Implementation and Configuration Guide

Document Version

- Version: [Version number]
- Date: [Date]
- Author: [Author Name]

Table of Contents

1. Introduction

- Purpose: Briefly describe the purpose of this guide and what it will cover.
- Scope: Define the scope of the implementation and what the guide will focus on.
- References: List any reference documents or external resources.

2. Prerequisites

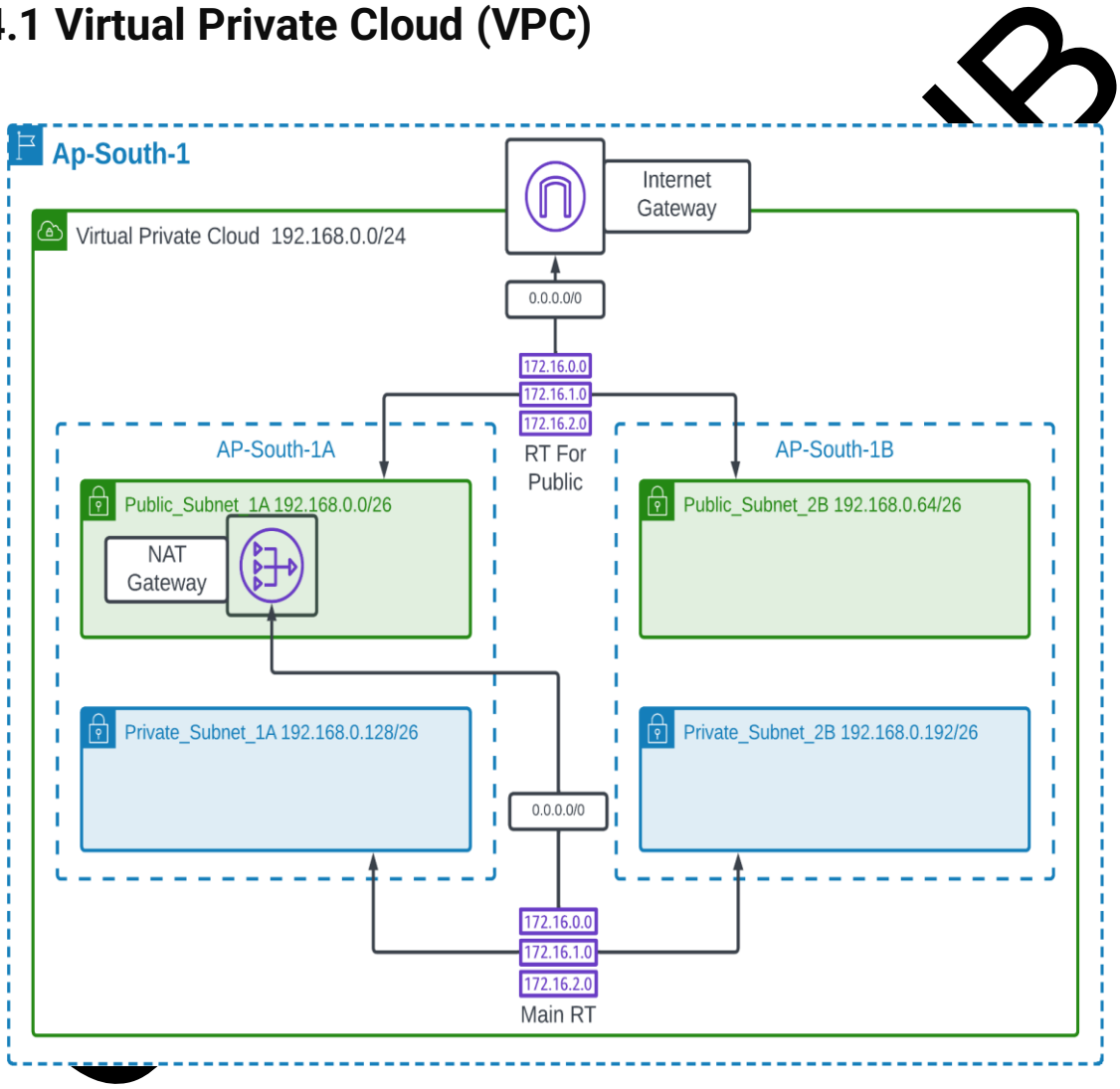
- AWS Account: Ensure you have an active AWS account.
- IAM Roles: Define the IAM roles required for the implementation.
- Knowledge Base: Specify any required knowledge or skills.

