You are hired as a DevOps Engineer for Analytics Pvt Ltd. This company is a product based organization which uses Docker for their containerization needs within the company. The final product received a lot of traction in the first few weeks of launch. Now with the increasing demand, the organization needs to have a platform for automating deployment, scaling and operations of application containers across clusters of hosts. As a DevOps Engineer, you need to implement a DevOps lifecycle such that all the requirements are implemented without any change in the Docker containers in the testing environment.

Up until now, this organization used to follow a monolithic architecture with just 2 developers. The product is present on: https://github.com/hshar/website.git

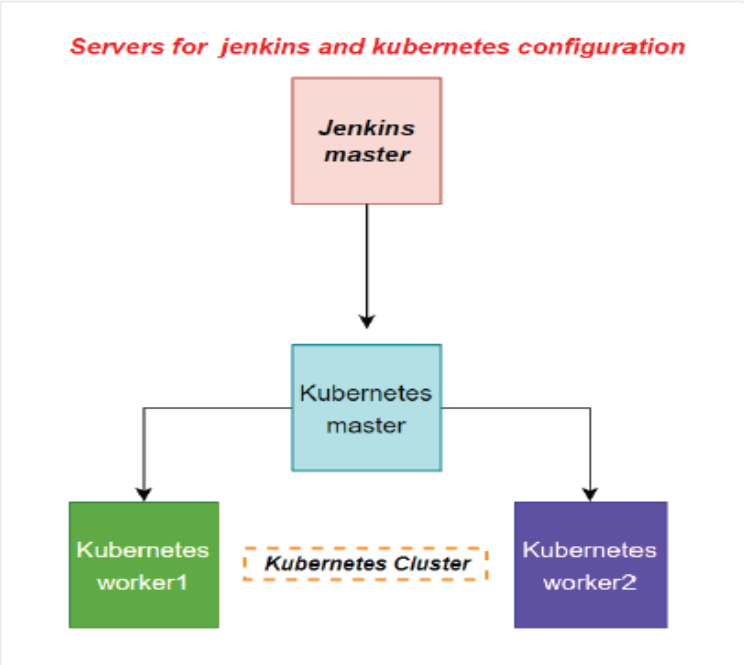
Following are the specifications of the lifecycle:

1. Git workflow should be implemented. Since the company follows a monolithic architecture of development, you need to take care of version control. The release should happen only on the 25th of every month.
2. CodeBuild should be triggered once the commits are made in the master branch.
3. The code should be containerized with the help of the Dockerfile. The Dockerfile should be built every time if there is a push to GitHub. Create a custom Docker image using a Dockerfile.
4. As per the requirement in the production server, you need to use the Kubernetes cluster and the containerized code from Docker Hub should be deployed with 2 replicas. Create a NodePort service and configure the same for port 30008.
5. Create a Jenkins Pipeline script to accomplish the above task.
6. For configuration management of the infrastructure, you need to deploy the configuration on the servers to install necessary software and configurations.
7. Using Terraform, accomplish the task of infrastructure creation in the AWS cloud provider.

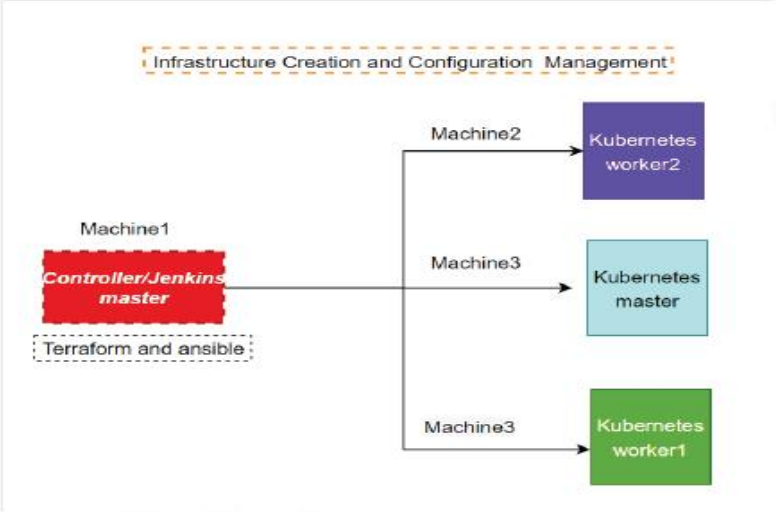
Architectural Advice:

Softwares to be installed on the respective machines using configuration management.

