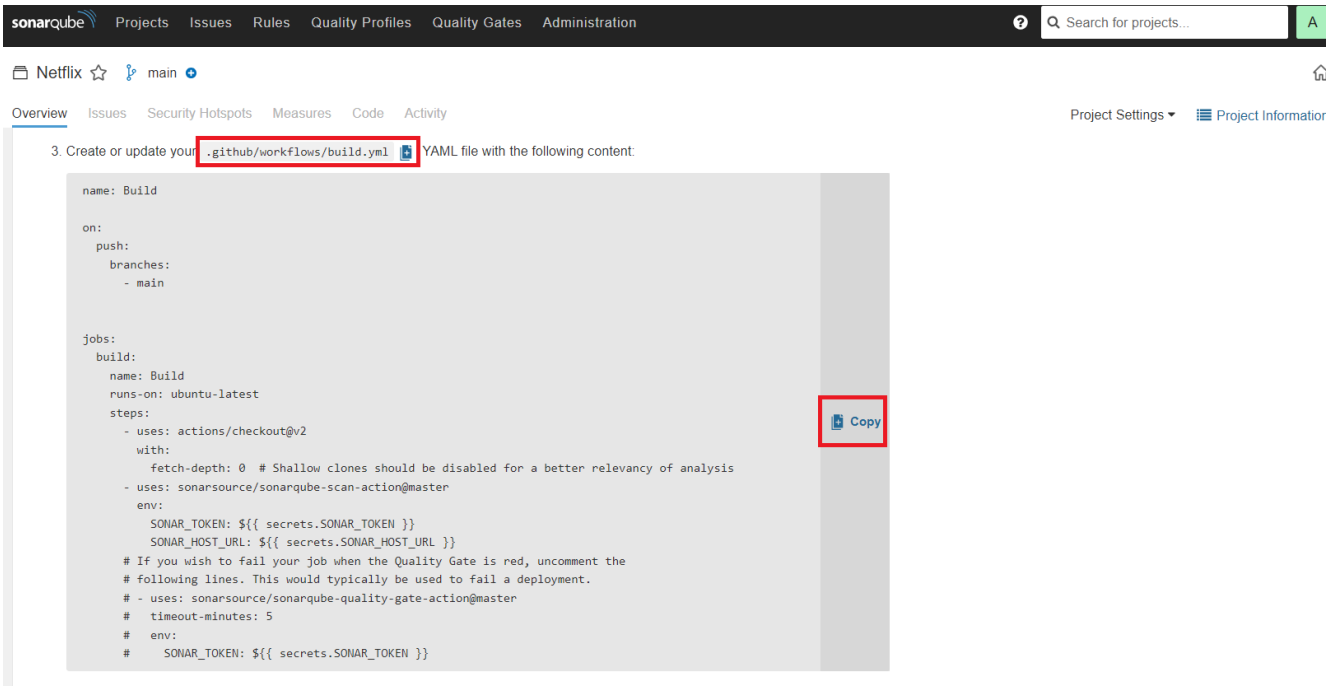
Let's add our workflow

To do that click on Add file and then click on Create a new file



Here is the file name

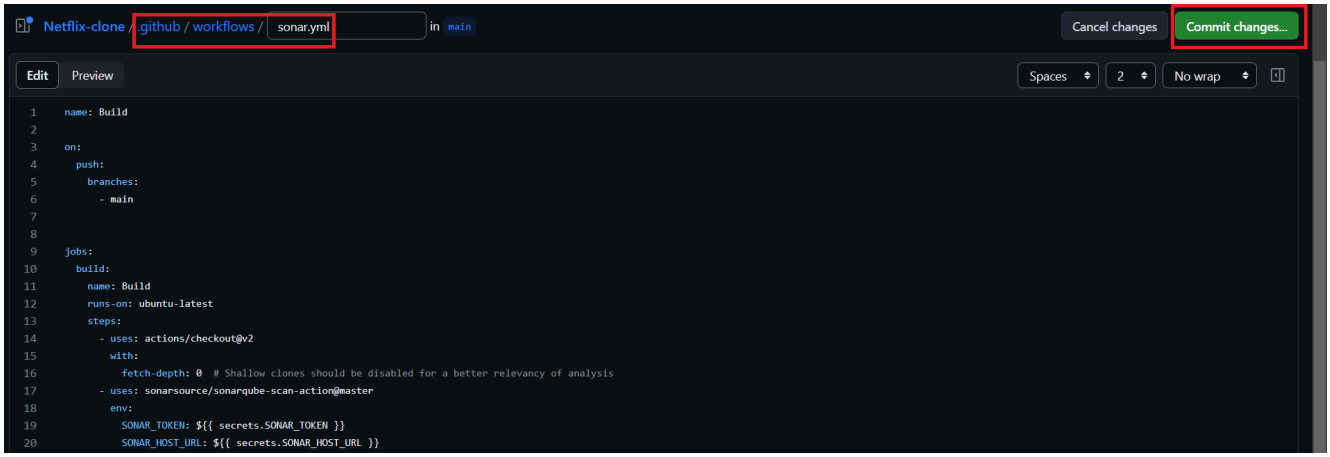
```
.github/workflows/build.yml  #you can use any name iam using sonar.yml
```



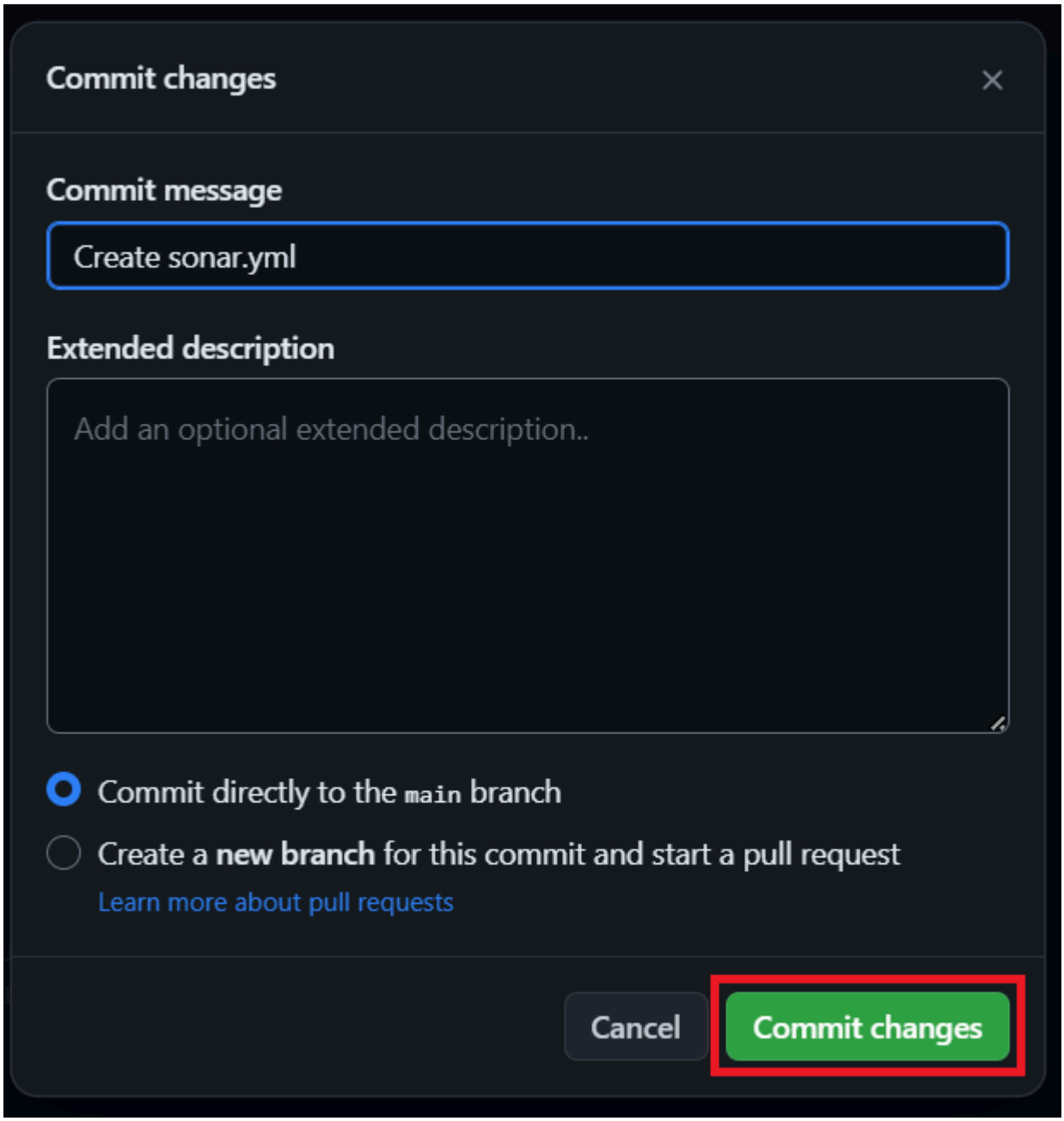
Copy content and add it to the file

```
name: Build,Analyze,scan
on:
  push:
    branches:
      - main
jobs:
  build-analyze-scan:
    name: Build
    runs-on: ubuntu-latest
    steps:
      - name: Checkout code
        uses: actions/checkout@v2
        with:
          fetch-depth: 0  # Shallow clones should be disabled for a bet
```

```
    - name: Build and analyze with SonarQube
      uses: sonarsource/sonarqube-scan-action@master
      env:
        SONAR_TOKEN: ${{ secrets.SONAR_TOKEN }}
        SONAR_HOST_URL: ${{ secrets.SONAR_HOST_URL }}
```

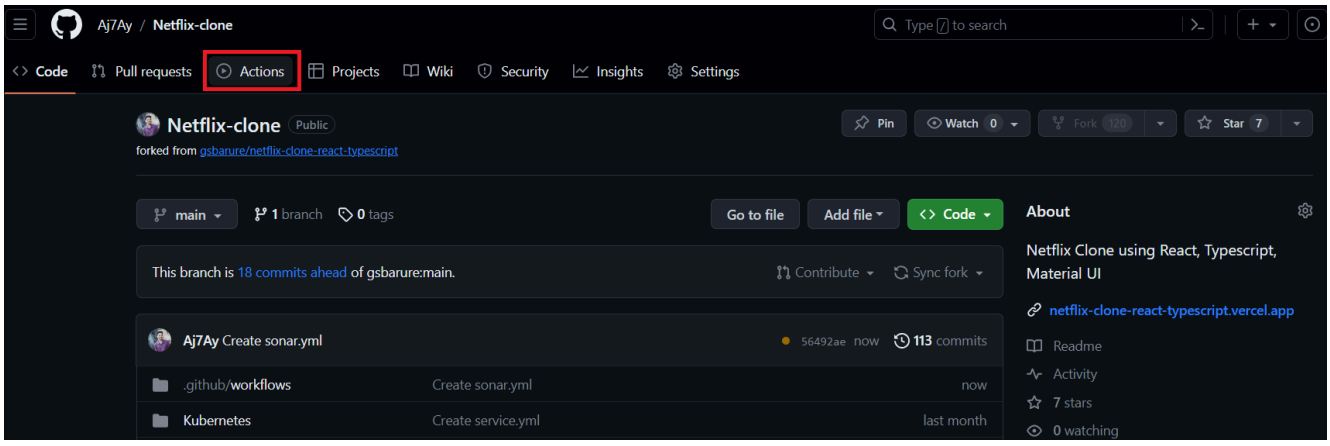


Click on commit changes

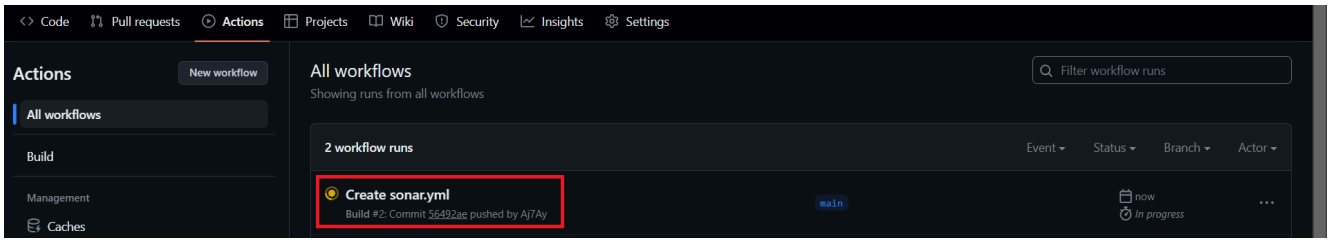


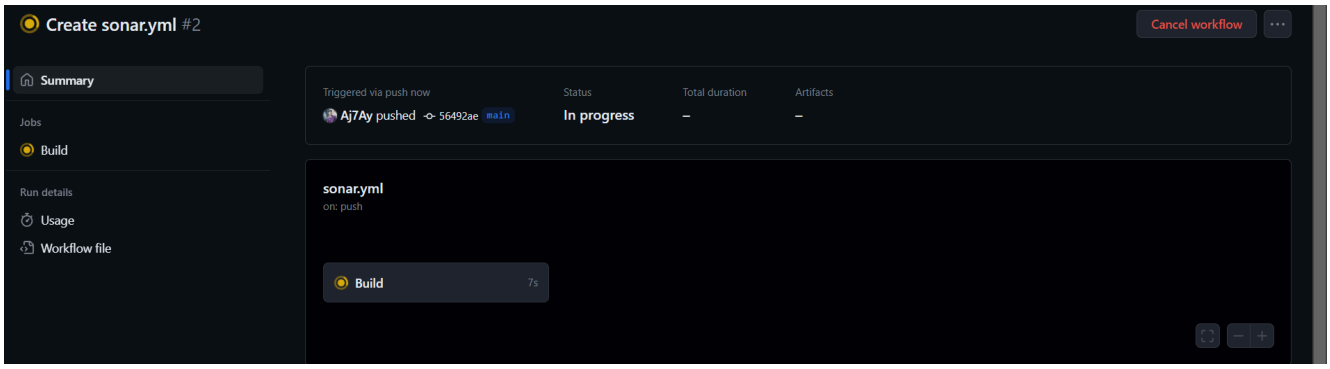
Now workflow is created.

Click on Actions now

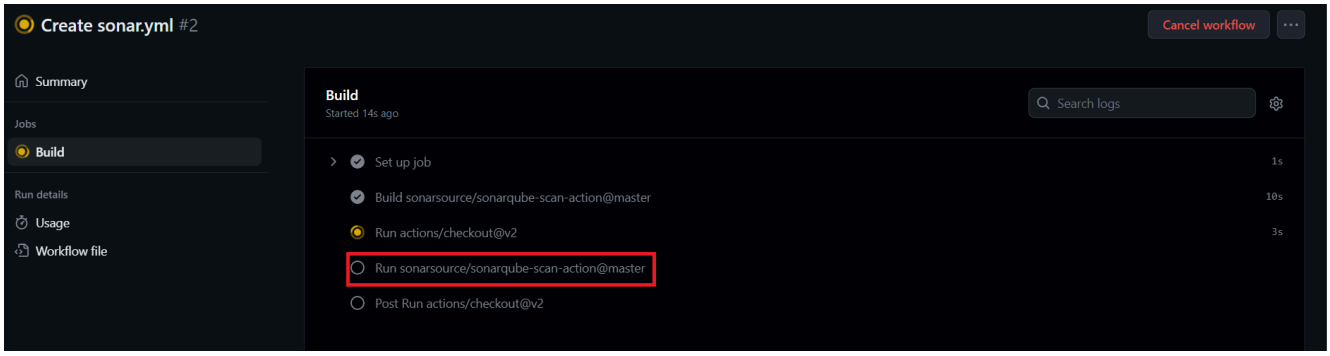


Now it's automatically started the workflow

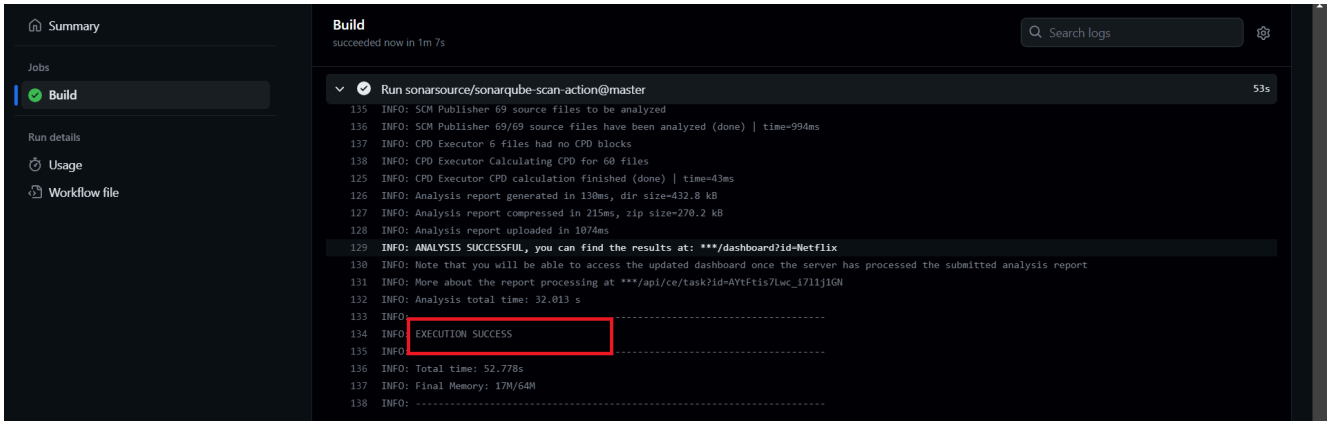




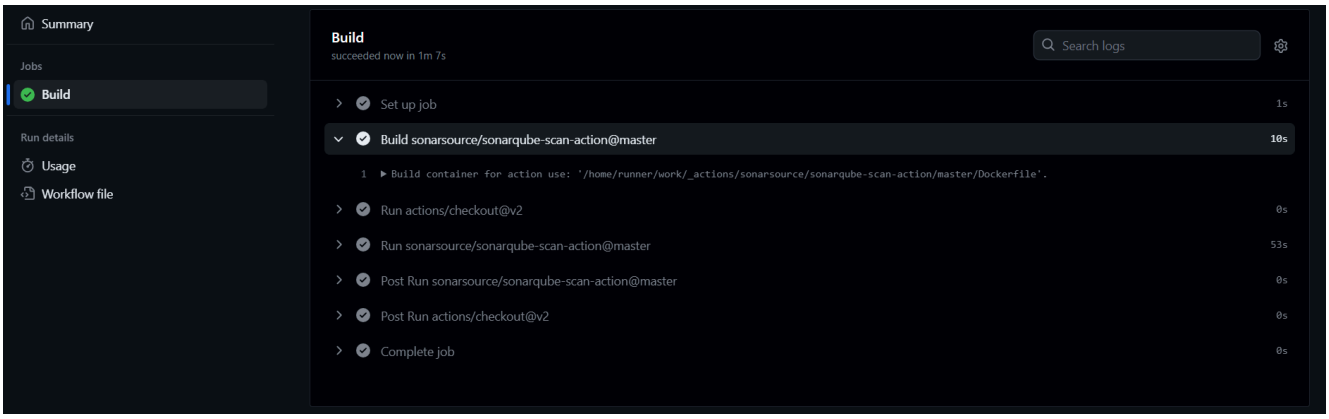
Let's click on Build and see what are the steps involved



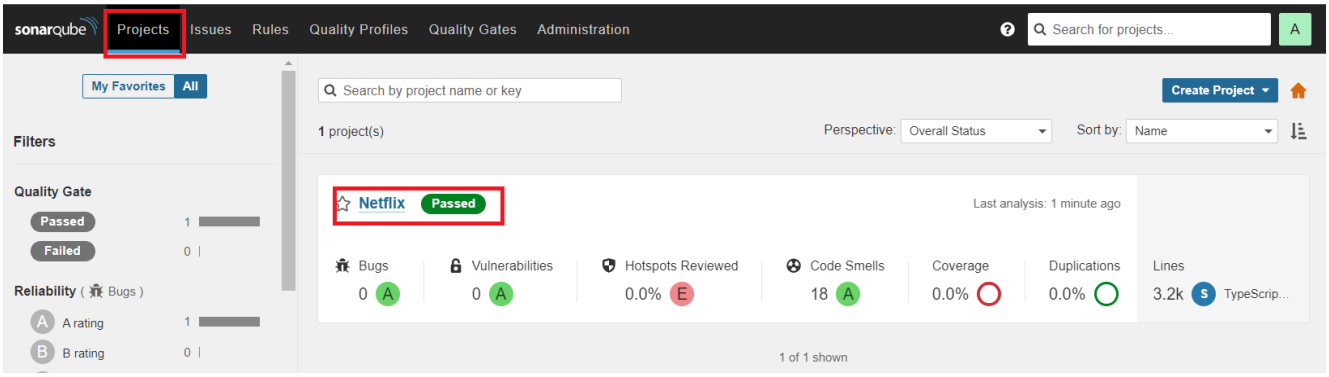
Click on Run Sonarsource and you can do this after the build completion



Build complete.