3. Architecture Overview

- Architecture Diagram: Include a diagram of the architecture.
- Description: Describe the high-level architecture and how different components interact.

4. AWS Services Configuration

4.1 Virtual Private Cloud (VPC)



Step 1: Create the VPC

Go to the VPC Dashboard in the AWS Management Console.
Click on "Create VPC".
In the "Name tag" field, input a name for your VPC (e.g., "Ap-South-1").
For the IPv4 CIDR block, enter `192.168.0.0/24`.
Skip the IPv6 CIDR block unless you need it.
Select "No" for Tenancy (unless you require a Dedicated Instance).
Click "Create".

Step 2: Create Subnets

In the VPC Dashboard, click on "Subnets".
Click on "Create subnet".
Select the VPC you created from the dropdown list.
For the first subnet:

- Name tag: "Public_Subnet_1A".
- Availability Zone: Select "ap-south-1a".
- IPv4 CIDR block: `192.168.0.0/26`.

Click "Create" to create the first subnet.
Repeat the steps for the additional subnets with the following details:

- For the second subnet:
  - Name tag: "Private_Subnet_1A".
  - Availability Zone: "ap-south-1a".
  - IPv4 CIDR block: `192.168.0.128/26`.
- For the third subnet:
  - Name tag: "Public_Subnet_2B".
  - Availability Zone: "ap-south-1b".
  - IPv4 CIDR block: `192.168.0.64/26`.
- For the fourth subnet:
  - Name tag: "Private_Subnet_2B".
  - Availability Zone: "ap-south-1b".
  - IPv4 CIDR block: `192.168.0.192/26`.

Step 3: Set Up Internet Gateway

In the VPC Dashboard, click on "Internet Gateways".
Click "Create internet gateway".
Provide a name tag (e.g., "IGW-Ap-South-1").
Click "Create".
Select the newly created internet gateway and click on "Actions".

Click "Attach to VPC" and select the VPC you have created.
Click "Attach".

Step 4: Create Route Tables

In the VPC Dashboard, go to "Route Tables".
Click "Create route table".
Enter a name for the route table (e.g., "Main RT").
Select your VPC from the dropdown list.
Click "Create".
After creation, select the new route table and click on "Routes".
Click "Edit routes" and add the following route to allow internet access:

- Destination: `0.0.0.0/0`.
- Target: Select the Internet Gateway you created.

Click "Save routes".

Step 5: Associate Route Tables with Subnets

Select the route table, click on "Subnet Associations".
Click "Edit subnet associations".
Select the public subnets ("Public_Subnet_1A" and "Public_Subnet_2B").Click "Save".

Step 6: Create NAT Gateway (for Private Subnets)

Go to "NAT Gateways" in the VPC Dashboard.
Click "Create NAT gateway".
Select one of the public subnets (e.g., "Public_Subnet_1A").
Allocate an Elastic IP by clicking "Allocate Elastic IP".
Click "Create a NAT Gateway".
Once created, go back to "Route Tables", and create a new route table for your private subnets.
Follow a similar process as before to add a route pointing to the NAT Gateway for internet access from the private subnets.

4.2 Elastic Compute Cloud (EC2)

- Go to EC2 Dashboard, Click on Launch Instance
- ***Configuration*** : Name- (Webserver)_ Instance type- (t2.micro)_AMI- (Amazon) Edit Network Setting(Launch in ap-south-1a in Public Subnet)_SG- (Web-SG) Enable public IP, give key-pair.
- Click on Launch Instance wait till 2/2 passed. Connect to Instance.
- Follow these commands

sudi -i

#yum install httpd -y

#systemctl start httpd

#systemctl enable httpd

#yum install amazon-efs-utils -y

Now go to your EFS and copy DNS and paste

#paste EFS DNS url

[Note: Remove /**efs** and add **/var/www/html/** and hit enter]