Worker1: Jenkins, Java

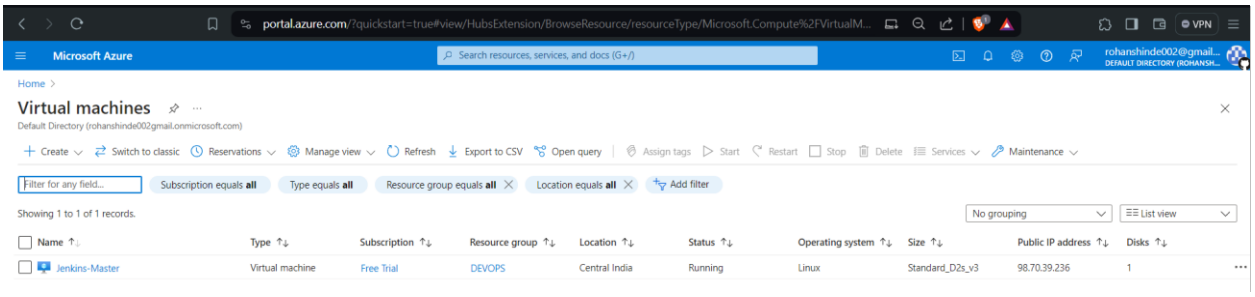


Worker2: Docker, Kubernetes
Worker3: Java, Docker, Kubernetes
Worker4: Docker, Kubernetes



SOLUTION

1. Created a Jenkins Master VM and installed terraform and ansible on it



2. Used terraform file for Infrastructure creation and ansible playbook to install java and docker

Main.tf file

```
# Configure the AWS provider

provider "aws" {

region = "ap-south-1" # Update with your desired region

}


resource "aws_instance" "example" {

   ami = "ami-007020fd9c84e18c7"

   count = 2

   instance_type = "t2.medium"

   key_name = "demo"

   tags = {

      Name = "kubernetes-slave-${count.index}"

   }

   user_data = <<-EOF
```

```
        #!/bin/bash
        apt-get update
        apt-get install -y openjdk-21-jdk
    EOF
}
resource "aws_instance" "main" {
    ami = "ami-007020fd9c84e18c7"
    instance_type = "t2.medium"
    key_name = "demo"
    tags = {
          Name = "kubernetes-master"
    }
    user_data = <<-EOF
        #!/bin/bash
        apt-get update
        apt-get install -y openjdk-21-jdk
    EOF
}

# Output public IP addresses for each instance
output "Master_Public_IP" {
    value = "${aws_instance.main.public_ip}"
}
output "Worker_public_IP_1" {
    value = "${aws_instance.example[0].public_ip}"     # Access first worker
}
```

```
output "Worker_public_IP_2" {
value = "${aws_instance.example[1].public_ip}"     # Access second worker
}
```

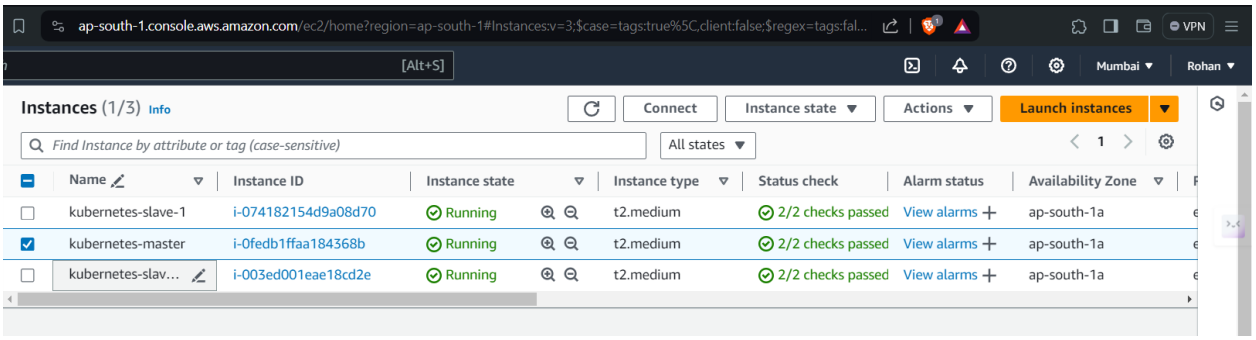
Ansible Playbook

```
---
- hosts: all
  become: yes
  tasks:
  - name: Update apt cache
      apt: update_cache=yes

  - name: Install OpenJDK Java
      apt: name={{ item }} state=present
      with_items:
          - openjdk-21-jdk     # Specify the desired Java version

  - name: Install required packages for Docker
      apt: name={{ item }} state=present
      with_items:
          - apt-transport-https
          - ca-certificates
          - curl
          - software-properties-common

  - name: Add Docker's official GPG key
      apt_key:
```

```
        url: https://download.docker.com/linux/ubuntu/gpg
        state: present

  - name: Add Docker apt repository
      apt_repository:
        repo: deb [arch=amd64] https://download.docker.com/linux/ubuntu focal stable
        state: present

  - name: Install Docker
      apt: name=docker-ce state=present

  - name: Enable Docker service at startup
      service: name=docker state=started enabled=yes
```