Go to the Sonarqube dashboard and click on projects and you can see the analysis



If you want to see the full report, click on issues.

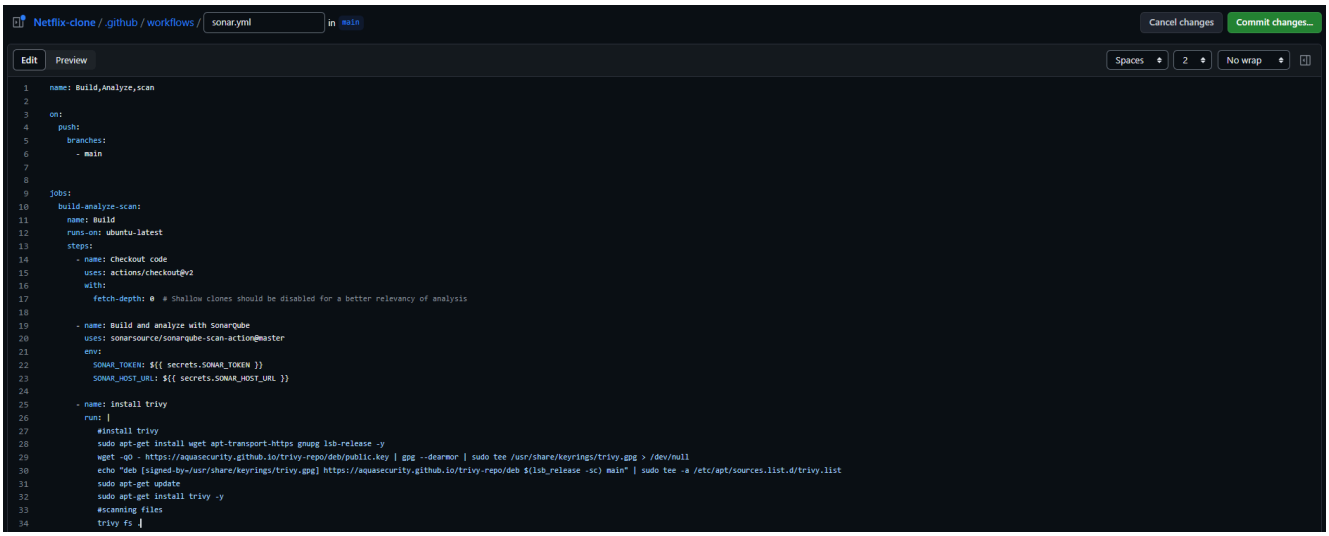
Step3: Let's scan files using Trivy

Add this code to your sonar.yml (I mean workflow)

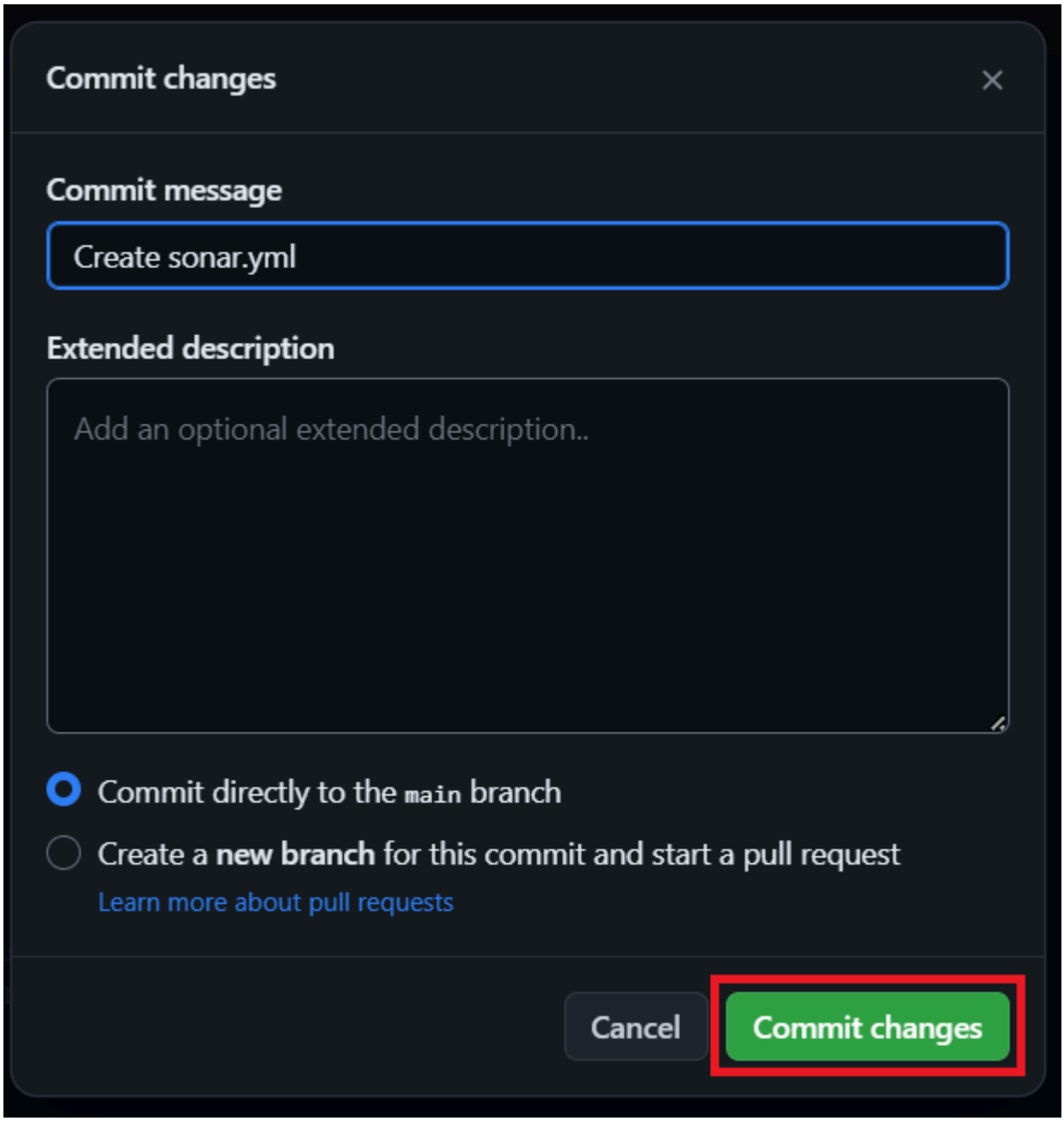
```
- name: install trivy
  run: |
    #install trivy
    sudo apt-get install wget apt-transport-https gnupg lsb-release -y
    wget -qO - https://aquasecurity.github.io/trivy-repo/deb/public.key
    echo "deb [signed-by=/usr/share/keyrings/trivy.gpg] https://aquasecu
    sudo apt-get update
    sudo apt-get install trivy -y
    #command to scan files
    trivy fs .
```

GitHub Actions workflow step that installs Trivy, a popular open-source vulnerability scanner for containers, and then uses it to scan the files.

