



FinacPlus SRE Assignment

Start Date: 5/12/2024

End Date: 6/12/2024

GitHub Repo URL: <https://github.com/Uj5Ghare/FinacPlus-DevOps-Project>

Tools Used

Ubuntu 24.04

Python 3.12.3

Pip 24.0

Docker 26.1.3

Kubernetes 1.30

AwsCli 2.22.12

Eksctl 0.197.0

kubectl 1.31.3

Overview

Setting up a Continuous Integration/Continuous Deployment (CI/CD) pipeline using Git, Jenkins, and Kubernetes (K8s). Automate the process of building artifacts upon code commits to specific Git repositories and deploying them to designated Kubernetes clusters.

Requirements Handled

- Whenever a commit is made to a specific Git repository, Jenkins should automatically trigger a build process.
- Upon successful build, Jenkins should deploy the artifact to a specified Kubernetes cluster.
- The solution should be scalable and adaptable to accommodate different Git repositories and Kubernetes clusters.

- Utilize Groovy scripting to implement the automation logic, ensuring flexibility and extensibility

Steps

1. Testing Application Locally

- **Installing Dependencies**

```
Bash ``
sudo apt install python3-pip python3-venv -y
``
```

- **Setup virtual environment**

```
Bash ``
python3 -m venv .venv
source .venv/bin/activate
``
```

- **Installing Flask**

```
Bash ``
pip install Flask=3.1.0
``
```

- **Adding code and running the application**

```
Bash ``
python app.py
``
```

2. Dockerizing Application

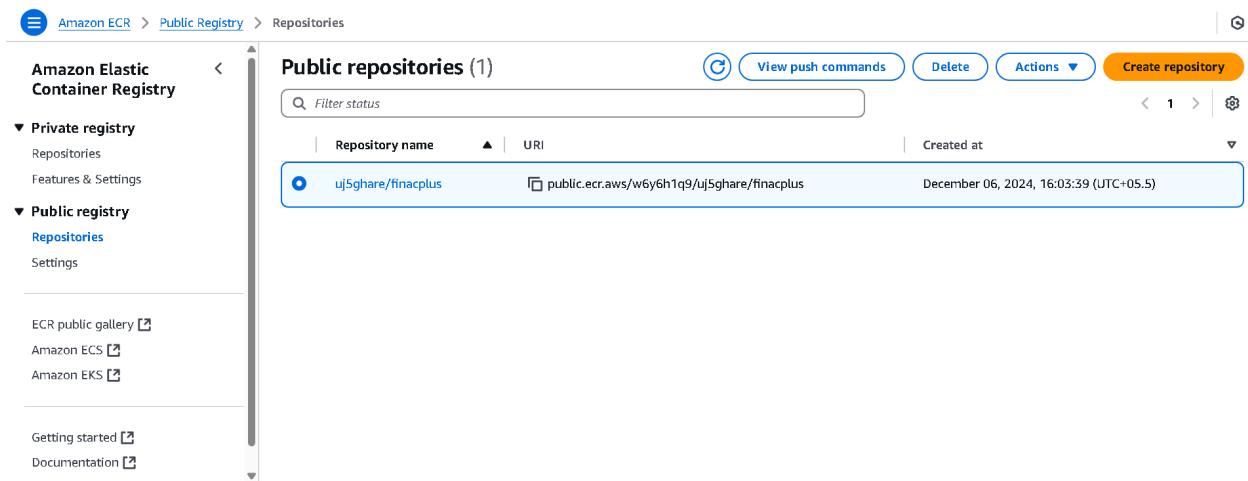
Used multistage dockerfile to reduce the size of final docker image and used only official docker images for security purpose.

- **Create Multistage Dockerfile**

Stage1 for installing dependencies
Stage2 for running application and exposing ports

- **Build the Docker Image**
- **Create ECR public repository**
- **Push Docker Image to ECR**

Screenshots for reference:



3. Kubernetes Setup

- **Configured awscli 2**

```
Bash ```
awscli configure
```
```

- **Creating EKS cluster**

```
Bash ```
eksctl create cluster --name finacplus-cluster --region ap-south-2 --nodegroup-name
finacplus-node-group --node-type t3.micro --nodes 2 --nodes-min 1 --nodes-max 3
--managed
```
```

- **Updating kubeconfig**

```
Bash ```
aws eks --region ap-south-2 update-kubeconfig --name finacplus-cluster
```
```

- Deploying application