#cd /var/www/html

#vi index.html

paste **EC2 script** as given

#vi /etc/fstab

and paste u **efs url id:/ /var/www/html/ efs defaults,_netdev 0 0**

4.3 Elastic File System (EFS)

- Go to EFS Dashboard and Name your EFS and choose VPC appropriately
- Click on Customize – Regional – Next
- Network Access – AZ(ap-south-1a and 1b) in Public subnet, Subnet ID- Private subnet ap-south-2a and 2b. Also edit Security group with EFS-SG.
- Click on **Next** and **Create.**

4.4 AMI

- Go to EC2 and create an AMI(Project-AMI) of your Instance. Wait till AMI is Ready.

- Terminate your Instance.

4.5 Launch Template

- Create Launch Template first. Go to Launch template.
- Name it (Project-1-LT), Version-(1), AMI-(Project-AM1), SG- (Web-SG), don't give subnet for now.
- Paste User-Data Script(given).

4.6 Auto Scaling Group

- Click on Create ASG and name it as (Project-1-ASG)
- Choose Launch Template (Project-1-LT)
- Network –VPC (My-VPC), AZ- (Private Subnets), Choose(No Load Balancer) and done.

4.7 Target Groups

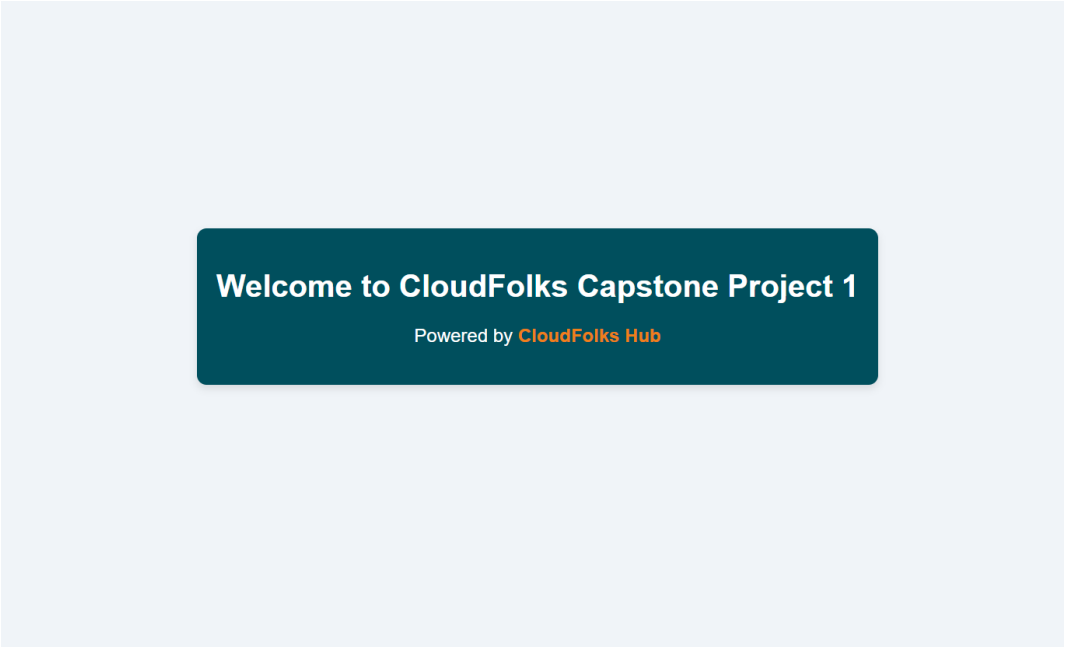
- Create 2 Target Groups – 1. Name(Web-app) with port 80-HTTP and 2. Name(Test-app) with port 8080-HTTP