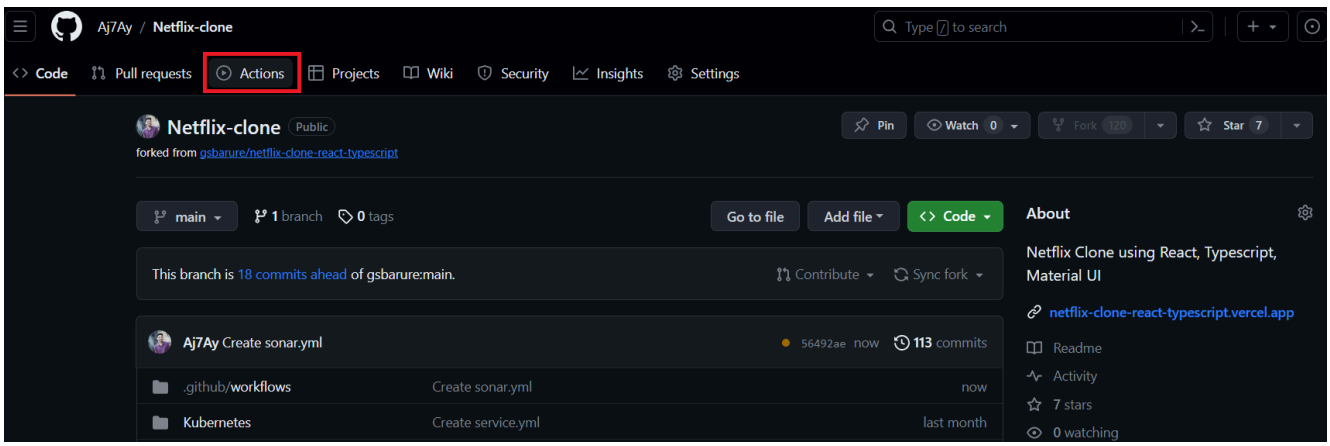
I added a step in the workflow



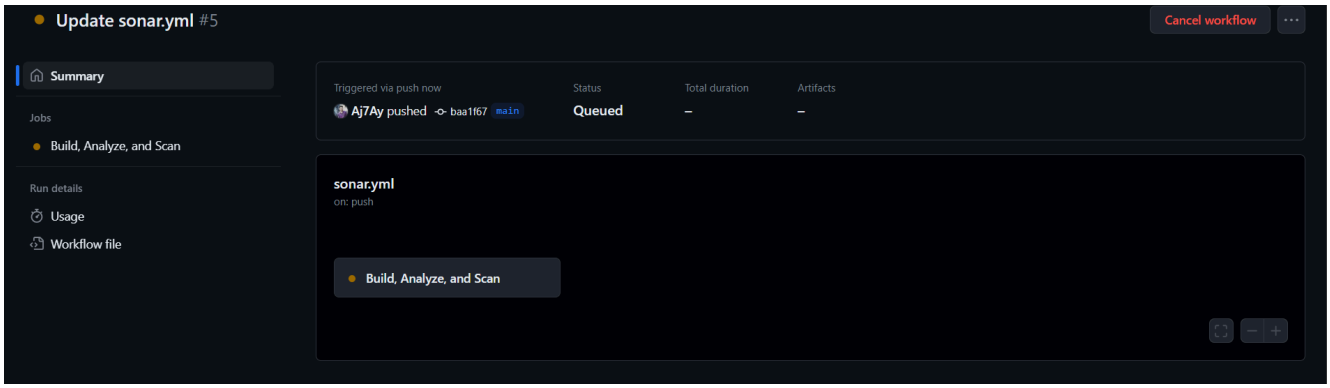
Commit changes



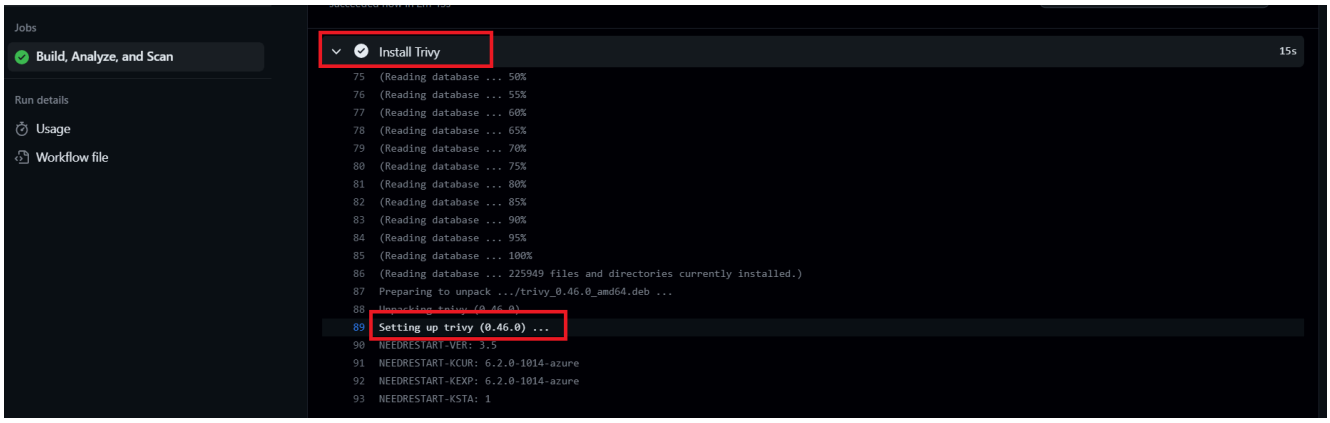
Click on actions again



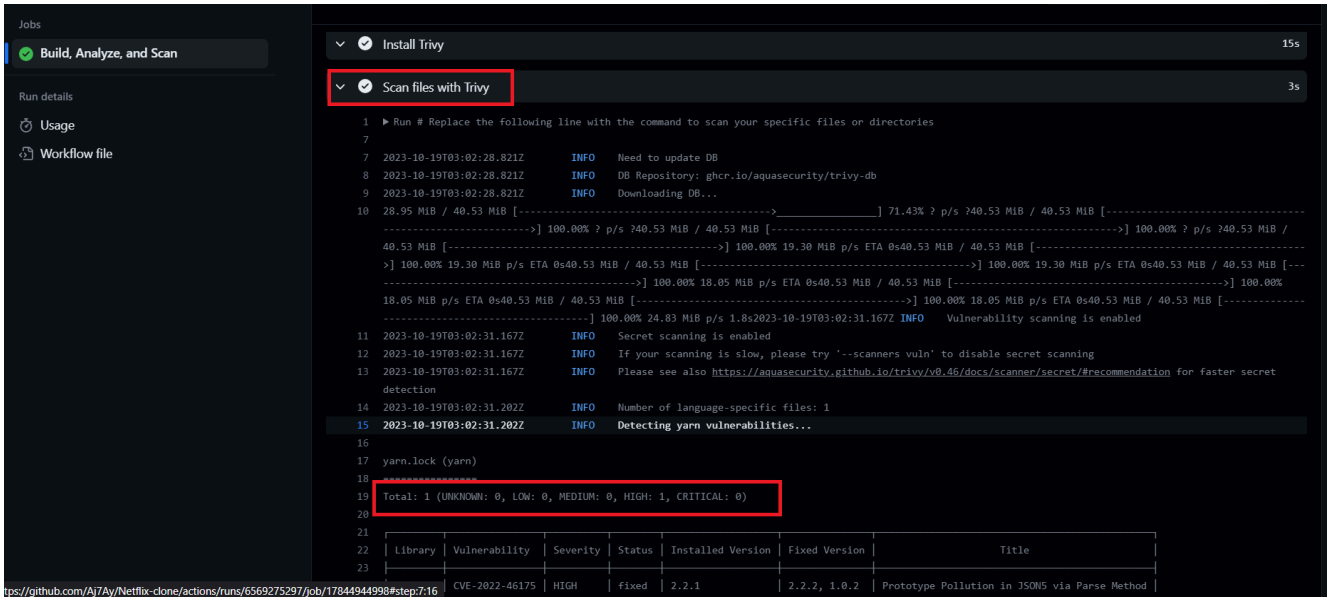
It started the workflow build



Click on Build, Analyze and scan



It installed Trivy version 0.46.0 and scanned files also. See report

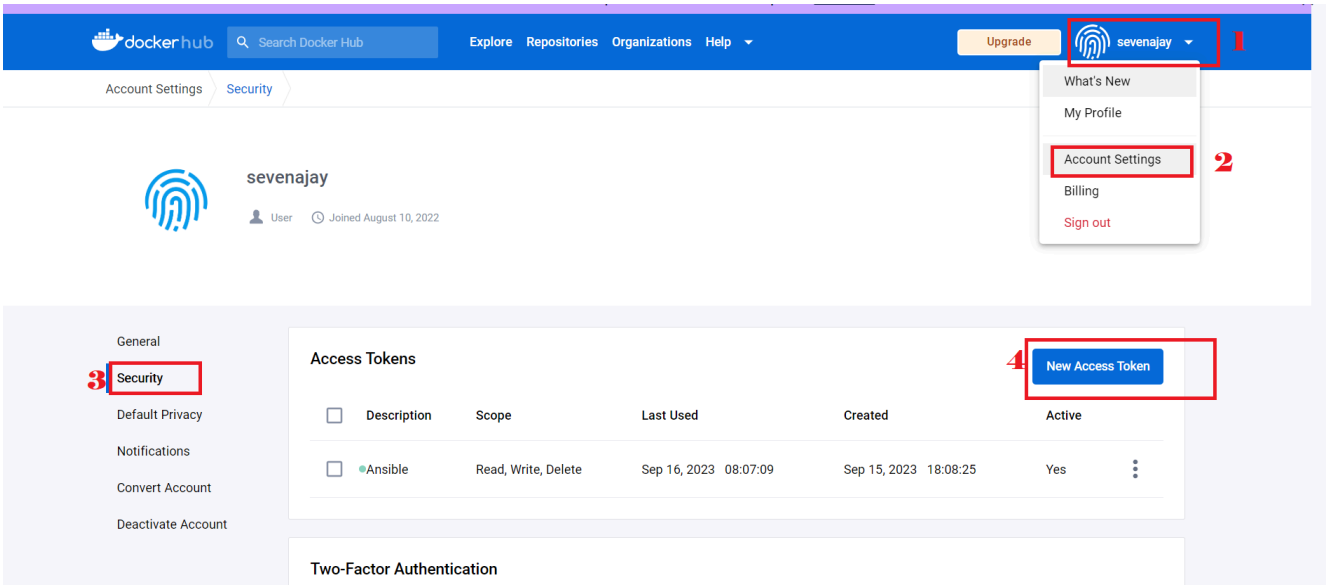


The file scan is completed, this is another security check

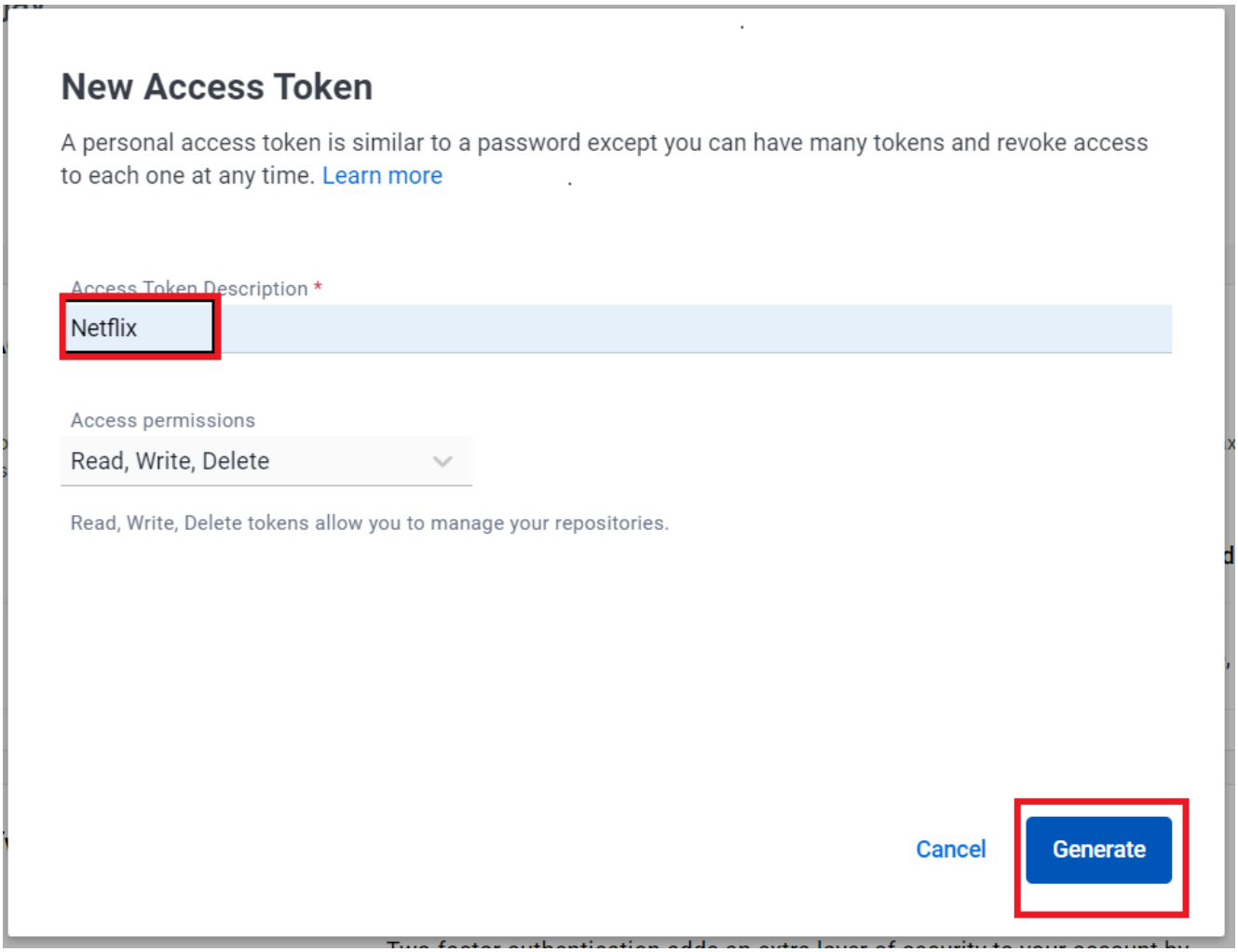
Step4A: Docker build and push to Dockerhub

Create a Personal Access token for your Dockerhub account

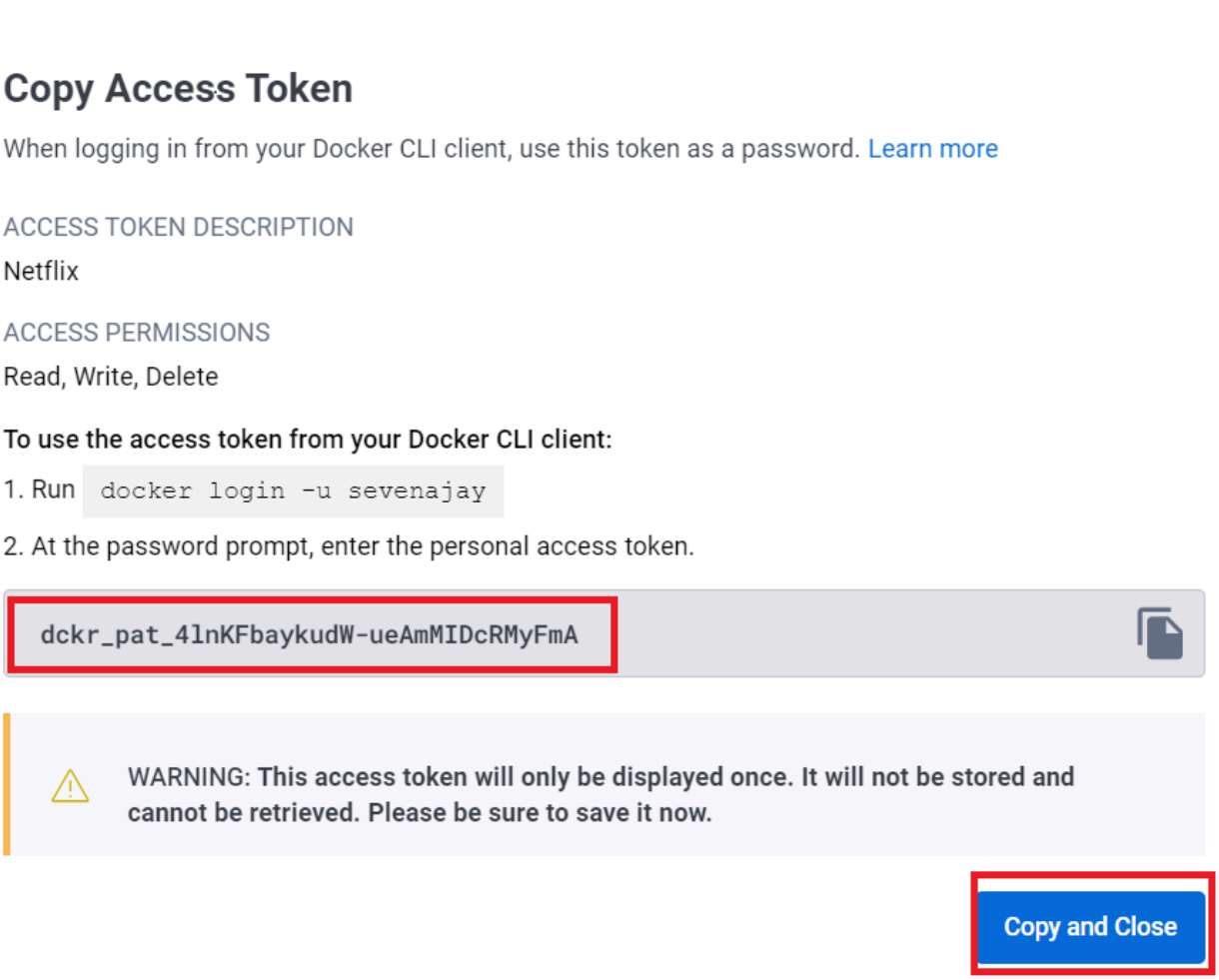
Go to docker hub and click on your profile –> Account settings –> security –> New access token



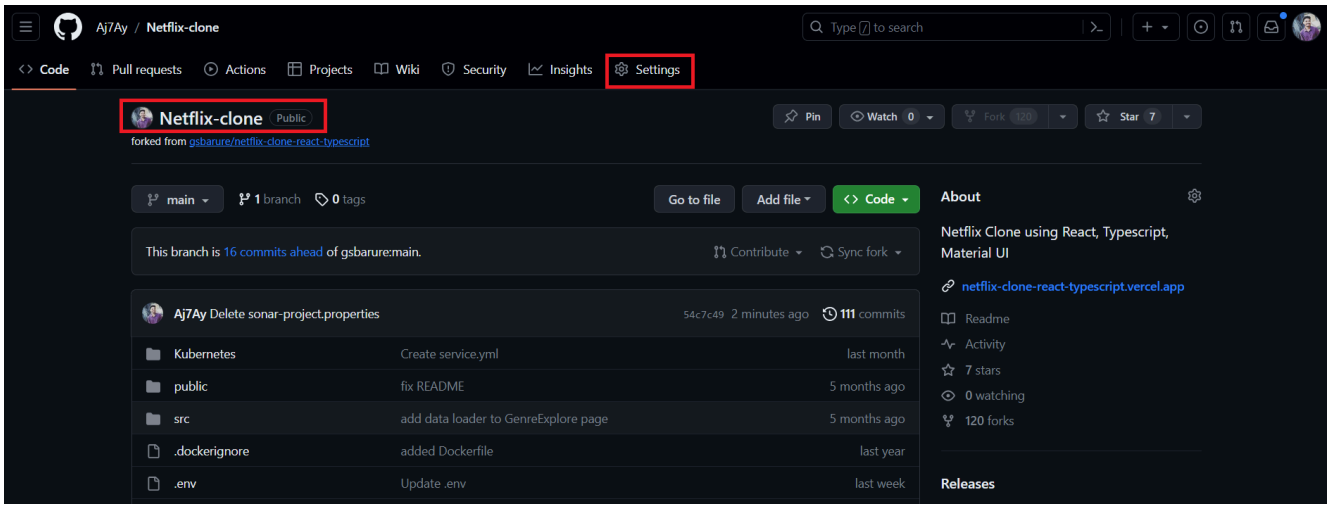
It asks for a name Provide a name and click on generate token



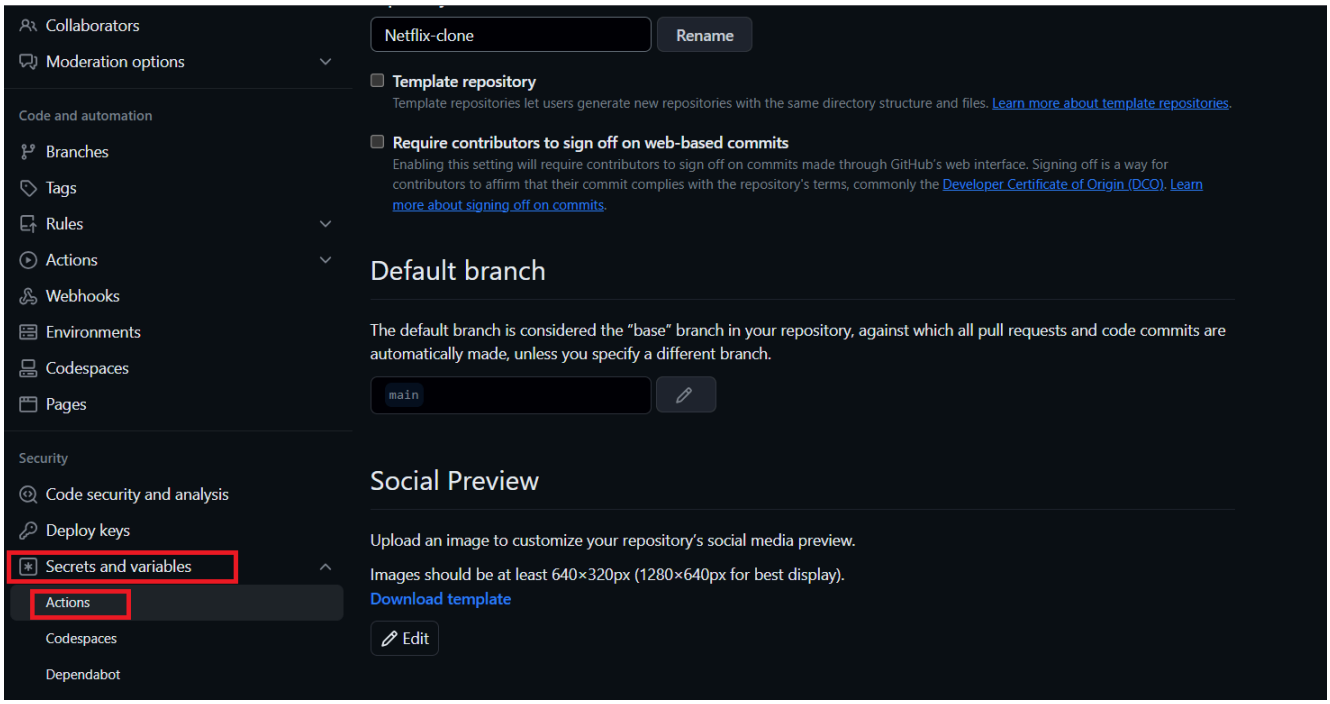
Copy the token save it in a safe place, and close



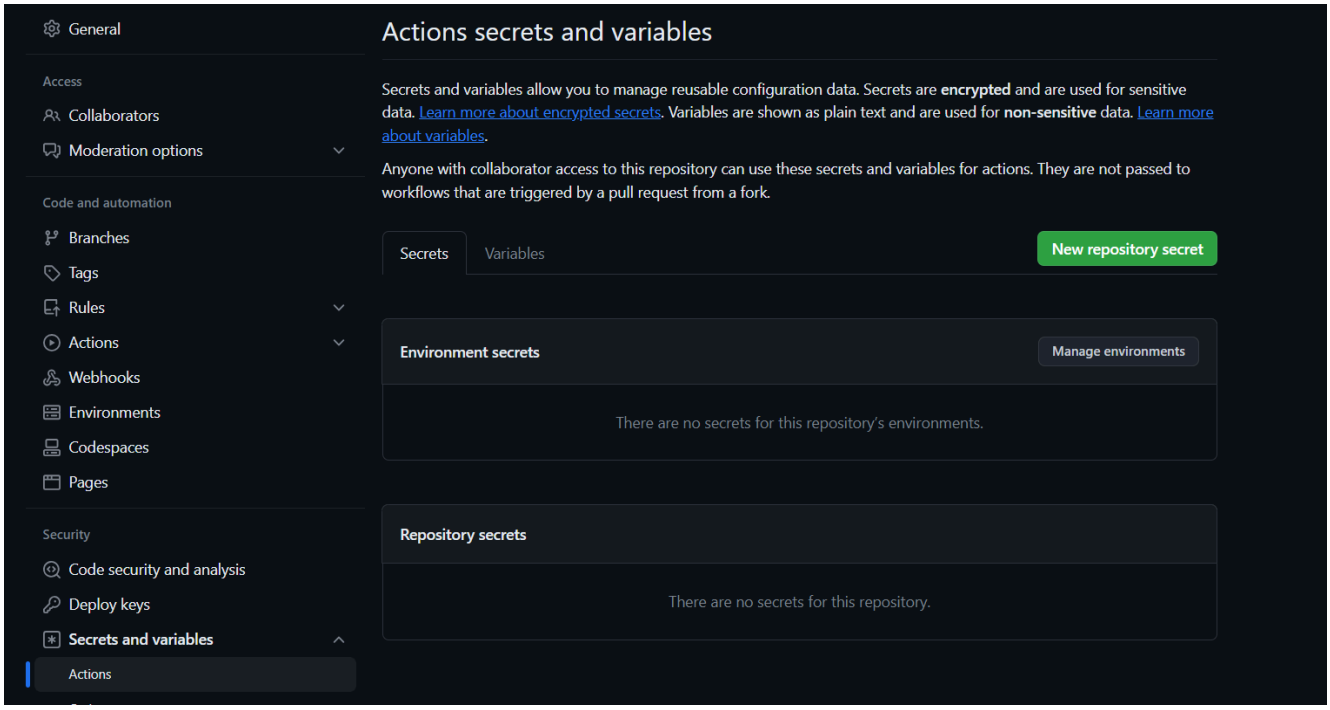
Now Go to GitHub again and click on settings



