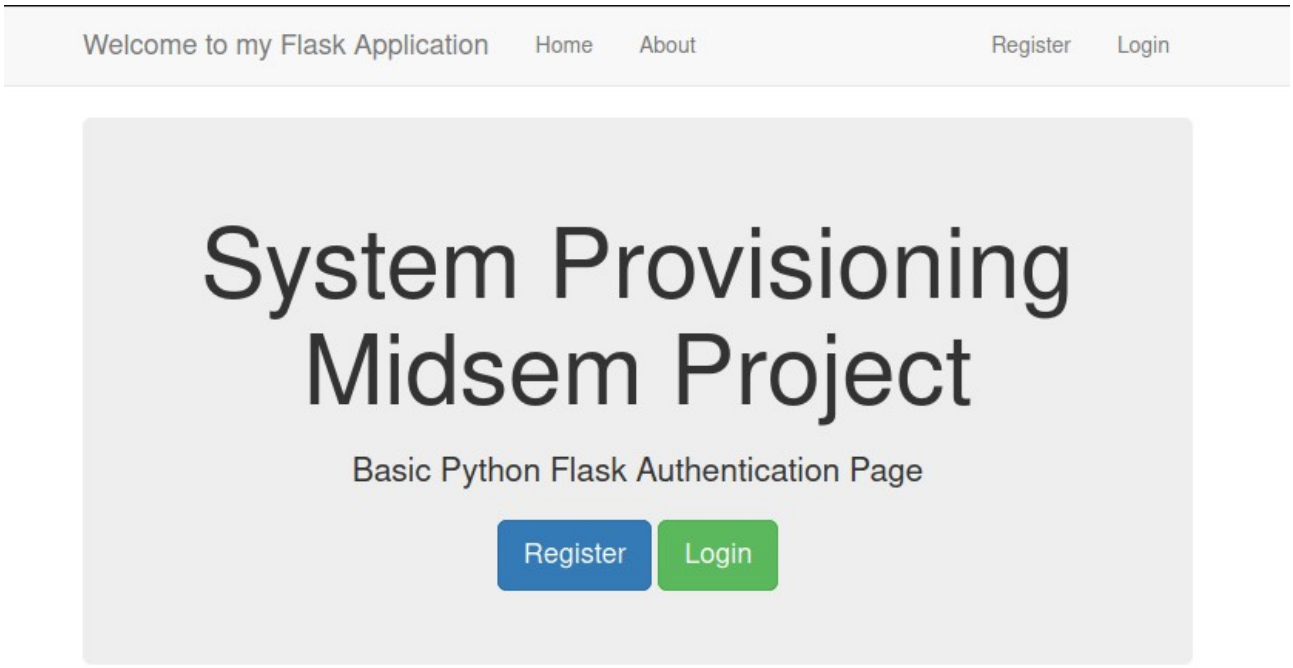
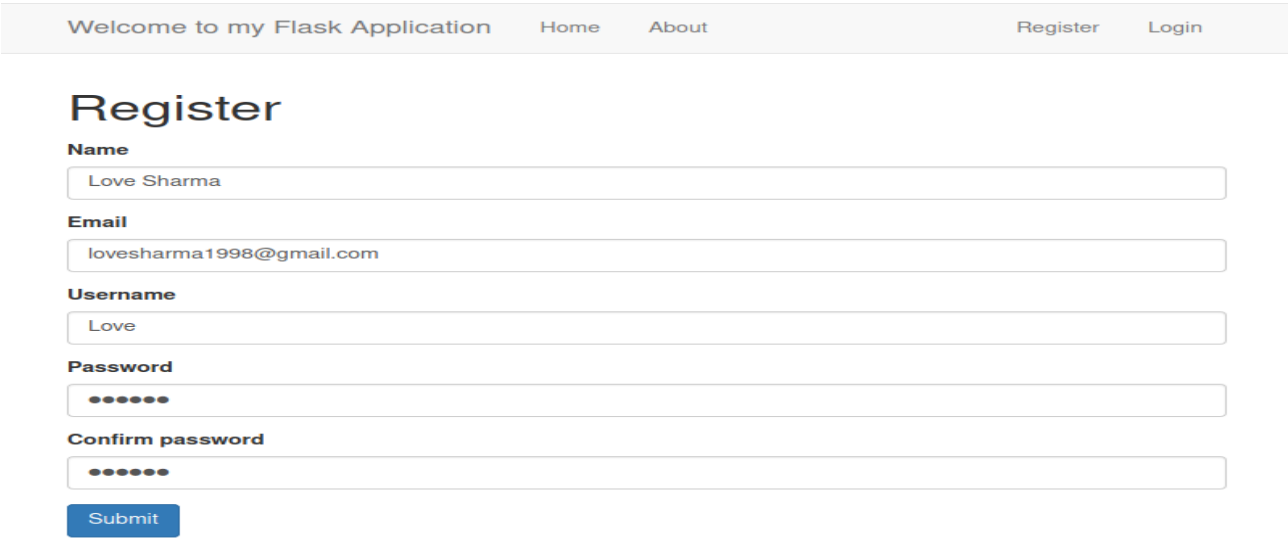
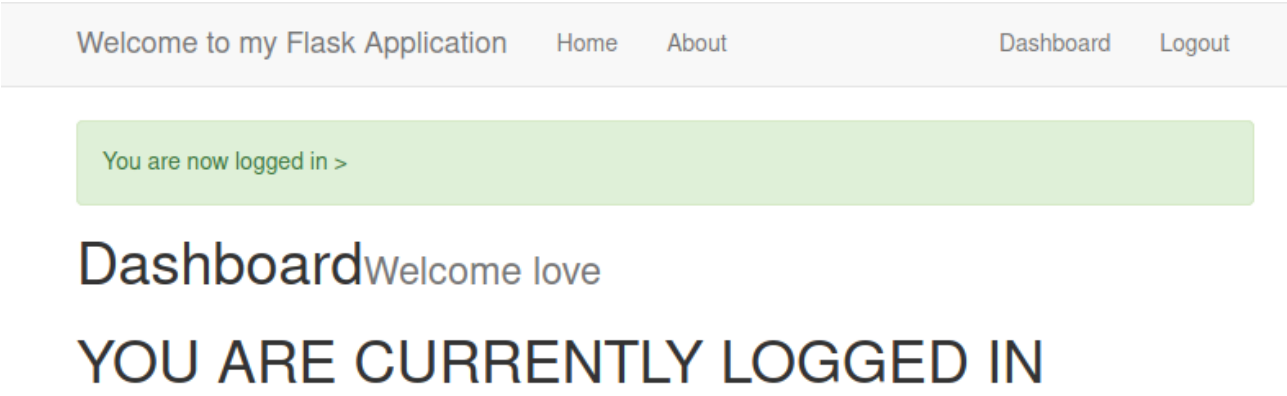
Name: Love Sharma
Sap-Id: 500060174
Roll: 32
Subject: System Provisioning And Configuration System
Mid-Sem Project
Course: B-tech CSE Devops