```
Bash ""
```

```
Kubectl apply -f k8s/*
```

```
""
```

## Screenshots for reference:

**finacplus-cluster** Refresh Delete cluster Upgrade version View dashboard

Info End of standard support for Kubernetes version 1.30 is July 28, 2025. On that date, your cluster will enter the extended support period with additional fees. For more information, see the [pricing page](#). Upgrade now

**Cluster info** Info

|                                   |                                                     |                                                                                 |                        |
|-----------------------------------|-----------------------------------------------------|---------------------------------------------------------------------------------|------------------------|
| <b>Status</b><br>Active           | <b>Kubernetes version</b> <span>Info</span><br>1.30 | <b>Support period</b><br><span>Info</span> Standard support until July 28, 2025 | <b>Provider</b><br>EKS |
| <b>Cluster health issues</b><br>0 | <b>Upgrade insights</b><br>1                        |                                                                                 |                        |

**Overview** | Resources | Compute | Networking | Add-ons 1 | Access | Observability | Update history | Tags

**Details**

|                                                                                                                                                                                                 |                                                                                                                                                                                                                 |                                                                                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| <b>API server endpoint</b><br><a href="https://017f17b5e48f4ea1373fdfdc695ad515.yl4.ap-south-2.eks.amazonaws.com">https://017f17b5e48f4ea1373fdfdc695ad515.yl4.ap-south-2.eks.amazonaws.com</a> | <b>OpenID Connect provider URL</b><br><a href="https://oidc.eks.ap-south-2.amazonaws.com/id/017f17b5e48f4ea1373fdfdc695ad515">https://oidc.eks.ap-south-2.amazonaws.com/id/017f17b5e48f4ea1373fdfdc695ad515</a> | <b>Created</b><br>an hour ago                                                                      |
| <b>Certificate authority</b><br>LSOHL51CRUdJTIBDRVJUSUZJQ0FURS0HLS0kCk1JSURCVENDQWUyZ0F3SUJBZ0LWU9nODFUUkF5MTR3RFFZ5ktvWklodmNOQVFFTEJRQXdGVEVUTUJ                                              | <b>Cluster IAM role ARN</b><br><a href="#">arnaws:iam::814495875142:role/eksctl-finacplus-cluster-cluster-ServiceRole-ZrEQtdXDiryH</a><br><a href="#">View in IAM</a>                                           | <b>Cluster ARN</b><br><a href="#">arnaws:eks:ap-south-2:814495875142:cluster/finacplus-cluster</a> |
| <b>Platform version</b> <span>Info</span><br>eks.20                                                                                                                                             |                                                                                                                                                                                                                 |                                                                                                    |

EC2 IAM VPC S3 RDS Lambda Route 53 Billing and Cost Management

**Instances (3)** Info Last updated less than a minute ago Connect Instance state Actions Launch instances

All states

| <input type="checkbox"/> | Name                                        | Instance ID         | Instance state | Instance type | Status check      | Alarm                  |
|--------------------------|---------------------------------------------|---------------------|----------------|---------------|-------------------|------------------------|
| <input type="checkbox"/> | finacplus-cluster-finacplus-node-group-Node | i-011d6d59cf9a01ea1 | Running        | t3.micro      | 3/3 checks passed | <a href="#">View a</a> |
| <input type="checkbox"/> | jenkins-server                              | i-08321741675a9192e | Running        | t3.small      | 3/3 checks passed | <a href="#">View a</a> |
| <input type="checkbox"/> | finacplus-cluster-finacplus-node-group-Node | i-07f9d718734d4297e | Running        | t3.micro      | 3/3 checks passed | <a href="#">View a</a> |

Select an instance

| Stack name                                                              | Status          | Created time                 | Description                                                                            |
|-------------------------------------------------------------------------|-----------------|------------------------------|----------------------------------------------------------------------------------------|
| <a href="#">eksctl-finacplus-cluster-nodegroup-finacplus-node-group</a> | CREATE_COMPLETE | 2024-12-06 21:48:30 UTC+0530 | EKS Managed Nodes (SSH access: false) [created by eksctl]                              |
| <a href="#">eksctl-finacplus-cluster-cluster</a>                        | CREATE_COMPLETE | 2024-12-06 21:38:27 UTC+0530 | EKS cluster (dedicated VPC: true, dedicated IAM: true) [created and managed by eksctl] |

## 4. Jenkins Setup

- Install Plugin Aws credentials
- Configure new ci/cd pipeline
- Configuring webhook for auto triggering

### Jenkinsfile stages

- Checkout code
- Building docker image
- Login to docker registry
- Push image to docker registry
- Updating kubecofig
- Deploy application on EKS

Bash ``