Search for Secrets and variables and click on and again click on actions

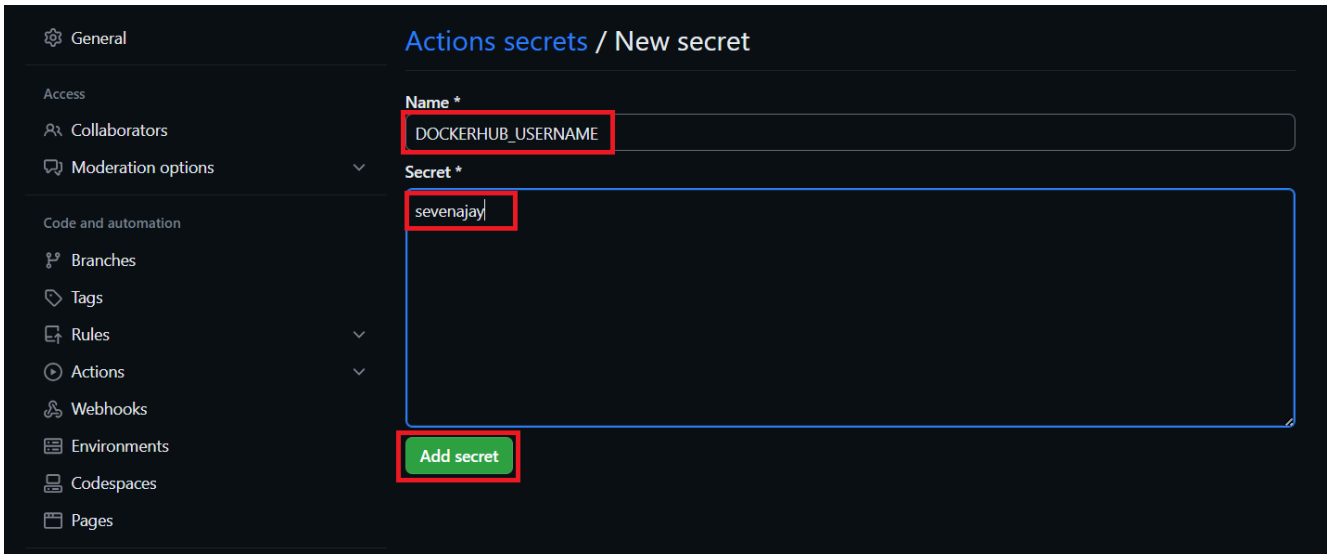


It will open a page like this click on New Repository secret



Add your Dockerhub username with the secret name as

```
DOCKERHUB_USERNAME #use your dockerhub username
```

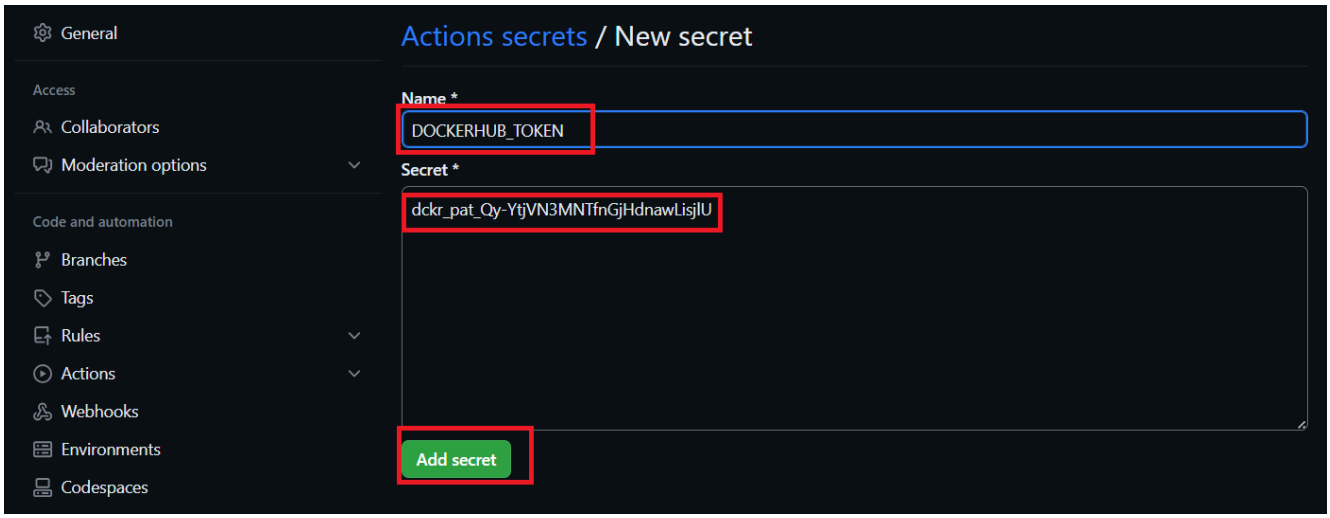


Click on Add Secret.

Let's add our token also and click on the new repository secret again

Name

```
DOCKERHUB_TOKEN
```

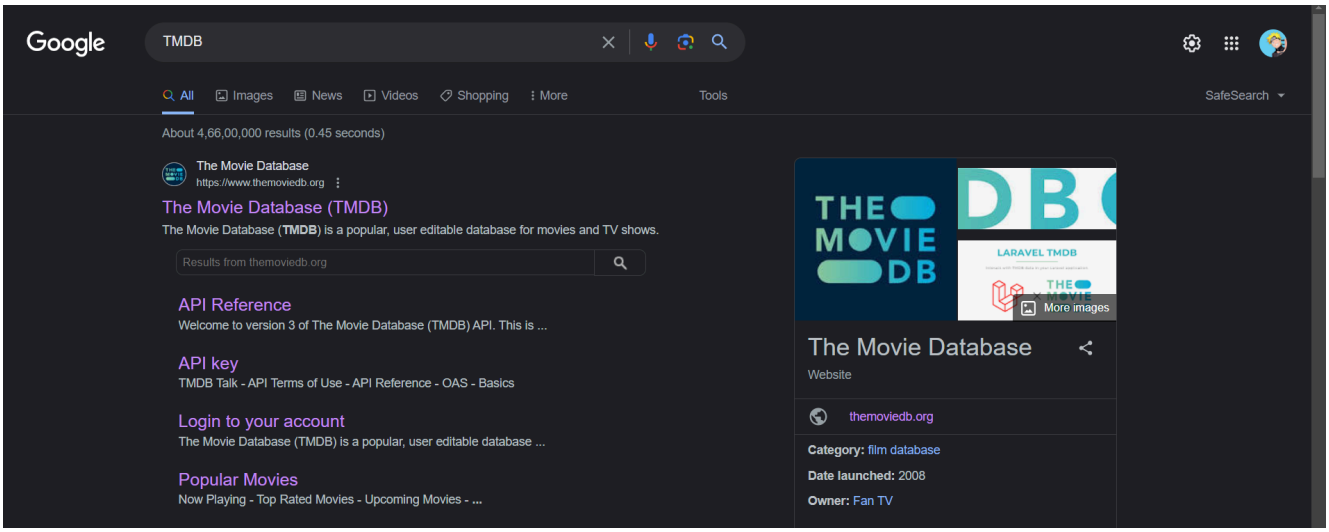


Paste the token that you generated and click on Add secret.

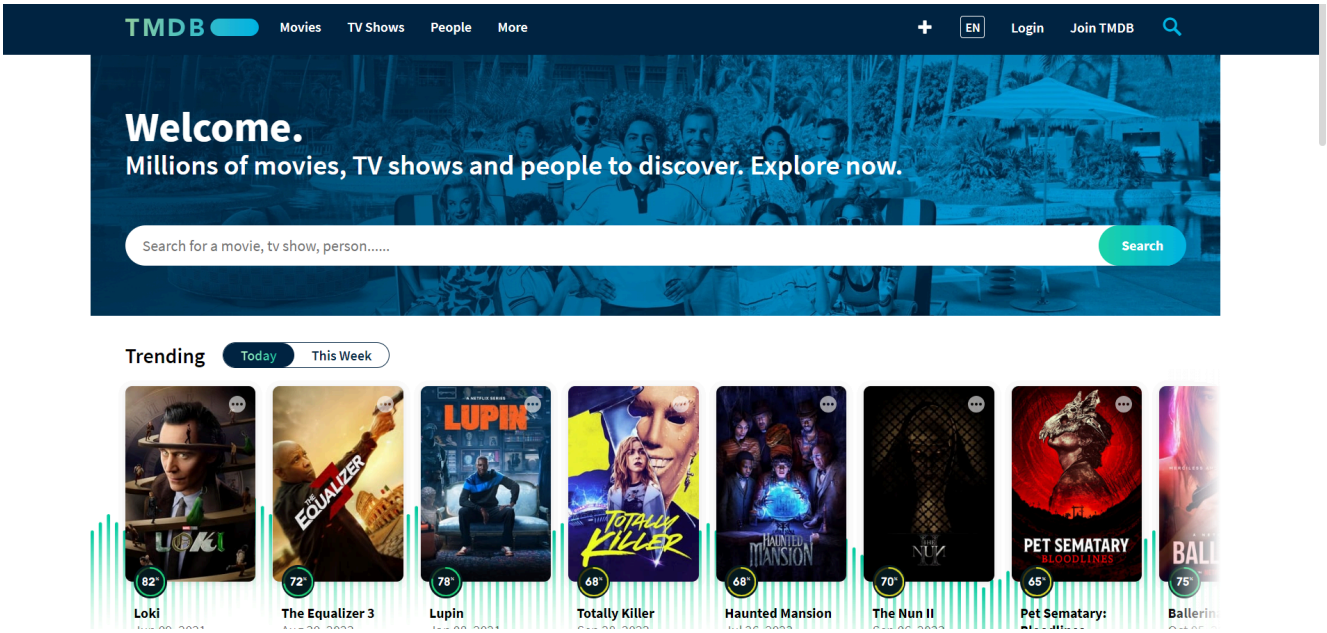
Step4B: Create a TMDB API Key

Next, we will create a TMDB API key

Open a new tab in the Browser and search for TMDB

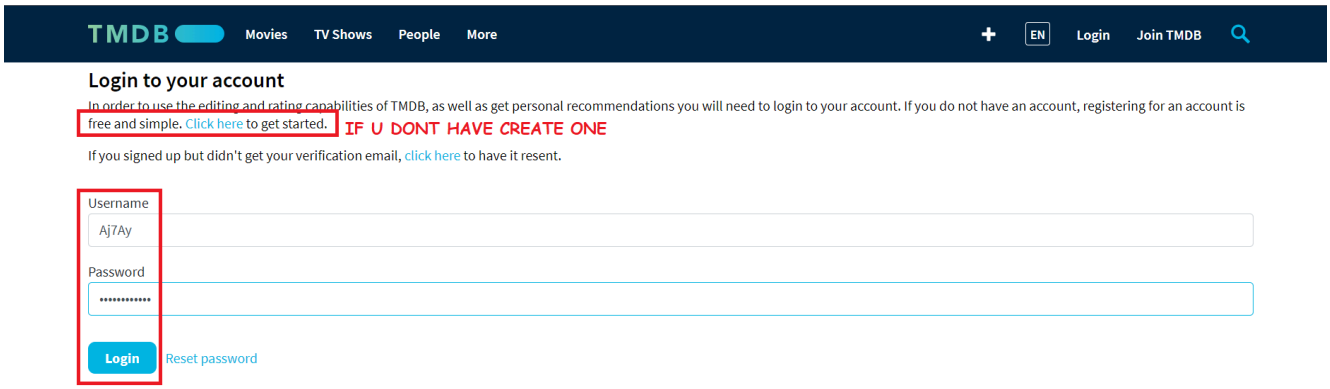


Click on the first result, you will see this page

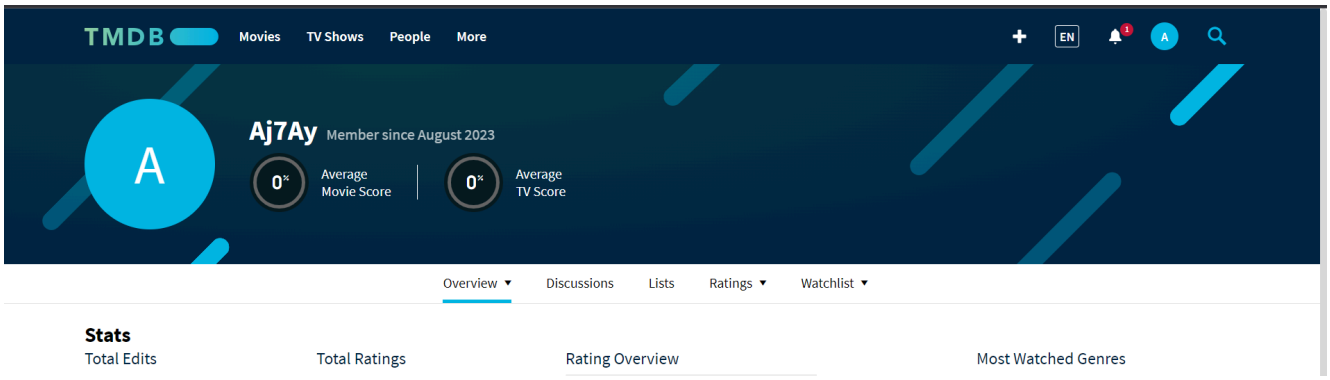


Click on the Login on the top right. You will get this page.

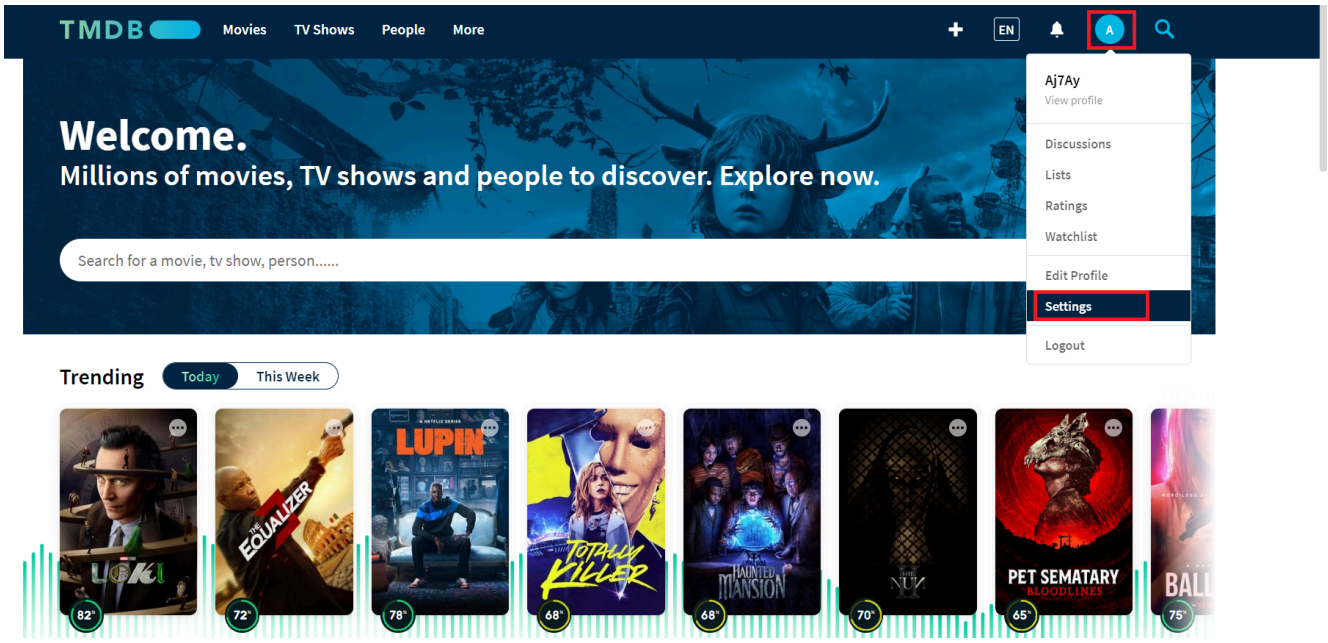
You need to create an account here. click on click here. I have an account that's why I added my details there.



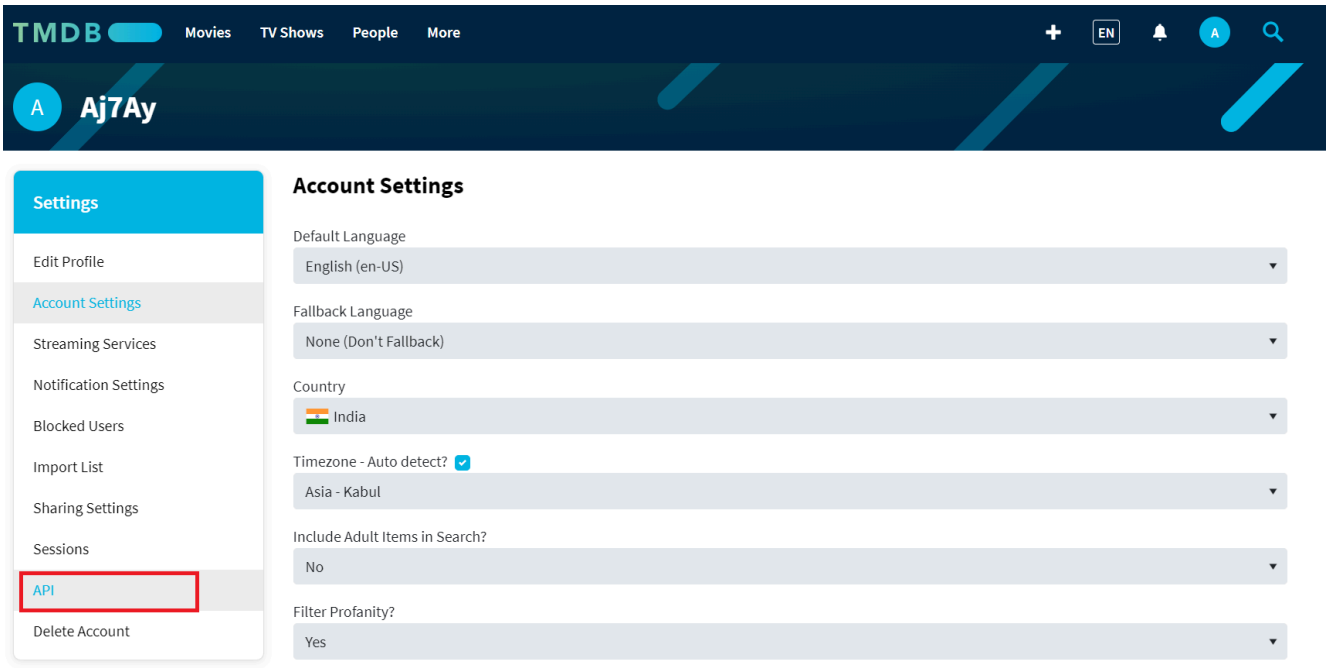
once you create an account you will see this page.