1. Create a small web application including DataBase

This application is a Register and Login functionality.







2. Create a job in Jenkins to make build of this application.

Workflow:

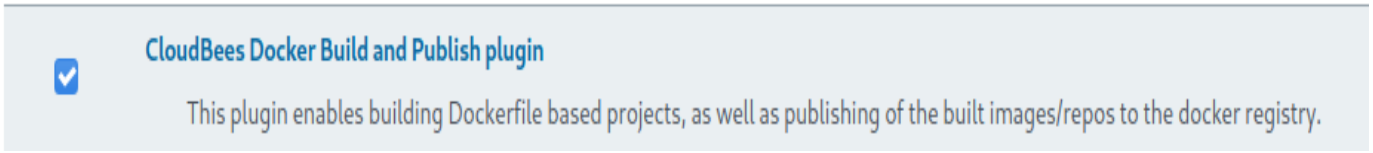
Two jobs have been created

Job 1: This job deals with fetching image from git repository, then building the image and at last deploying the built image to dockerhub repository.

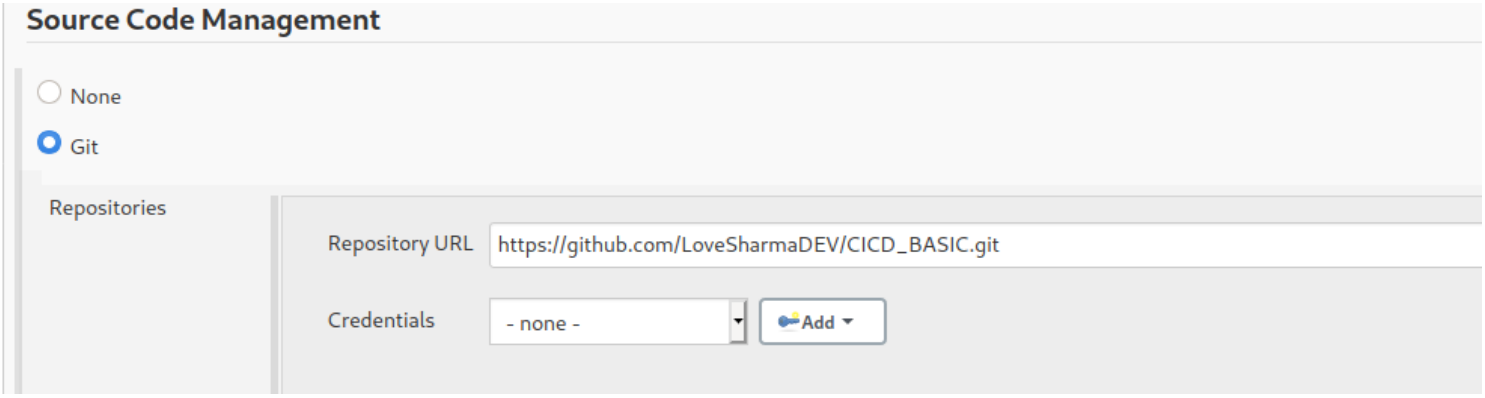
Job 2: This job is triggered if the job 1 is successful. This job deploys the docker instances on the local machine using docker-compose.

JOB 1 (Image-Build)

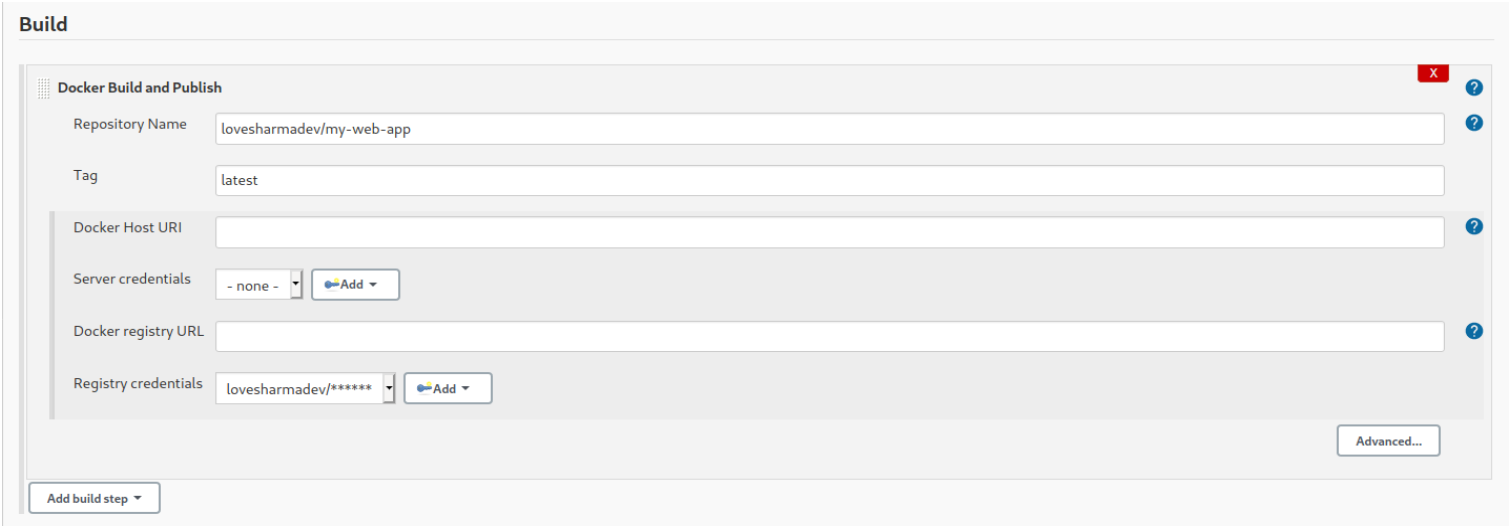
Docker plugin Used:



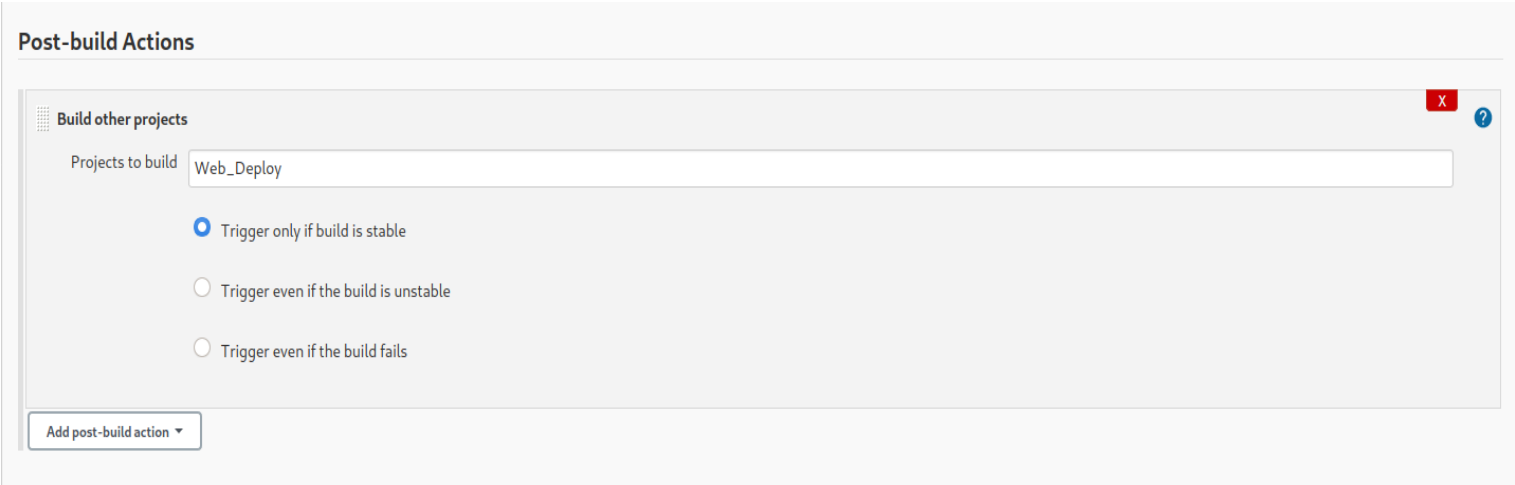
1. provide **Jenkins** the repository to fetch code from