4.8 Application Load Balancer(ALB)

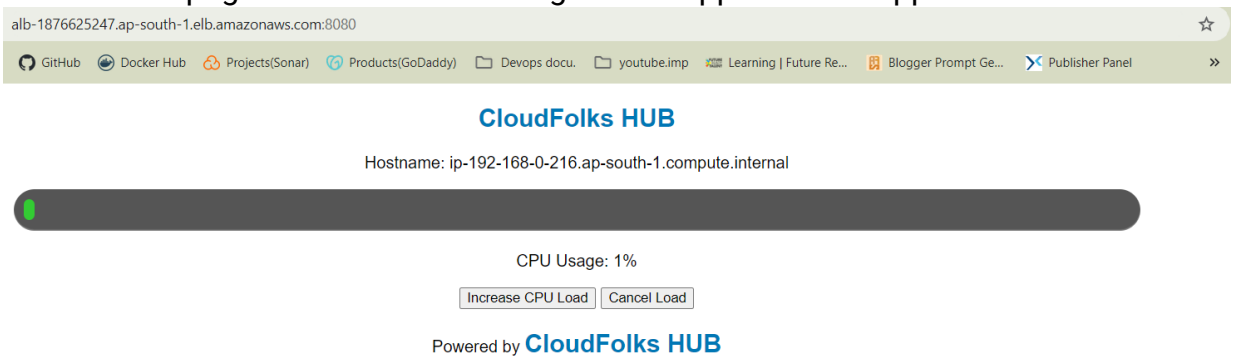
- Create ALB(Project-ALB), mapping with public subnets.
- Select both 2 Listener (Web-app and Test-app) and done.

5. Application Deployment

- Copy ALB url id and paste in browser and you will see you Web-app,



- Add :8080 beside your alb-url and you will see your Test-app
.
- Now refresh page to see load balancing in Web-app and Test-app



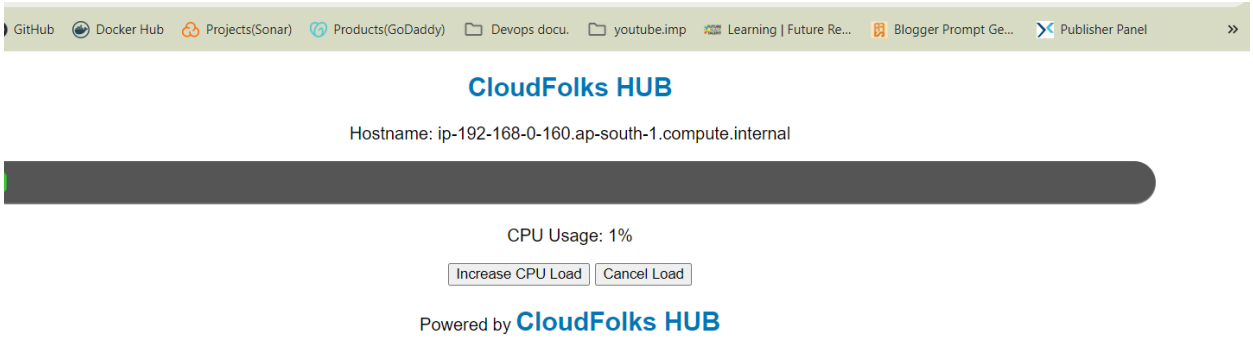
6. Security Configuration

- Now configured your Security Groups to enhance security
- ALB-SG – Remove old rules and add (HTTP-80-0.0.0.0) and (Custom-TCP-8080-My-IP) and click on save rules.
- Web-SG - Remove old rules and add (HTTP-80-ALB-SG) and (Custom-TCP-8080-ALB-SG) click on save rules.
- EFS-SG Remove old rules and add (NFS-2049-Web-SG) and click on save rules.