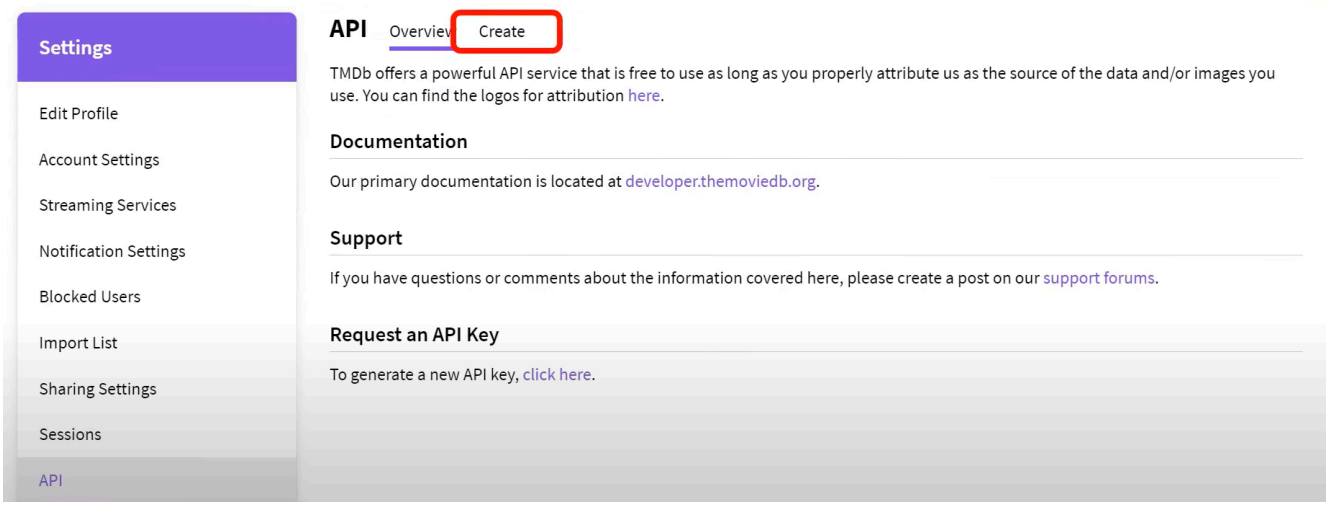
Let's create an API key, By clicking on your profile and clicking settings.



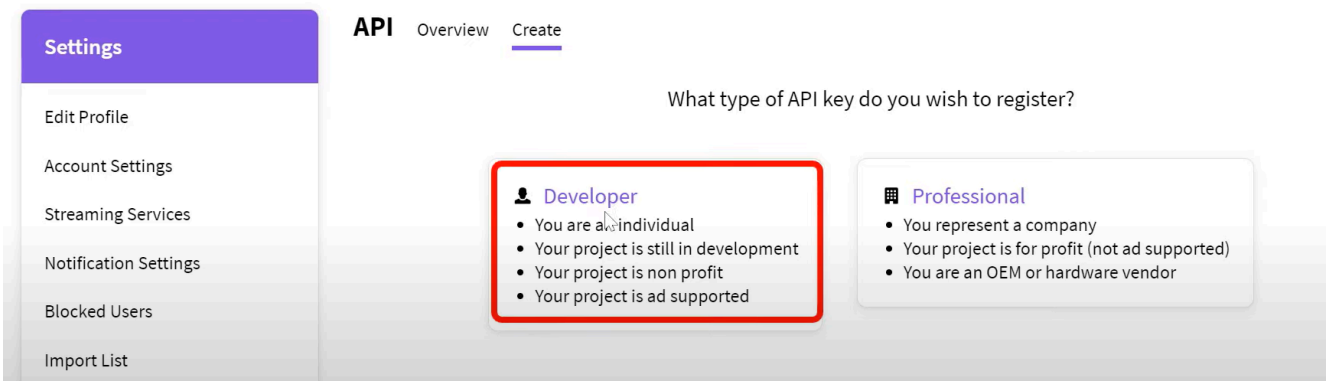
Now click on API from the left side panel.



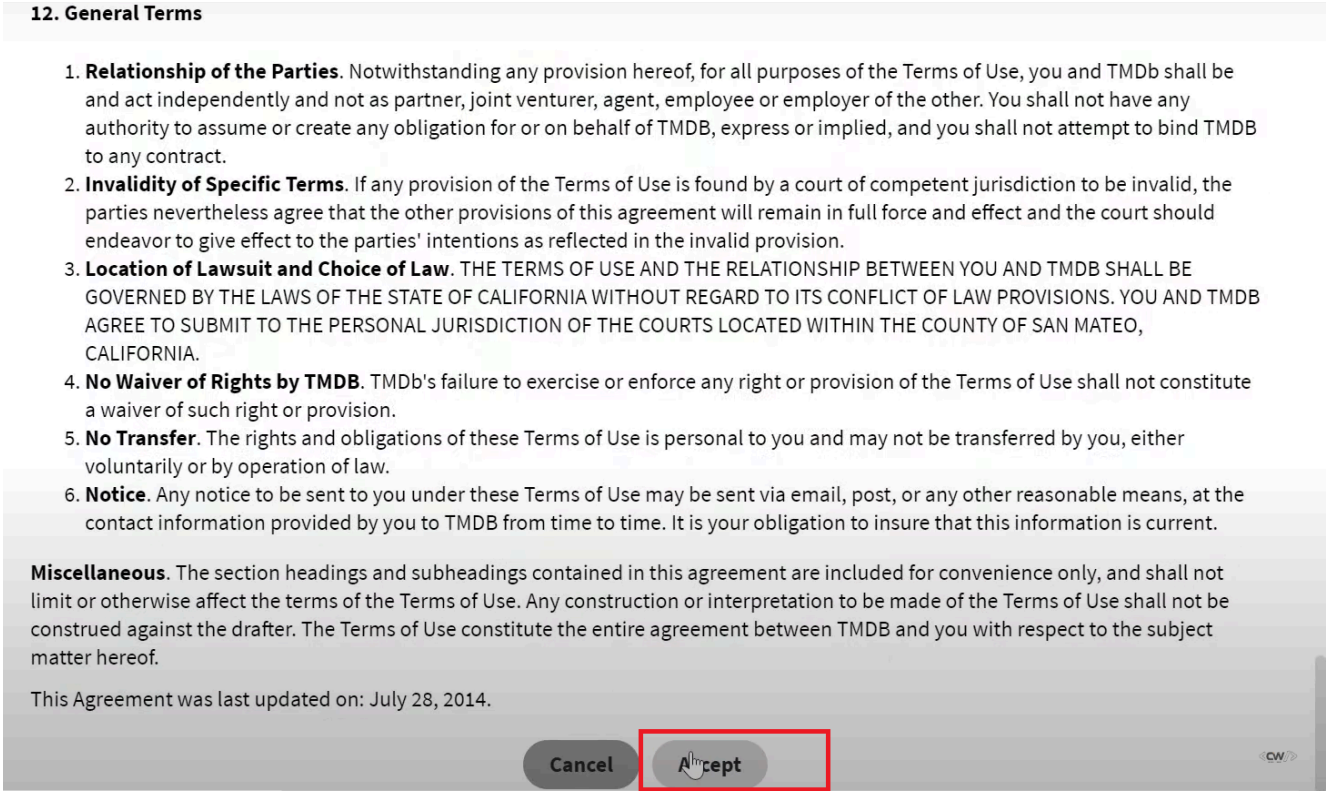
Now click on create



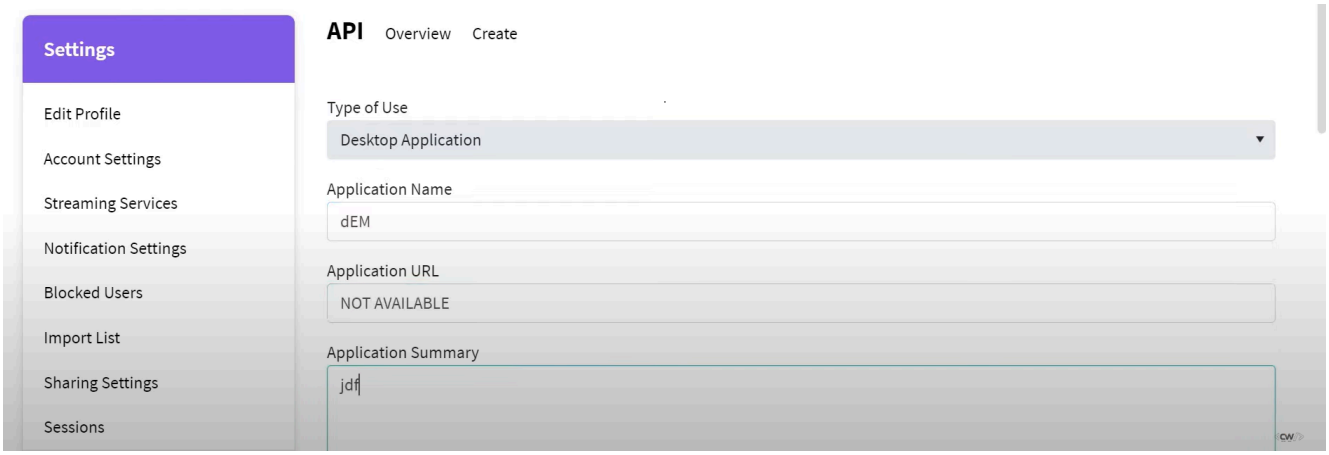
Click on Developer

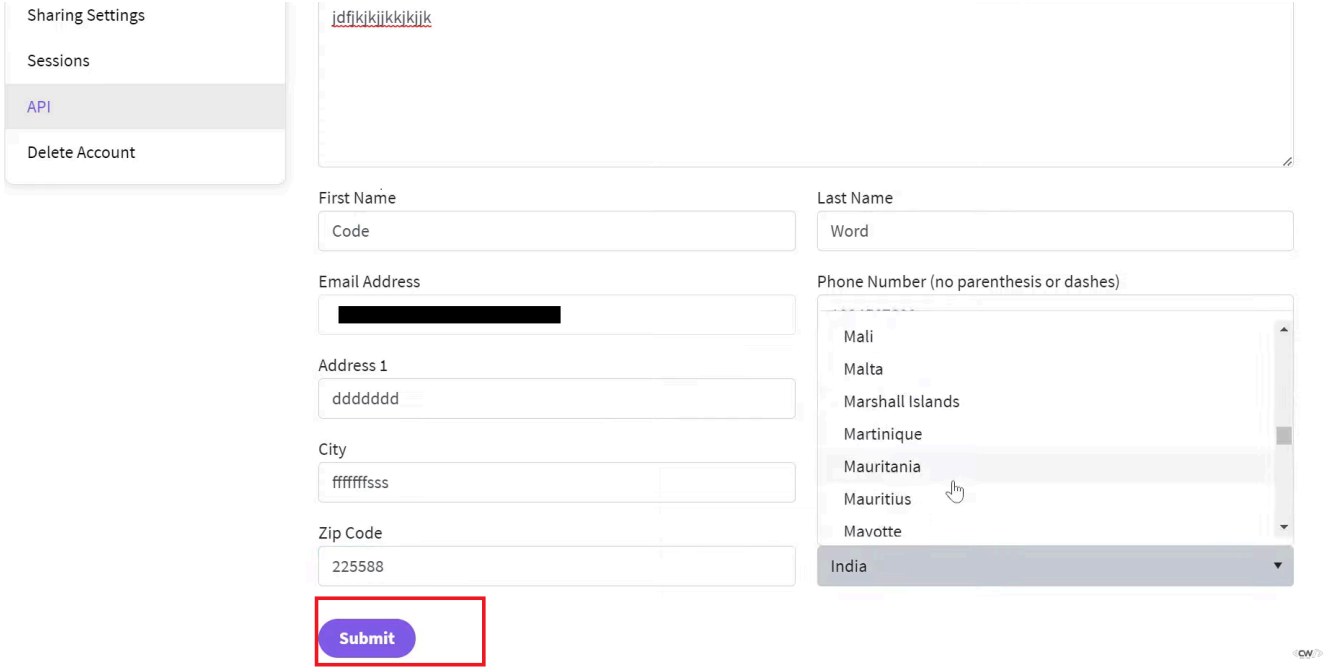


Now you have to accept the terms and conditions.

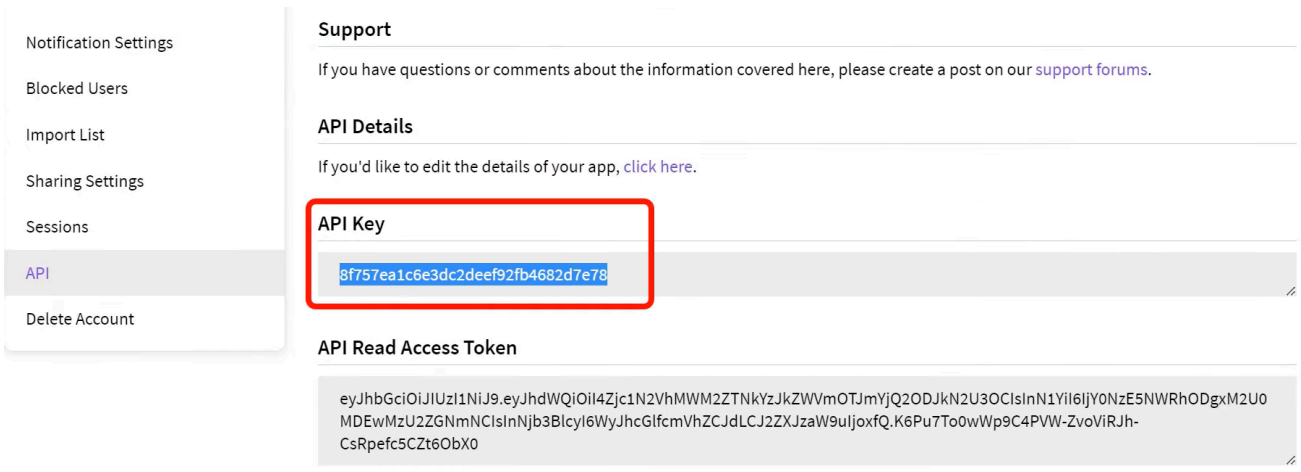


Provide basic details





Click on submit and you will get your API key.



Let's add the below step to the workflow

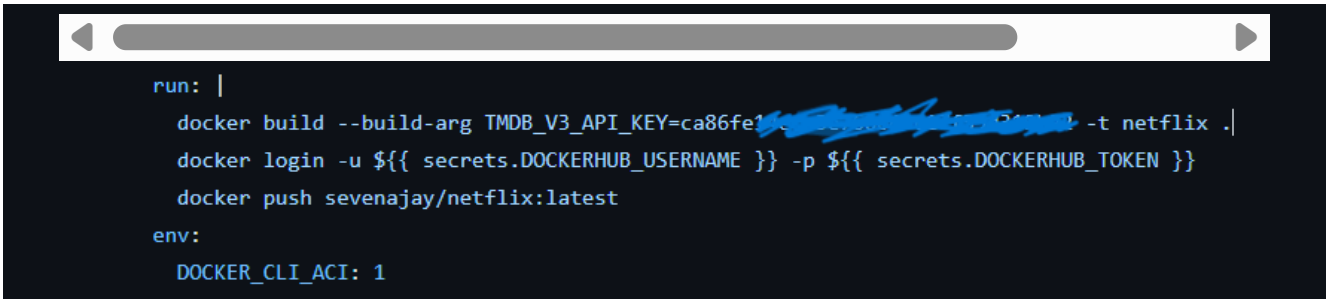
You have to add API at the Build command

Change your username also

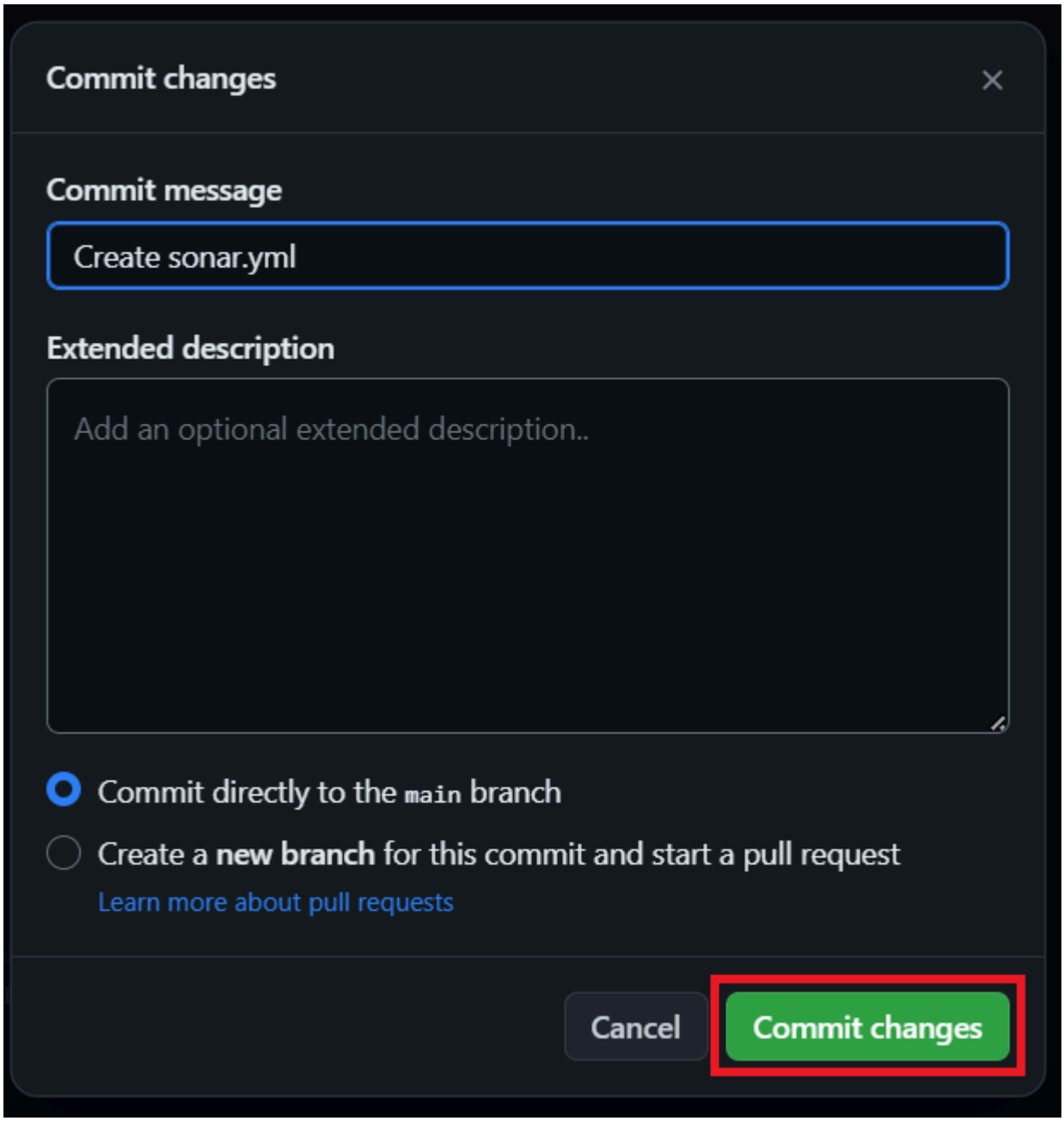
```
- name: Docker build and push
  run: |
    #run commands to build and push docker images
    docker build --build-arg TMDB_V3_API_KEY=<USE YOUR API KEY> -t netf
    docker tag netflix sevenajay/netflix:latest
    docker login -u ${{ secrets.DOCKERHUB_USERNAME }} -p ${{ secrets.DO
```

```
      docker push sevenajay/netflix:latest
    env:
      DOCKER_CLI_ACI: 1
```