2. Use the **plugin** to configure Jenkins to dockerhub repository

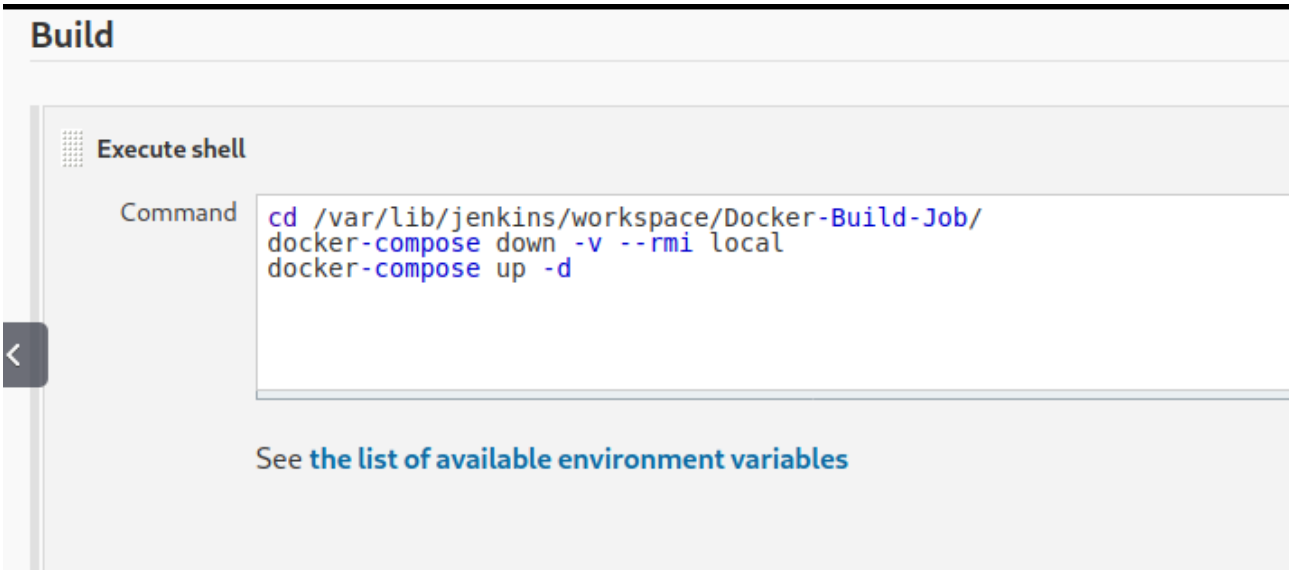


3. Set the post build actions to **trigger** the deployment build



JOB 2 (Image-Deploy to local environment) ==> STAGING ENVIRONMENT)

Deploy using **docker compose**



SCREEN SHOTS

Console Output

```
Started by user Love Sharma
Running as SYSTEM
Building in workspace /var/lib/jenkins/workspace/Docker-Build-Job
The recommended git tool is: NONE
No credentials specified
 > git rev-parse --is-inside-work-tree # timeout=10
Fetching changes from the remote Git repository
 > git config remote.origin.url https://github.com/LoveSharmaDEV/CICD_BASIC.git # timeout=10
Fetching upstream changes from https://github.com/LoveSharmaDEV/CICD_BASIC.git
 > git --version # timeout=10
 > git --version # 'git version 2.28.0'
 > git fetch --tags --force --progress -- https://github.com/LoveSharmaDEV/CICD_BASIC.git +refs/heads/*:refs/remotes/origin/* # timeout=10
 > git rev-parse refs/remotes/origin/master^{commit} # timeout=10
Checking out Revision edb3fd0bd28b4c8f74cf8759281af15a3ab7987f (refs/remotes/origin/master)
 > git config core.sparsecheckout # timeout=10
 > git checkout -f edb3fd0bd28b4c8f74cf8759281af15a3ab7987f # timeout=10
Commit message: "Updates"
First time build. Skipping changelog.
[Docker-Build-Job] $ docker build -t lovesharmadev/my-web-app --pull=true /var/lib/jenkins/workspace/Docker-Build-Job
Sending build context to Docker daemon  2.169MB

Step 1/8 : FROM python
latest: Pulling from library/python
Digest: sha256:03af1810bd46d201a4bd1477aeff337a09e67118d96c50138e3360c2b4bd6b9f
Status: Image is up to date for python:latest
 ---> dfc47c6cee13
Step 2/8 : RUN apt-get update -y
 ---> Using cache
 ---> 0fde1e2ff1f0
Step 3/8 : RUN pip install Flask
 ---> Using cache
 ---> 256d116640a1
```

Console Output

```
Started by upstream project "Docker-Build-Job" build number 10
originally caused by:
 Started by user Love Sharma
Running as SYSTEM
Building in workspace /var/lib/jenkins/workspace/Web_Deploy
[Web_Deploy] $ /bin/sh -xe /tmp/jenkins8912279571567638141.sh
+ cd /var/lib/jenkins/workspace/Docker-Build-Job/
+ docker-compose down -v --rmi local
Removing network docker-build-job_default
+ docker-compose up -d
Creating network "docker-build-job_default" with the default driver
Creating docker-build-job_database_1 ...
[1A[2K
Creating docker-build-job_database_1 ... [32mdone[0m
[1BCreating docker-build-job_webapp_1   ...
[1A[2K
Creating docker-build-job_webapp_1   ... [32mdone[0m
[1BFinished: SUCCESS
```

All +

S	W	Name ↓	Last Success	Last Failure	Last Duration
		Docker-Build-Job	1 min 13 sec - #1 lovesharmadev/my-web-app	N/A	29 sec
		Web_Deploy	37 sec - #1	N/A	20 sec