```
pipeline {
 agent any

 environment {
 REGISTRY_REPO = 'public.ecr.aws/w6y6h1q9'
 IMAGE_TAG = "$BUILD_NUMBER"
 IMAGE_NAME = 'uj5ghare/finacplus'
 AWS_USER = 'AWS'
 AWS_REGION = 'ap-south-2'
 CLUSTER_NAME = 'finacplus-cluster'
 }
}
```

```
stages {
 stage('Checkout') {
 steps {
 git url: 'https://github.com/Uj5Ghare/FinacPlus-SRE-Assignment.git', branch: 'main'
 }
 }

 stage('Build_Docker_Img') {
 steps {
 script {
 sh 'docker build -t $REGISTRY_REPO/$IMAGE_NAME:$IMAGE_TAG .'
 }
 }
 }

 stage('Login_To_ECR') {
 steps {
 script {
 sh 'aws ecr-public get-login-password --region us-east-1 | docker login --username
$AWS_USER --password-stdin $REGISTRY_REPO'
 }
 }
 }

 stage('Push_To_ECR') {
 steps {
 script {
 sh 'docker push $REGISTRY_REPO/$IMAGE_NAME:$IMAGE_TAG'
 }
 }
 }

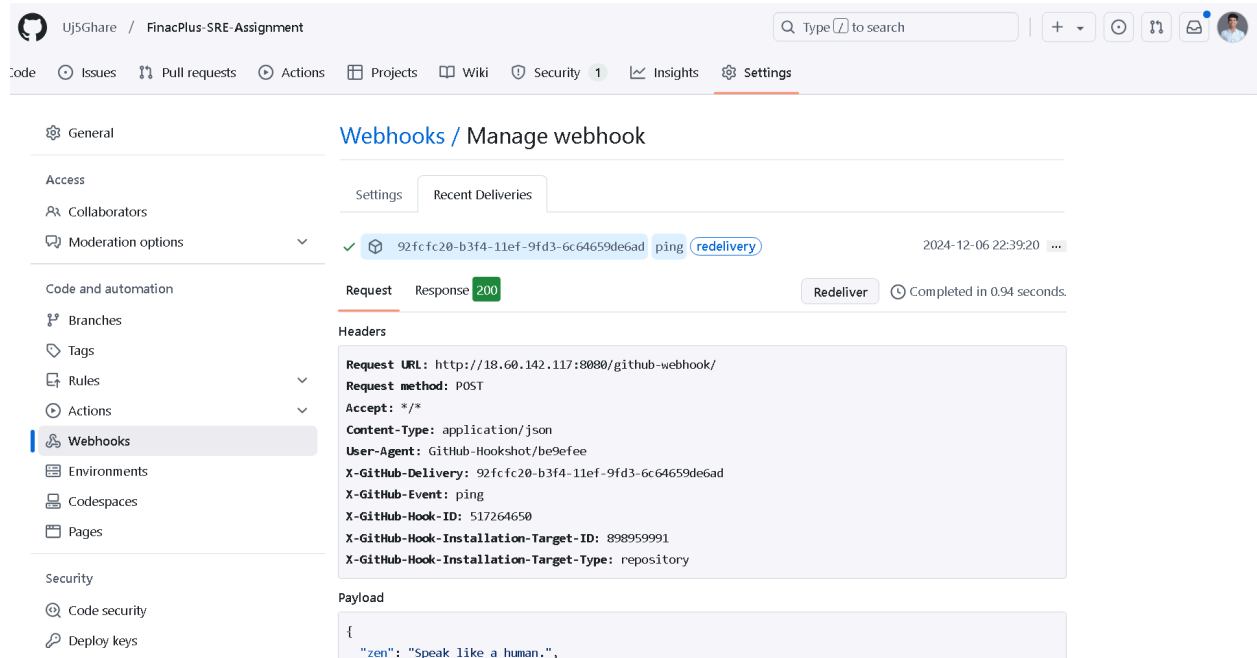
 stage('Update_Kubeconfig') {
 steps {
 script {
 sh "aws eks --region $AWS_REGION update-kubeconfig --name
$CLUSTER_NAME"
 }
 }
 }