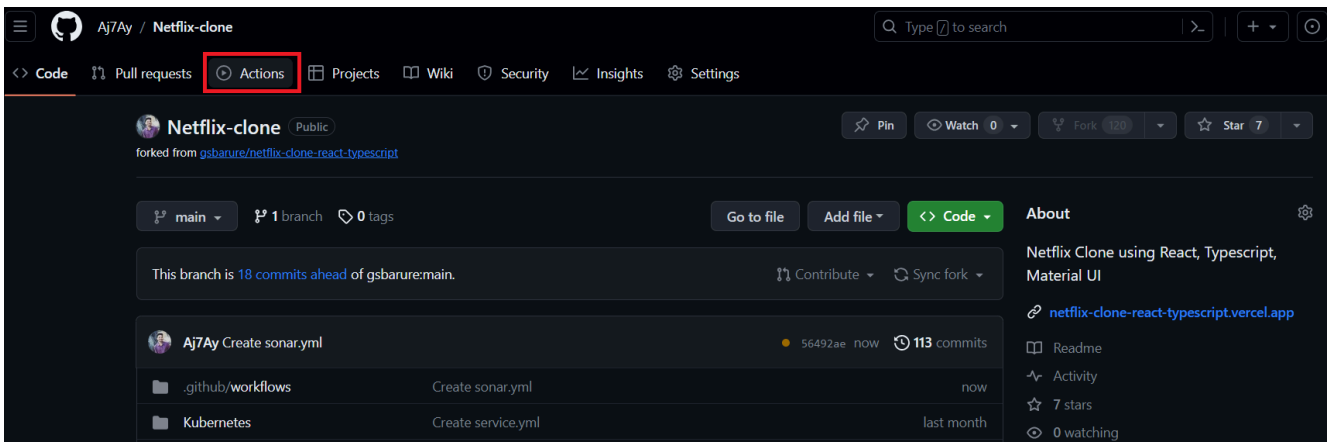
You can see the image, I already added



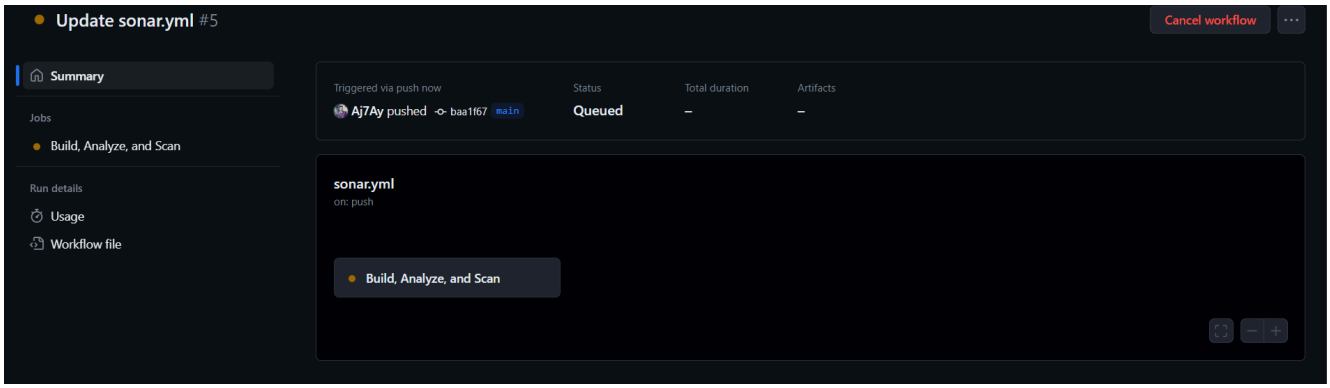
Let's commit changes



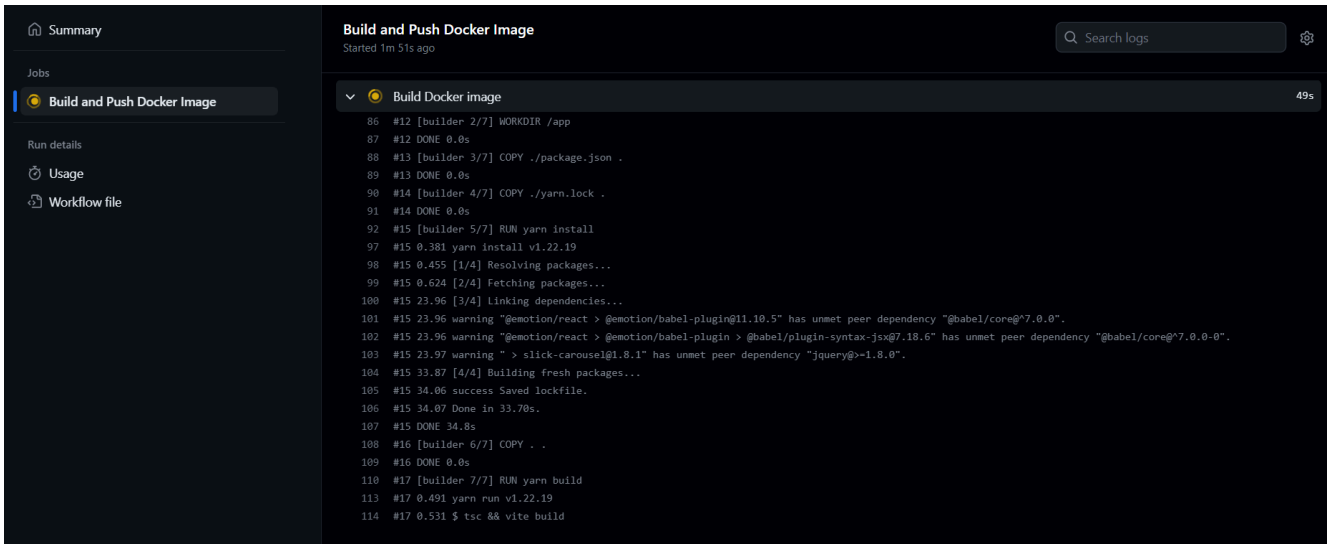
Click on actions again



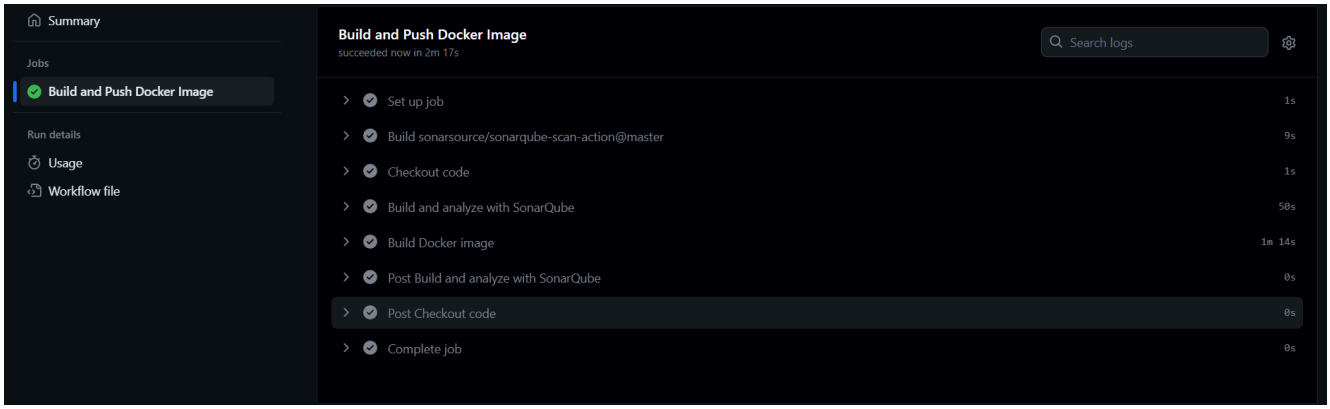
It started the workflow build



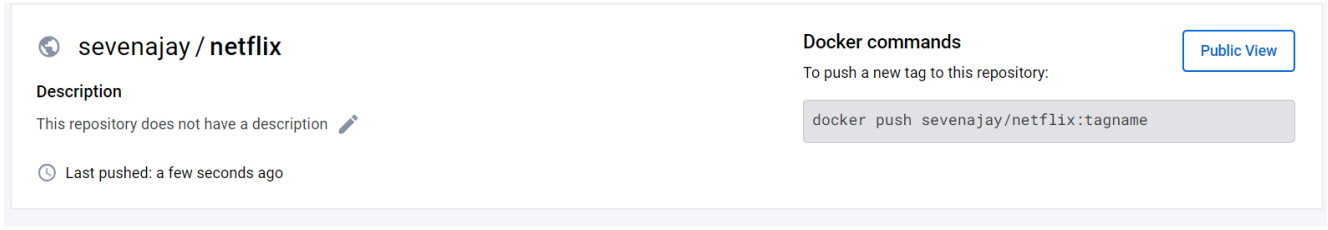
Click on Build, Analyze and Scan. You will see this Docker image is building now



Build Succeeded

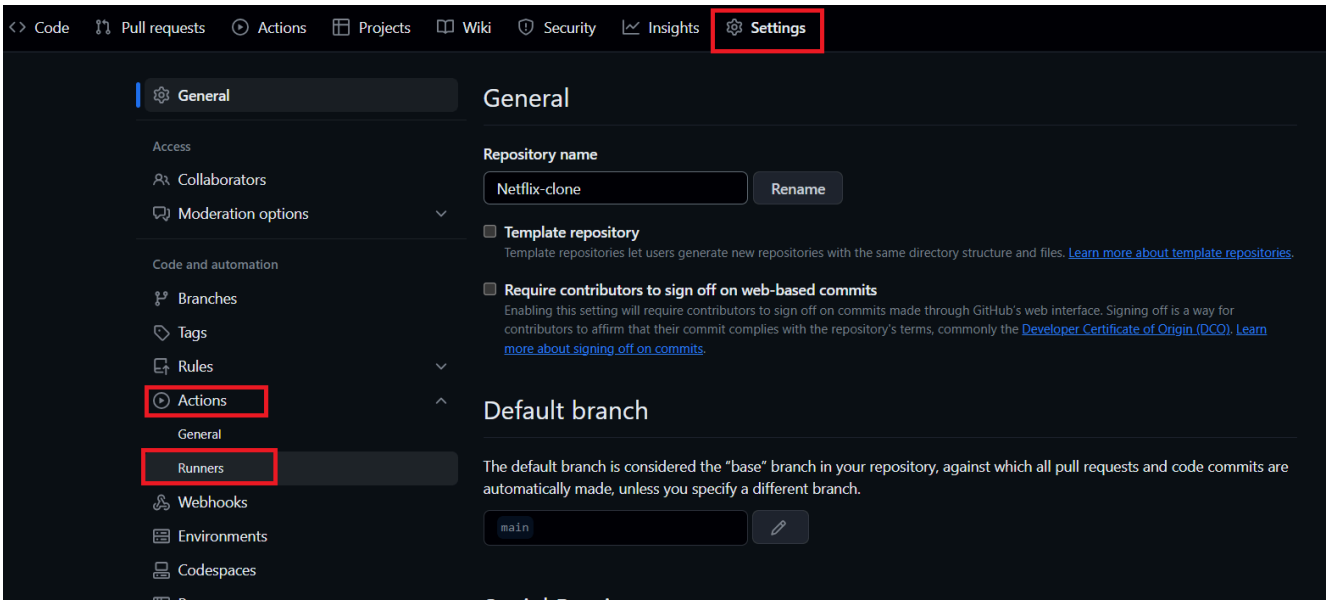


If you go to your Docker hub, you will find that the image is pushed to Dockerhub

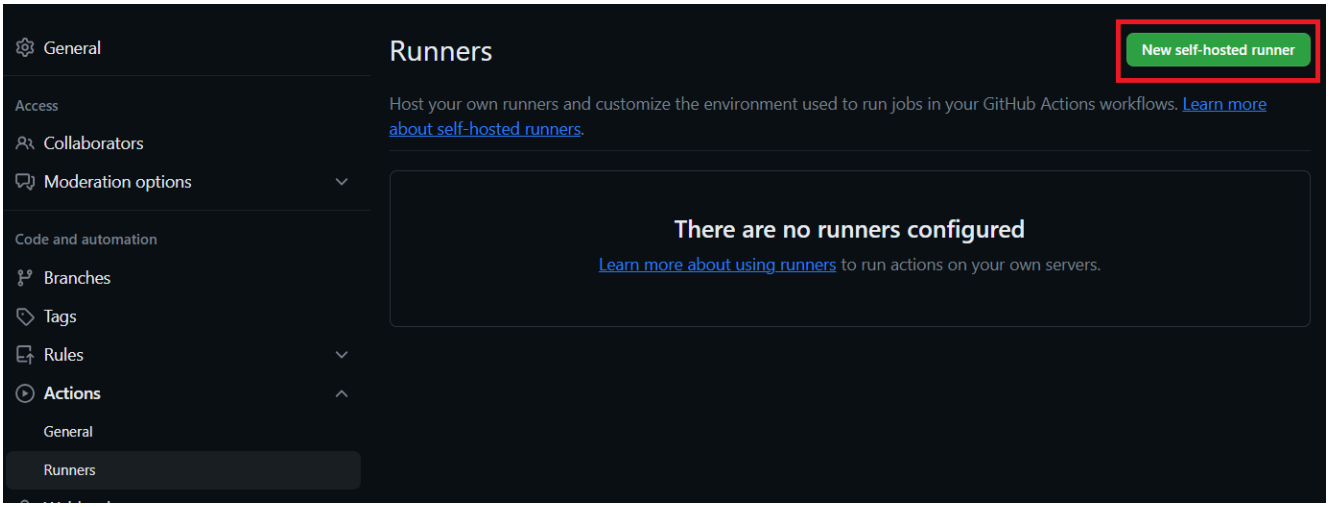


Step5A: Add a self-hosted runner to Ec2

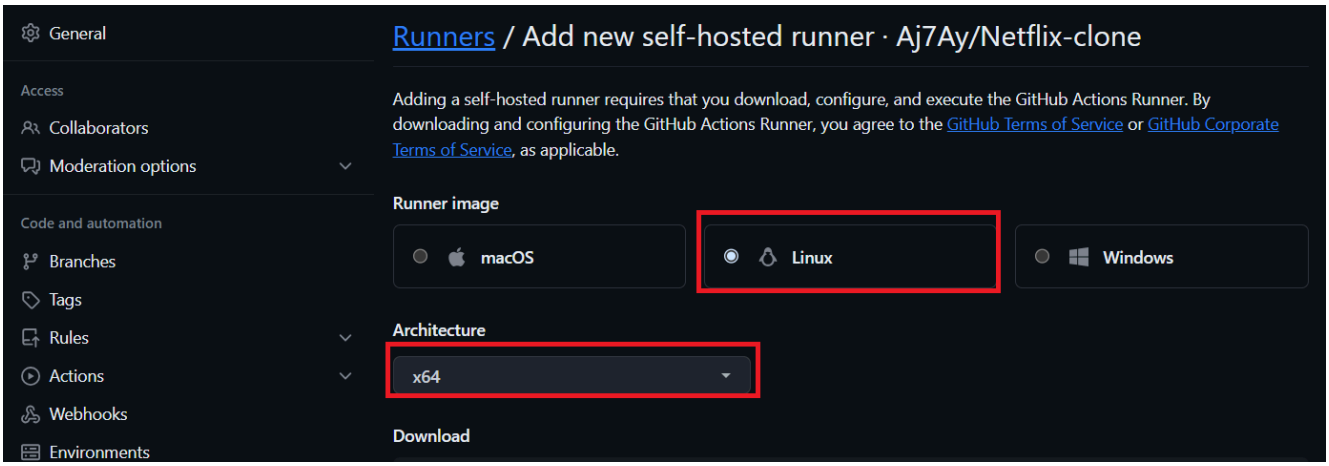
Go to GitHub and click on Settings –> Actions –> Runners



Click on New self-hosted runner



Now select Linux and Architecture X64



Use the below commands to add a self-hosted runner

Download

```
# Create a folder
$ mkdir actions-runner && cd actions-runner
# Download the latest runner package
$ curl -o actions-runner-linux-x64-2.310.2.tar.gz -L
https://github.com/actions/runner/releases/download/v2.310.2/actions-runner-linux-x64-2.310.2.tar.gz
# Optional: Validate the hash
$ echo "fb28a1c3715e0a6c5051af0e6eeff9c255009e2eec6fb08bc2708277fbb49f93  actions-runner-linux-x64-
2.310.2.tar.gz" | shasum -a 256 -c
# Extract the installer
$ tar xzf ./actions-runner-linux-x64-2.310.2.tar.gz
```

Configure

```
# Create the runner and start the configuration experience
$ ./config.sh --url https://github.com/Aj7Ay/Netflix-clone --token A2MXW45MNGB3QV6SJ6D5LWTFGCRPW
# Last step, run it!
$ ./run.sh
```

Using your self-hosted runner

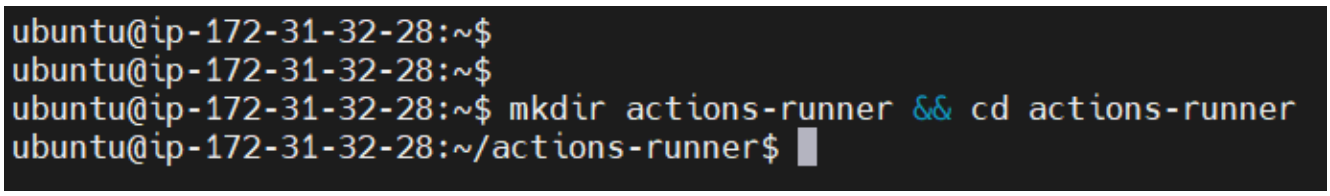
```
# Use this YAML in your workflow file for each job
runs-on: self-hosted
```

Go to Putty or Mobaxtreme and connect to your ec2 instance

And paste the commands

NOTE: USE YOUR RUNNER COMMANDS (EXAMPLE CASE IAM USING MINE)

```
mkdir actions-runner && cd actions-runner
```



The command “mkdir actions-runner && cd actions-runner” is used to create a new directory called “actions-runner” in the current working directory and then immediately change the current working directory to the newly created “actions-runner” directory. This allows you to organize your files and perform subsequent actions within the newly created directory without having to navigate to it separately.

```
curl -o actions-runner-linux-x64-2.310.2.tar.gz -L https://github.com/a
```

This command downloads a file called “actions-runner-linux-x64-2.310.2.tar.gz” from a specific web address on GitHub and saves it in your current directory.