Icon: S M L

Legend Atom feed for all Atom feed for failures Atom feed for just latest builds

```
┌─love@kali ~
└─$ docker ps
CONTAINER ID        IMAGE                     COMMAND                  CREATED             STATUS
            PORTS                  NAMES
5a42b4b701d0        lovesharmadev/my-php-app   "/docker-entrypoint.…"   About a minute ago   Up About
 a minute   0.0.0.0:8000->80/tcp   docker-build-job_webapp_1
5d11d8d5f1af        mysql:5.7                  "docker-entrypoint.s…"   2 minutes ago        Up About
 a minute   3306/tcp, 33060/tcp    docker-build-job_database_1
┌─love@kali ~
└─$
```

3.Write a Terraform script to deploy the image on AWS Docker platform.

BRIEF ON STEPS:

1. Initialize the provider to set the API's to be used. After setting "aws" as a provider you would be able to use the AWS resources.

```
provider "aws"{
    region="us-east-1"
    access_key="************************"
    secret_key="****************************************"
}
```

2. Next step is to set up the VPC. This is the place where we would be deploying our ECS cluster

```
resource "aws_vpc" "main"{
    cidr_block = "132.0.0.0/16"
    tags = {
        Name=var.vpc_name
    }
}
```

3. After creating VPC we would have to setup the subnet configuration.

```
resource "aws_subnet" "main" {
  count = 2
  vpc_id     = aws_vpc.main.id
  cidr_block = cidrsubnet(aws_vpc.main.cidr_block, 8, count.index)
  map_public_ip_on_launch=true
  tags = {
    Name = var.subnet_name
  }
}
```

4. Next step involves configuration of our vpc and subnets.

```
resource "aws_subnet" "main" {
  count = 2
  vpc_id     = aws_vpc.main.id
  cidr_block = cidrsubnet(aws_vpc.main.cidr_block, 8, count.index)
  map_public_ip_on_launch=true
  tags = {
    Name = var.subnet_name
  }
}

resource "aws_internet_gateway" "internetgateway" {
  vpc_id = aws_vpc.main.id
}

resource "aws_route" "internet_access" {
  route_table_id = aws_vpc.main.main_route_table_id
  destination_cidr_block = "0.0.0.0/0"
  gateway_id = aws_internet_gateway.internetgateway.id
}
```

5. The next step is to implement AWS security groups for incoming traffic and to configure permissions ECS by IAM policies.

```
resource "aws_security_group" "accessgroups" {
  name = "allowinbound"
  vpc_id = aws_vpc.main.id
  ingress {
    cidr_blocks=["0.0.0.0/0"]
    from_port=0
    to_port=65535
    protocol="tcp"
  }
  ingress {
    cidr_blocks=["0.0.0.0/0"]
    from_port=0
    to_port=0
    protocol=-1
  }
  tags = {
    Name = "ECS-Access"
  }

}

data "aws_iam_policy_document" "ecs_task_execution_role" {
  version = "2012-10-17"
  statement {
    sid = ""
    effect = "Allow"
    actions = ["sts:AssumeRole"]

    principals {
      type        = "Service"
      identifiers = ["ecs-tasks.amazonaws.com"]
    }
  }
}
```