7. Monitoring and Logging

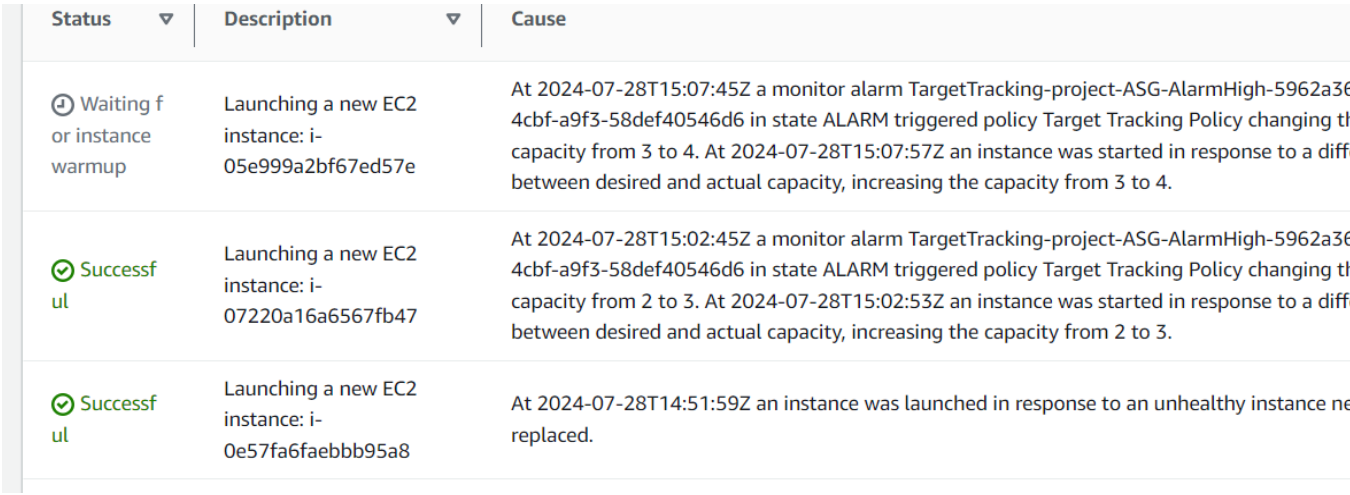
- Go to EC2 instance and see how automatically instances are created.
- Refresh page and see how Ip's of two instances fluctuates which means load are balancing between both the servers.

- To test, terminate one Instance and after some time another instance will be there.



- Go to ASG dashboard and go to Activity section to monitor how terminated and created instances history is maintained.

8. Backup and Disaster Recovery



Status	Description	Cause
Waiting for instance warmup	Launching a new EC2 instance: i-05e999a2bf67ed57e	At 2024-07-28T15:07:45Z a monitor alarm TargetTracking-project-ASG-AlarmHigh-5962a36 4cbf-a9f3-58def40546d6 in state ALARM triggered policy Target Tracking Policy changing th capacity from 3 to 4. At 2024-07-28T15:07:57Z an instance was started in response to a diff between desired and actual capacity, increasing the capacity from 3 to 4.
Successful	Launching a new EC2 instance: i-07220a16a6567fb47	At 2024-07-28T15:02:45Z a monitor alarm TargetTracking-project-ASG-AlarmHigh-5962a36 4cbf-a9f3-58def40546d6 in state ALARM triggered policy Target Tracking Policy changing th capacity from 2 to 3. At 2024-07-28T15:02:53Z an instance was started in response to a diff between desired and actual capacity, increasing the capacity from 2 to 3.
Successful	Launching a new EC2 instance: i-0e57fa6faebbb95a8	At 2024-07-28T14:51:59Z an instance was launched in response to an unhealthy instance ne replaced.

- Go to ASG dashboard, Automatic Scaling section
- Go to Dynamic scaling option and create it in which mention 65% in Target CPU Utilization Section and done.
- Now go to the Details section and edit with Desired-2, Minimum-2 and maximum-5.
- Now go to Test-app webpage and click on Increase CPU Utilization more 65%. Wait sometime and go to ASG Automatic scaling section and see how instances are terminated and created.

9. Troubleshooting

- Unable to configure the Security Group of all SG, so while troubleshooting I

came to know that I must remove the old configuration completely and then add another configured rule.

- After installation of HTTPD server, it is advised to start as well as enable the httpd service, otherwise when we stop the instance, httpd will stop automatically and we can’t access our webpage.
- Configure EFS setting appropriately. Mention **/var/www/html by** replacing **efs** directory.

10. Additional Resources

- Documentation: Links to AWS documentation and other helpful resources.

Appendices

- Appendix A: Detailed configuration settings.
- Appendix B: Scripts and commands used.

Revision History

- [Date]: [Changes made], [Author]