Let’s validate the hash installation

```
echo "fb28a1c3715e0a6c5051af0e6eeff9c255009e2eec6fb08bc2708277fbb49f93
```

```
ubuntu@ip-172-31-32-28:~/actions-runner$
ubuntu@ip-172-31-32-28:~/actions-runner$
ubuntu@ip-172-31-32-28:~/actions-runner$ echo "fb28a1c3715e0a6c5051af0e6eeff9c255009e2eec6fb08bc2708277fbb49f93  actions-runner-linux-x64-2.310.2.tar.gz" | shasum -a 256 -c
actions-runner-linux-x64-2.310.2.tar.gz: OK
ubuntu@ip-172-31-32-28:~/actions-runner$
```

Now Extract the installer

```
tar xzf ./actions-runner-linux-x64-2.310.2.tar.gz
```

```
ubuntu@ip-172-31-32-28:~/actions-runner$
ubuntu@ip-172-31-32-28:~/actions-runner$
ubuntu@ip-172-31-32-28:~/actions-runner$ tar xzf ./actions-runner-linux-x64-2.310.2.tar.gz
ubuntu@ip-172-31-32-28:~/actions-runner$
```

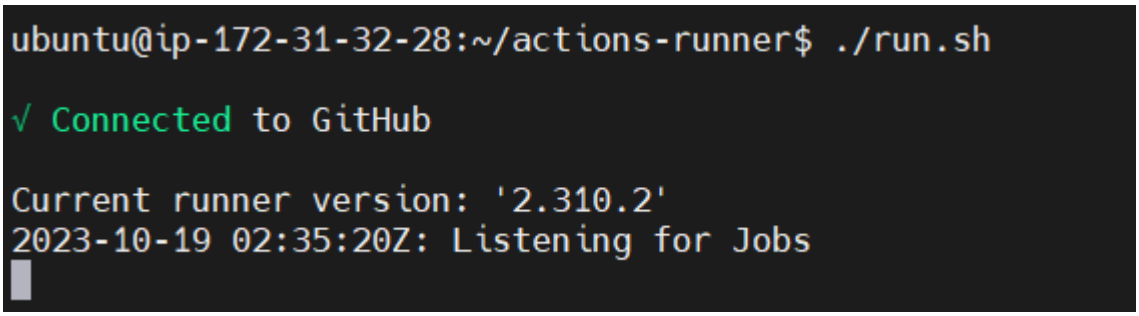
Let's configure the runner

```
./config.sh --url https://github.com/Aj7Ay/Netflix-clone --token A2MXW4
```

```
ubuntu@ip-172-31-32-28:~/actions-runner$
ubuntu@ip-172-31-32-28:~/actions-runner$
ubuntu@ip-172-31-32-28:~/actions-runner$ ./config.sh --url https://github.com/Aj7Ay/Netflix-clone --token A2MXW45MNGB3QV6SJ6D5LWTFGCRPW

--------------------------------------------------------------------------------
|                            AJAY                                              |
|        ____ _ _   _   _       _          _     _                            |
|       / ___(_) |_| | | |_   _| |__      / \   __| |_(_) ___  _ __  ___       |
|      | |  _| | __| |_| | | | | '_ \    / _ \ / _| __| |/ _ \| '_ \/ __|      |
|      | |_| | | |_|  _  | |_| | |_) |  / ___ \ (_| |_| | (_) | | | \__ \      |
|       \____|_|\__|_| |_|\__,_|_.__/  /_/   \_\___|\__|_|\___/|_| |_|___/      |
|                                                                              |
|                       Self-hosted runner registration                        |
|                                                                              |
--------------------------------------------------------------------------------

# Authentication


√ Connected to GitHub

# Runner Registration

Enter the name of the runner group to add this runner to: [press Enter for Default]  CLICK ENTER

Enter the name of runner: [press Enter for ip-172-31-32-28] aws-netflix   PROVIDE A RUNNER NAME HERE

This runner will have the following labels: 'self-hosted', 'Linux', 'X64'
Enter any additional labels (ex. label-1,label-2): [press Enter to skip] aws-netflix  LABEL NAME

√ Runner successfully added
√ Runner connection is good

# Runner settings

Enter name of work folder: [press Enter for _work]  Enter

√ Settings Saved.

ubuntu@ip-172-31-32-28:~/actions-runner$
```

Let's start runner

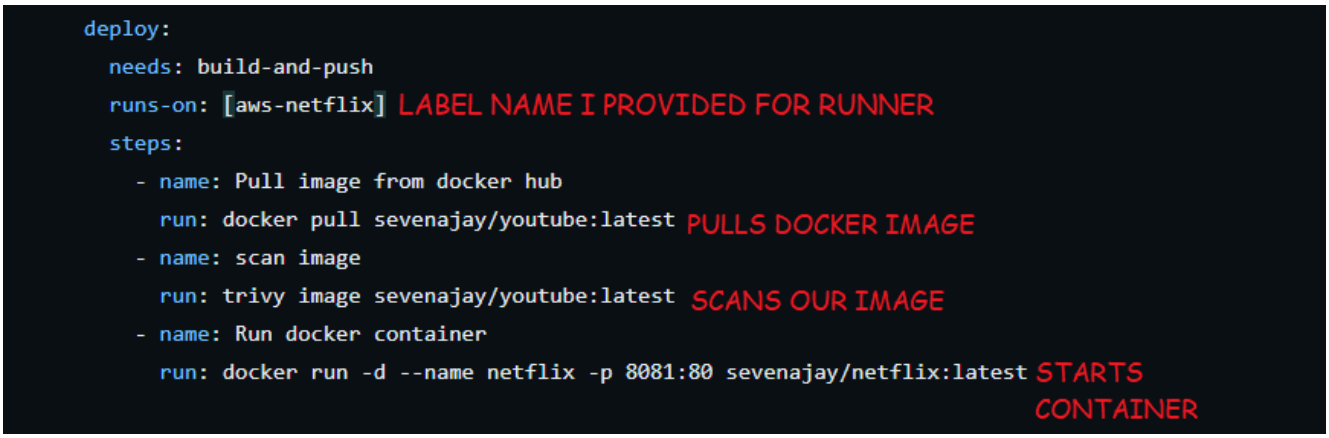
```
./run.sh
```



Step5B: Final workflow to run the container

Let's add a deployment workflow

```
deploy:
    needs: build-analyze-scan
    runs-on: [aws-netflix]
    steps:
      - name: Pull the docker image
        run: docker pull sevenajay/netflix:latest
      - name: Trivy image scan
        run: trivy image sevenajay/netflix:latest
      - name: Run the container netflix
        run: docker run -d --name netflix -p 8081:80 sevenajay/netflix:l
```

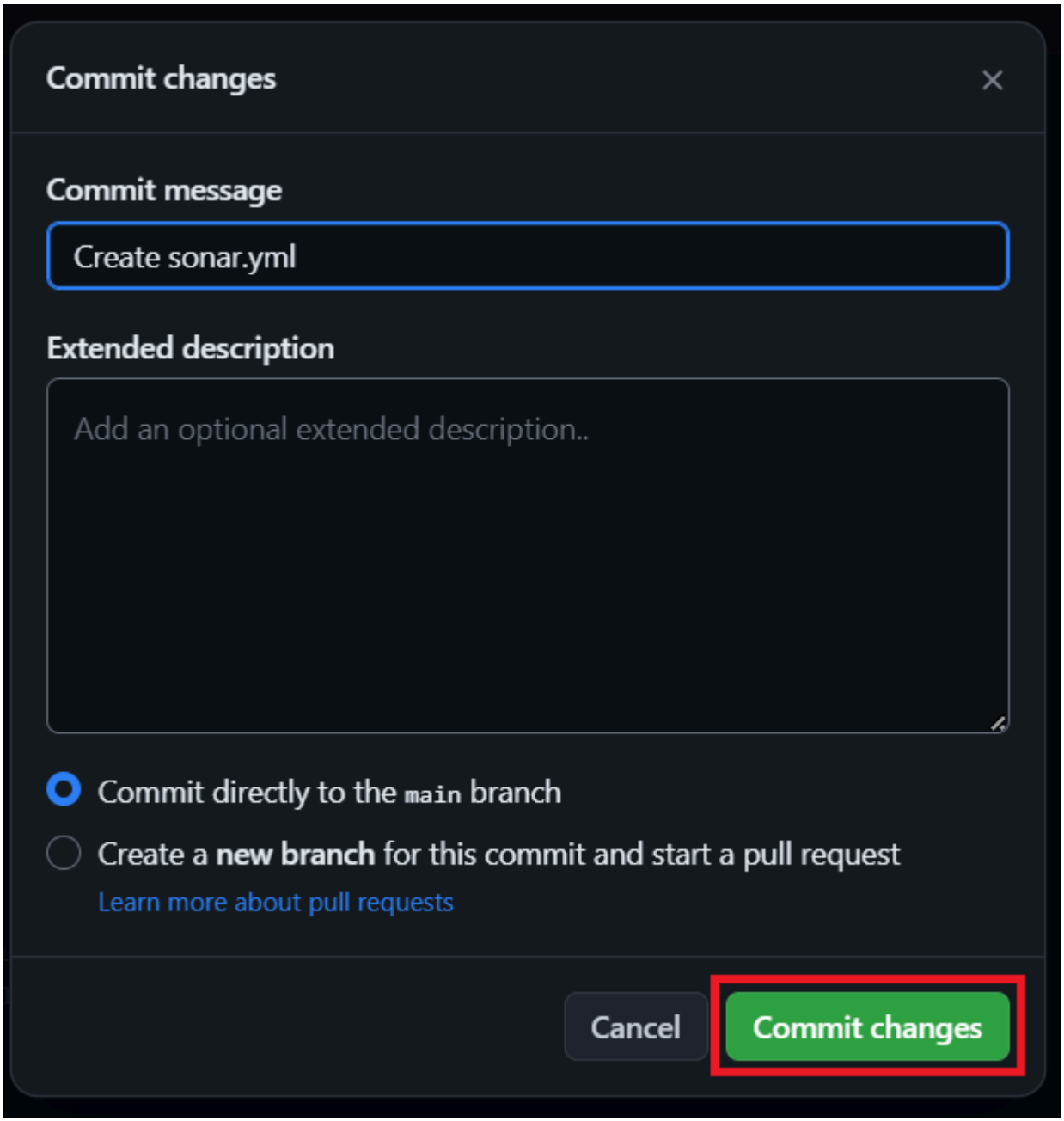


1. `deploy:` : This is the name of a workflow or job, likely associated with a CI/CD pipeline. It specifies what should happen when this deployment job is triggered.
2. `needs: build-analyze-scan` : This line indicates that this deployment job depends on the successful completion of a previous job named "build-analyze-scan." In other words, it waits for "build-analyze-scan" to finish before starting.
3. `runs-on: [aws-netflix]` : This job is set to run on a specific type of runner or environment, labeled as "aws-netflix." Runners are the environments where jobs are executed, and "aws-netflix" suggests that this deployment might be intended for an AWS-based infrastructure.
4. `steps:` : This section lists the individual steps or tasks to be executed as part of the deployment job.
    - `name: Pull the docker image` : This step has a descriptive name. It uses the `docker pull` command to fetch a Docker image labeled "sevenajay/netflix:latest." This is a common step in container-based deployments, where it ensures that the latest version of the Docker image is available locally.
    - `name: Trivy image scan` : This step performs a security scan on the Docker image "sevenajay/netflix:latest" using a tool called Trivy. Trivy is used for vulnerability scanning of container images.
    - `name: Run the container netflix` : This step starts a Docker container named "netflix" using the image "sevenajay/netflix:latest." It runs the container in detached mode ("-d") and maps port 8081 on the host to port 80 in the container, making the service accessible via port 8081 on the host.

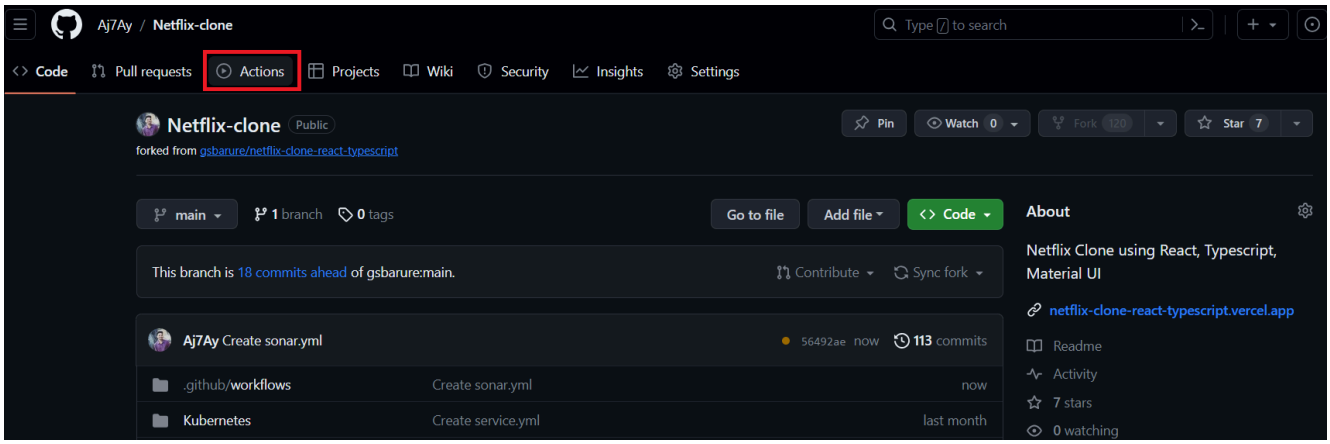
This workflow is designed to automate the deployment of a Docker container, with checks for the latest image, a security scan, and launching the container. The success of this job depends on the success of the preceding "build-analyze-scan"

job, and it's meant to be executed on the specified runner, possibly in an AWS environment.