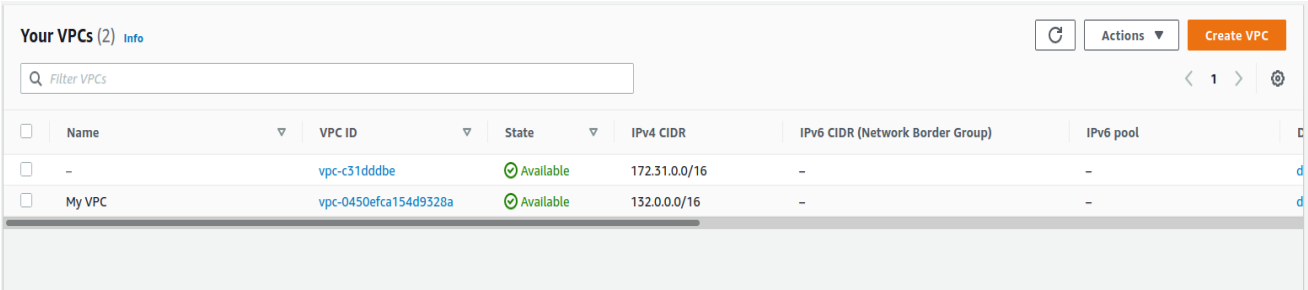
6. Last step boils all down to configuring ECS

```
# ECS task execution role
resource "aws_iam_role" "ecs_task_execution_role" {
  name               = "MyEcsTaskExecutionRole"
  assume_role_policy = data.aws_iam_policy_document.ecs_task_execution_role.json
}

# ECS task execution role policy attachment
resource "aws_iam_role_policy_attachment" "ecs_task_execution_role" {
  role       = aws_iam_role.ecs_task_execution_role.name
  policy_arn = "arn:aws:iam::aws:policy/service-role/AmazonECSTaskExecutionRolePolicy"
}

resource "aws_ecs_cluster" "nodecluster" {
  name = "sysprov"
}

resource "aws_ecs_task_definition" "flaskapp" {
  family                = "service"
  container_definitions = file("service.json")
  execution_role_arn=aws_iam_role.ecs_task_execution_role.arn
  network_mode="awsvpc"
  requires_compatibilities=["FARGATE"]
  memory="1024"
  cpu="512"
}

resource "aws_ecs_service" "main" {
  name = "service-ecs"
  cluster = aws_ecs_cluster.nodecluster.name
  task_definition = aws_ecs_task_definition.flaskapp.arn
  launch_type = "FARGATE"
  network_configuration {
    security_groups = [aws_security_group.accessgroups.id]
    subnets = aws_subnet.main.*.id
    assign_public_ip = true
  }
  depends_on=[aws_iam_role_policy_attachment.ecs_task_execution_role]
}
```

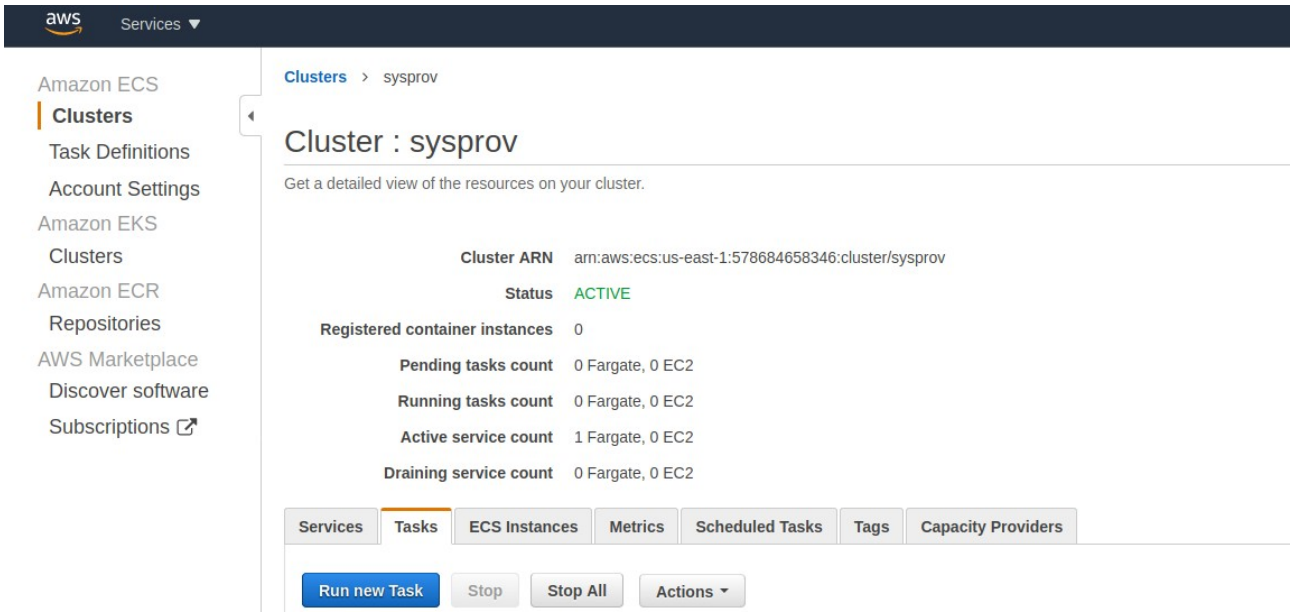
AFTER CREATING TERRAFORM CONFIG FILES
RUN FOLLOWING COMMANDS ON THE TERMINAL:

1. terraform init
2. terraform plan
3. terraform apply

On running above commands the architecture defined in terraform would be provisioned on aws platform.