 stage('Deploy_To_EKS') {

```

```
steps {
 script {
 sh """
 kubectl apply -f k8s/namespace.yml,k8s/deployment.yml,k8s/service.yml
 kubectl set image deployment/finacplus-deployment
finacplus-con=$REGISTRY_REPO/$IMAGE_NAME:$IMAGE_TAG -n finacplus
 """
 }
 }
}
post {
 success {
 script {
 // Actions to take if the pipeline is successful
 echo 'Pipeline completed successfully!'
 }
 }
 failure {
 script {
 // Actions to take if the pipeline fails
 echo 'Pipeline failed!'
 }
 }
}
}
```

## Screenshots for reference:



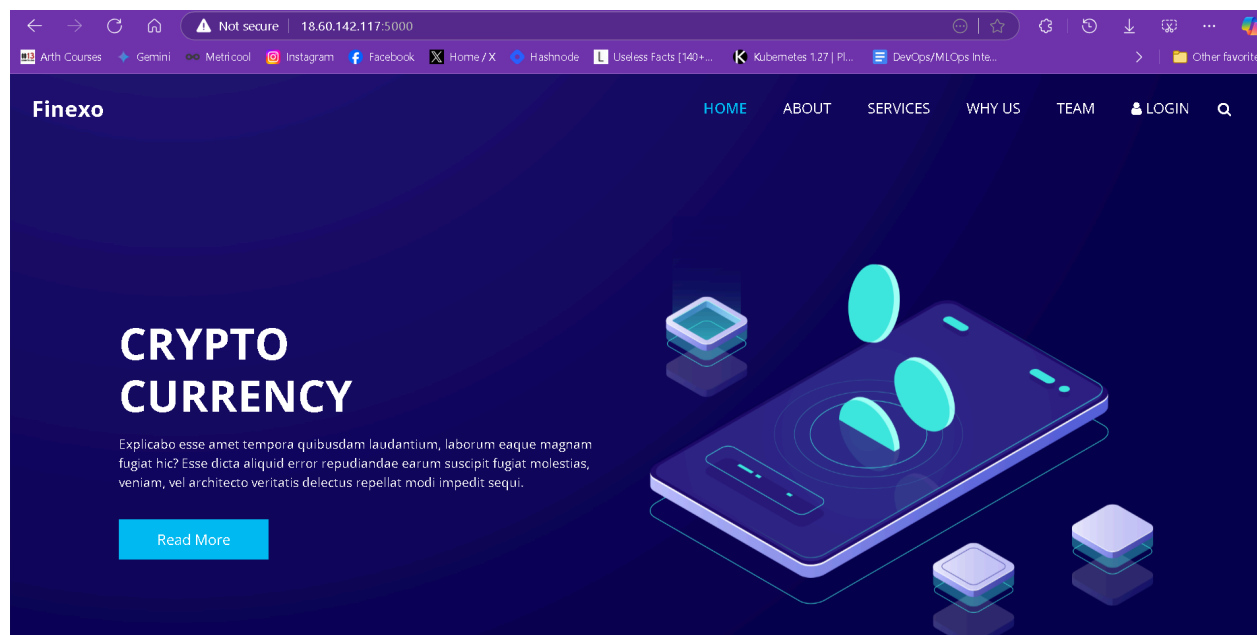
The screenshot shows the GitHub Actions interface for a repository named "FinacPlus-SRE-Assignment". The "Webhooks" section is active, displaying the "Manage webhook" page. The "Recent Deliveries" tab is selected, showing a successful delivery of a "ping" event. The "Request" and "Response" fields are visible, with the response being a "200" status code. The "Headers" section shows the following information:

```
Request URL: http://18.60.142.117:8080/github-webhook/
Request method: POST
Accept: */*
Content-Type: application/json
User-Agent: GitHub-Hookshot/be9efee
X-GitHub-Delivery: 92fcfc20-b3f4-11ef-9fd3-6c64659de6ad
X-GitHub-Event: ping
X-GitHub-Hook-ID: 517264650
X-GitHub-Hook-Installation-Target-ID: 898959991
X-GitHub-Hook-Installation-Target-Type: repository
```

The "Payload" section shows the following JSON data:

```
{
 "zen": "Speak like a human."
}
```

Successfully deployed flask application on EKS cluster and can be accessible through web browser on port 5000 with "kubectl port-forward" command.



The screenshot shows a web browser displaying the "Finexo" website. The browser's address bar shows the URL "18.60.142.117:5000". The website has a dark blue background and features a navigation menu with links for "HOME", "ABOUT", "SERVICES", "WHY US", "TEAM", and "LOGIN". The main content area is titled "CRYPTO CURRENCY" and includes a sub-header "Explicabo esse amet tempora quibusdam laudantium, laborum eaque magnam fugiat hic? Esse dicta aliquid error repudiandae earum suscipit fugiat molestias, veniam, vel architecto veritatis delectus repellat modi impedit sequi." Below the text is a "Read More" button. The website also features a 3D illustration of a smartphone with several glowing blue coins floating above it, and a small cube-like object in the foreground.