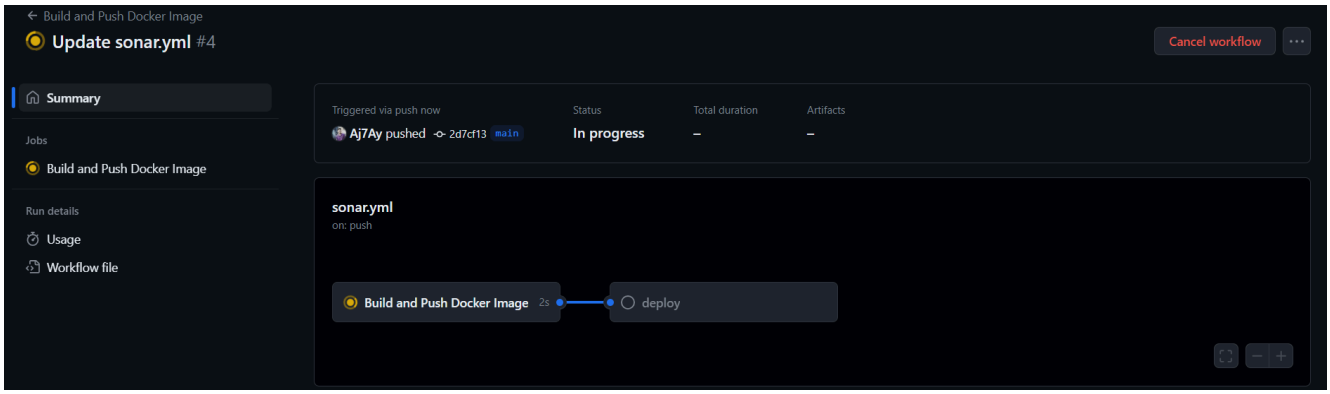
Commit changes



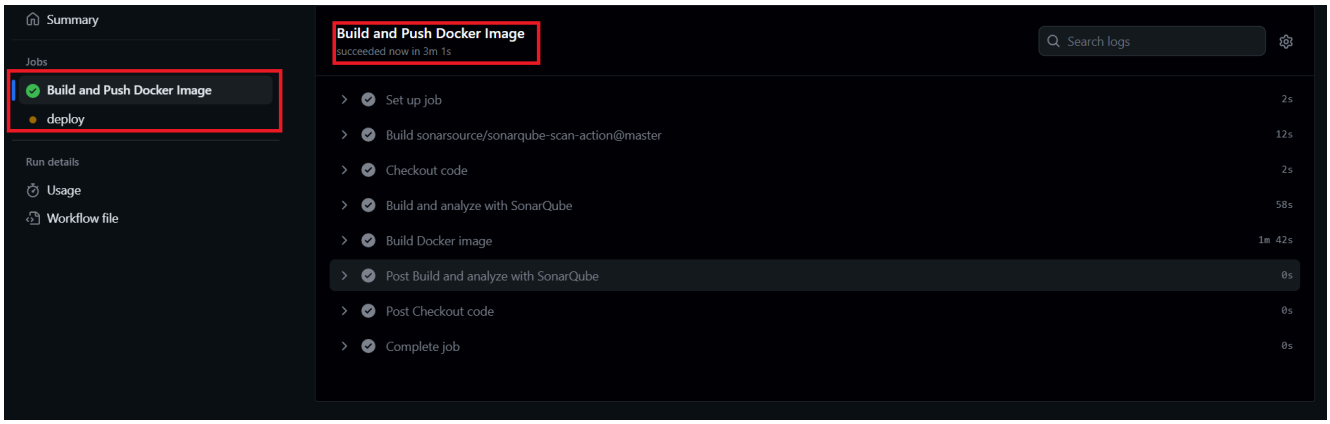
Click on actions again



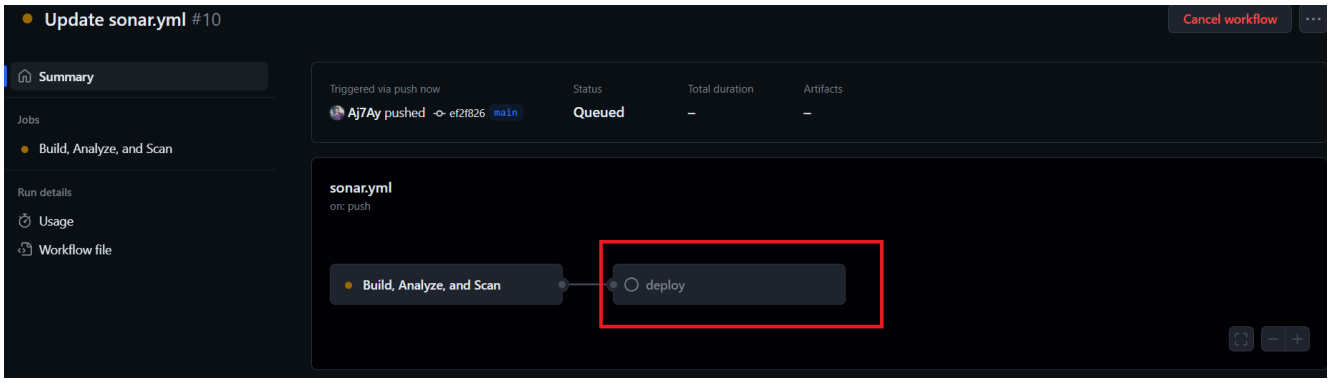
You will see two different Jobs now



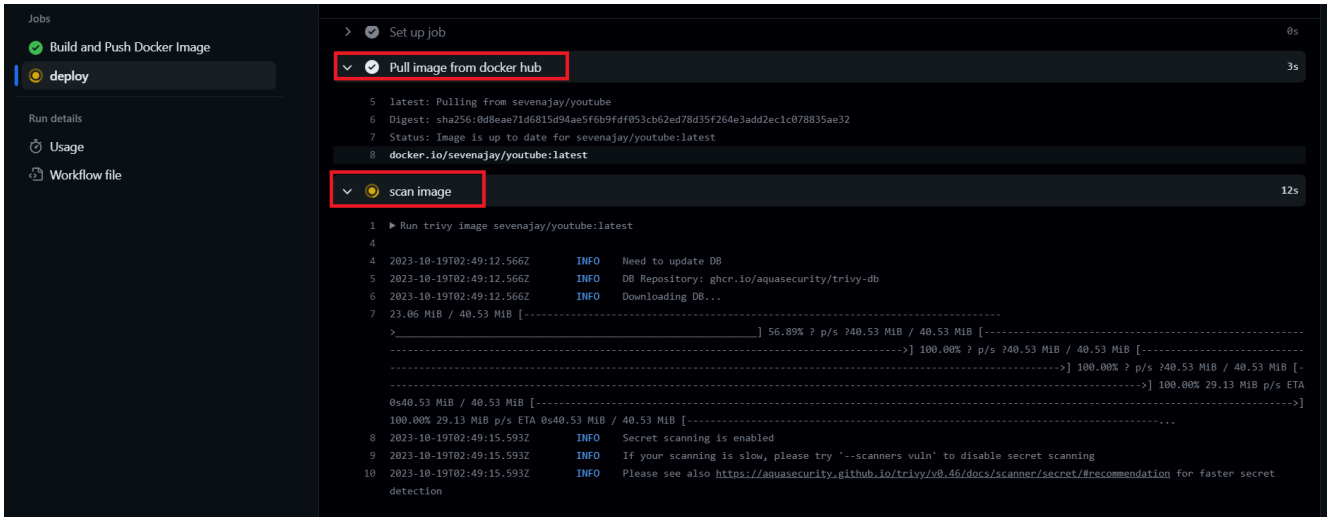
Click on Build and Push docker image Build (using the above image), you will see this once the first job completes



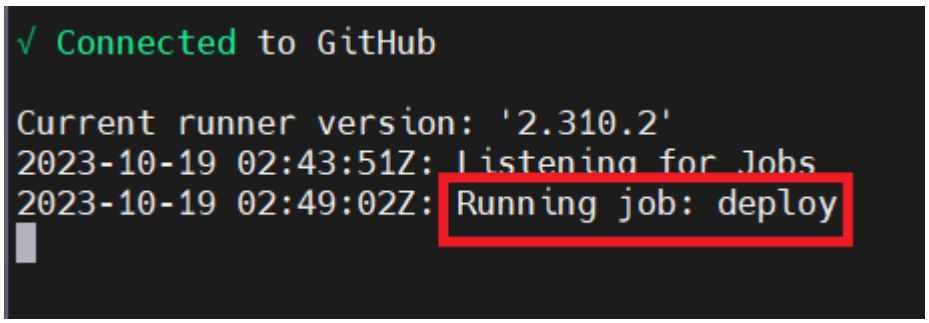
Now come back by clicking on Summary and click on Deploy now



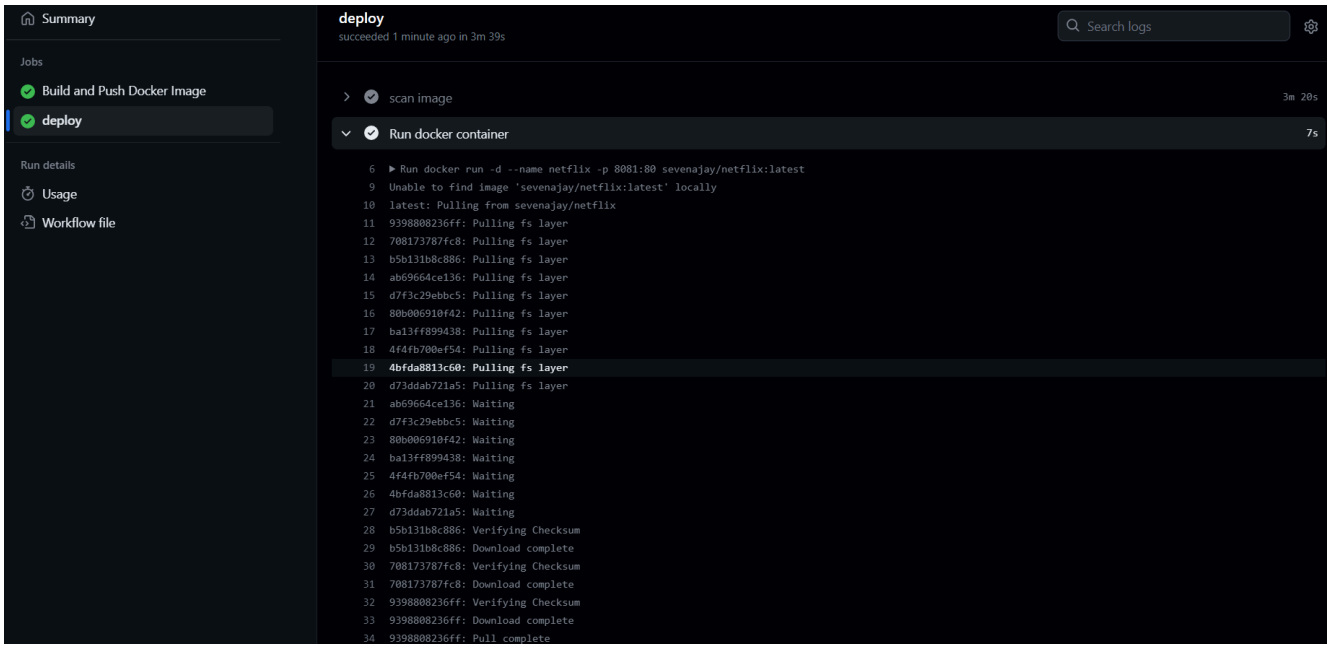
You can see how it's pulling image and scanning image



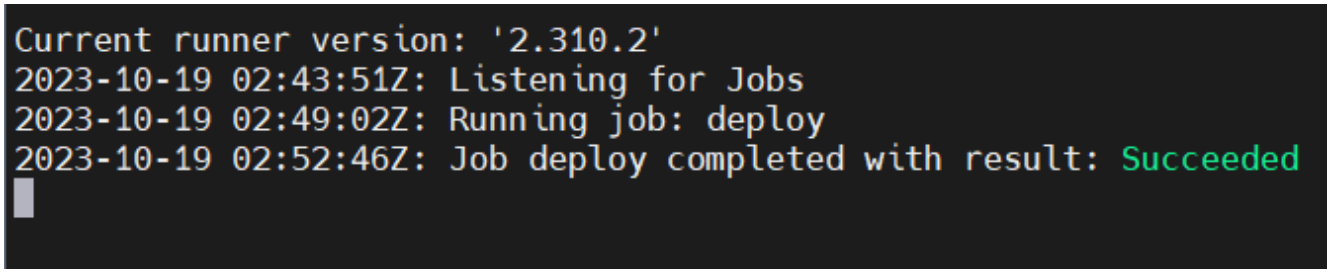
It starts running the job on your Ec2 instance



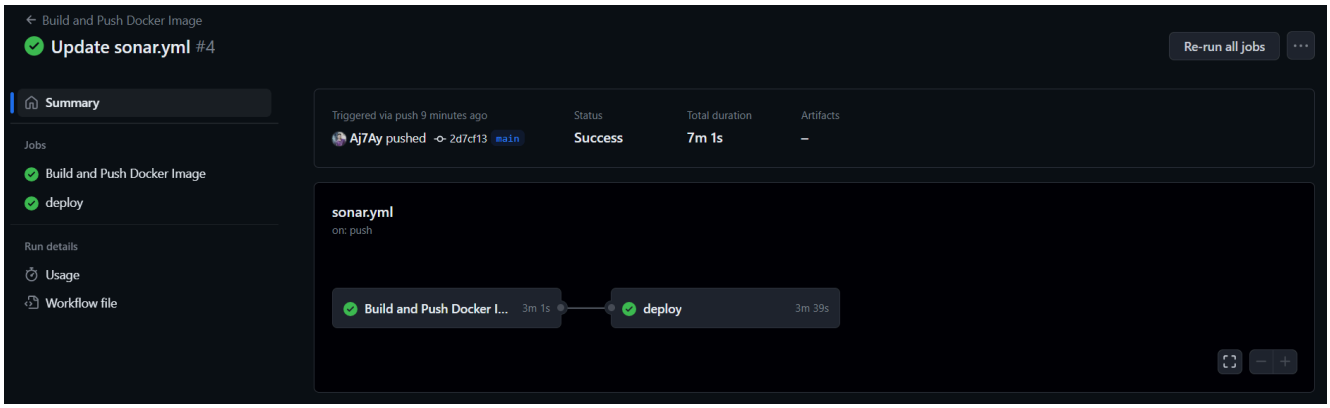
Now it's completed running the container



You will see this in the instance



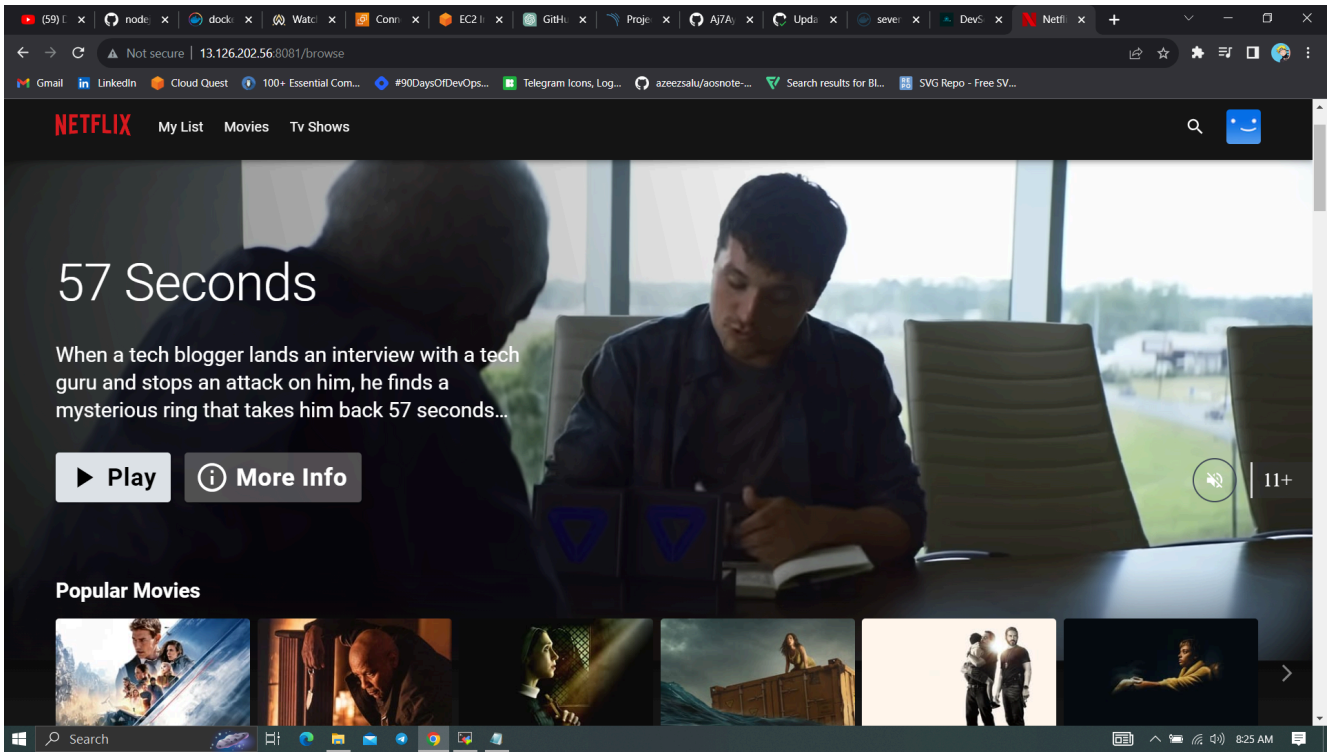
On GitHub, you will see this. the build succeeded



Now copy your ec2 instance ip and go to the browser

```
Ec2-instance-ip:8081
```

You will see Netflix app will run



Deployment is done.

FULL WORKFLOW

```
name: Build,Analyze,scan
on:
  push:
    branches:
      - main
jobs:
  build-analyze-scan:
    name: Build
    runs-on: ubuntu-latest
    steps:
      - name: Checkout code
        uses: actions/checkout@v2
        with:
          fetch-depth: 0  # Shallow clones should be disabled for a bet
      - name: Build and analyze with SonarQube
        uses: sonarsource/sonarqube-scan-action@master
        env:
          SONAR_TOKEN: ${{ secrets.SONAR_TOKEN }}
```

```
            SONAR_HOST_URL: ${{ secrets.SONAR_HOST_URL }}
        - name: install trivy
          run: |
             #install trivy
             sudo apt-get install wget apt-transport-https gnupg lsb-relea
             wget -qO - https://aquasecurity.github.io/trivy-repo/deb/publ
             echo "deb [signed-by=/usr/share/keyrings/trivy.gpg] https://a
             sudo apt-get update
             sudo apt-get install trivy -y
             #scanning files
             trivy fs .
        - name: Docker build and push
          run: |
            #run commands to build and push docker images
            docker build --build-arg TMDB_V3_API_KEY=Aj7ay86fe14eca3e7686
            docker tag netflix sevenajay/netflix:latest
            docker login -u ${{ secrets.DOCKERHUB_USERNAME }} -p ${{ secre
            docker push sevenajay/netflix:latest
          env:
            DOCKER_CLI_ACI: 1
    deploy:
      needs: build-analyze-scan
      runs-on: [aws-netflix]
      steps:
        - name: Pull the docker image
          run: docker pull sevenajay/netflix:latest
        - name: Trivy image scan
          run: trivy image sevenajay/netflix:latest
        - name: Run the container netflix
          run: docker run -d --name netflix -p 8081:80 sevenajay/netflix:l
```

```yaml
name: Build,Analyze,scan

on:
  push:
    branches:
      - main


jobs:
  build-analyze-scan:
    name: Build
    runs-on: ubuntu-latest
    steps:
      - name: Checkout code
        uses: actions/checkout@v2
        with:
          fetch-depth: 0  # Shallow clones should be disabled for a better relevancy of analysis

      - name: Build and analyze with SonarQube
        uses: sonarsource/sonarqube-scan-action@master
        env:
          SONAR_TOKEN: ${{ secrets.SONAR_TOKEN }}
          SONAR_HOST_URL: ${{ secrets.SONAR_HOST_URL }}

      - name: install trivy
        run: |
          #install trivy
          sudo apt-get install wget apt-transport-https gnupg lsb-release -y
          wget -qO - https://aquasecurity.github.io/trivy-repo/deb/public.key | gpg --dearmor | sudo tee /usr/share/keyrings/trivy.gpg > /dev/null
          echo "deb [signed-by=/usr/share/keyrings/trivy.gpg] https://aquasecurity.github.io/trivy-repo/deb $(lsb_release -sc) main" | sudo tee -a /etc/apt/sources.list.d/trivy.list
          sudo apt-get update
          sudo apt-get install trivy -y
          #scanning files
          trivy fs .

      - name: Docker build and push
        run: |
          #run commands to build and push docker images
          docker build --build-arg TMDB_V3_API_KEY=Aj7ay86fe14eca3e76869b92 -t netflix .
          docker tag netflix sevenajay/netflix:latest
          docker login -u ${{ secrets.DOCKERHUB_USERNAME }} -p ${{ secrets.DOCKERHUB_TOKEN }}
          docker push sevenajay/netflix:latest
        env:
          DOCKER_CLI_ACI: 1

  deploy:
    needs: build-analyze-scan
    runs-on: [aws-netflix]
    steps:
      - name: Pull the docker image
        run: docker pull sevenajay/netflix:latest
      - name: Trivy image scan
        run: trivy image sevenajay/netflix:latest
      - name: Run the container netflix
        run: docker run -d --name netflix -p 8081:80 sevenajay/netflix:latest
```

Clear the instance.

I hope you found this blog insightful and that you've learned something new about how GitHub Actions can supercharge your Netflix deployments through the lens of DevSecOps. As technology evolves, staying informed and adaptable is key to thriving in the world of software development. If you have any questions or would like to share your thoughts, feel free to reach out. Your feedback and engagement are invaluable as we continue to explore and embrace the exciting innovations in the tech landscape. Thank you for joining me on this journey of discovery!

Ajay Kumar Yegireddi is a DevSecOps Engineer and System Administrator, with a passion for sharing real-world DevSecOps projects and tasks. **Mr. Cloud Book**, provides hands-on tutorials and practical insights to help others master DevSecOps tools and workflows. Content is designed to bridge the gap between development, security, and operations, making complex concepts easy to understand for both beginners and professionals.

Comments

One response to “GitHub Actions: Netflix Deployment Powered by DevSecOps”

Artem
16 May 2024

Hello,
This is really cool project. I’ve learned some new features here. Keep up the good work.

Full workflow has one little issue in deploy job. The step named “Trivy image scan” is not running correctly. I think that is because of trivy missing on our ec2 (self-hosted runner).

Thanks for your time.
Regards,
Artem

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