Next task would be to create a task and run it on ECS cluster.



Amazon ECS
- Clusters
- Task Definitions
- Account Settings

Amazon EKS
- Clusters

Amazon ECR
- Repositories

AWS Marketplace
- Discover software
- Subscriptions

Run Task

Select the cluster to run your task definition on and the number of copies of that task to run. To apply container overrides or target particular container instances, click Advanced Options.

Launch type FARGATE EC2

Switch to capacity provider strategy

Task Definition
Family: service — Enter a value
Revision: 2 (latest)

Platform version LATEST

Cluster sysprov

Number of tasks 1

Task Group

VPC and security groups

VPC and security groups are configurable when your task definition uses the awsvpc network mode.

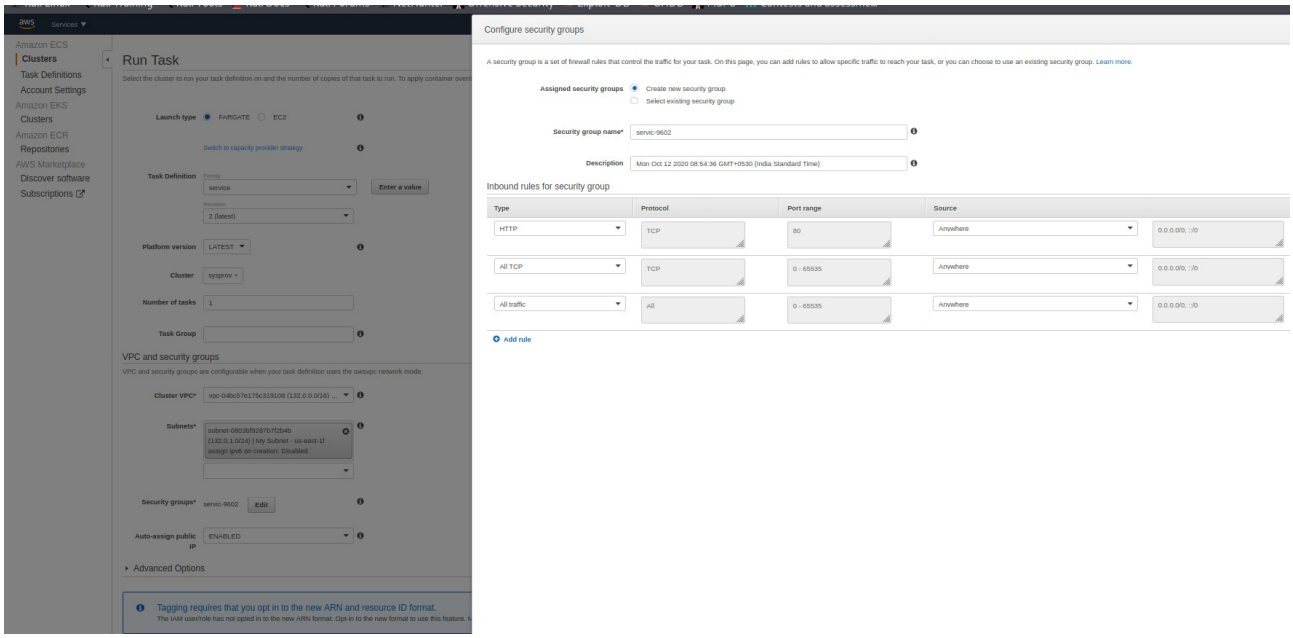
Cluster VPC* vpc-04bc57e175c319108 (132.0.0.0/16) ...

Subnets* subnet-0803bf9287b7f2b4b (132.0.1.0/24) | My Subnet - us-east-1f assign ipv6 on creation: Disabled

Security groups* servic-9602 Edit

Auto-assign public IP ENABLED

Advanced Options



After all of the configuration, access your task through public IP provided.