Installed kubernetes using .sh files which are in zip folder

Infrastructure created : -



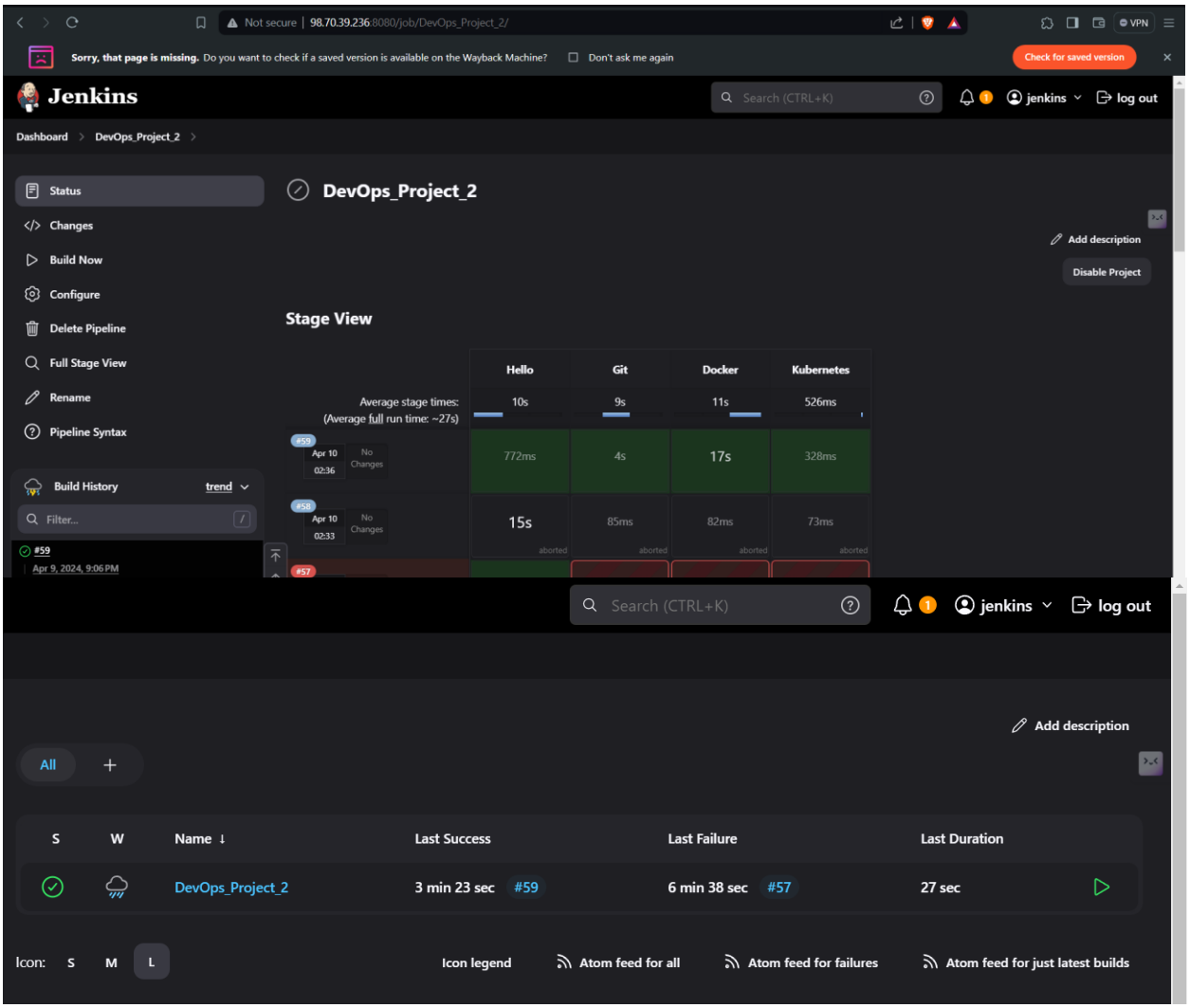
Groovy Script for Jenkins Declarative Pipeline:-

```
pipeline{
    agent none
    environment {
```

```
        DOCKERHUB_CREDENTIALS=credentials('dockercred')
    }
    stages{
        stage('Hello'){
            agent{
                label 'kube-master'
            }
            steps{
                echo 'Hello World'
            }
        }
        stage('Git'){
            agent{
                label 'kube-master'
            }

            steps{

                git 'https://github.com/sparkyx0022/Jenkins-Case-study.git'
            }
        }
        stage('Docker') {
            agent {
                label 'kube-master'
            }

            steps {
```

```
                    sh 'sudo docker build . -t ronn0022/devopsproject02'
                    sh 'sudo echo $DOCKERHUB_CREDENTIALS_PSW | sudo docker login -u $DOCKERHUB_CREDENTIALS_USR --password-stdin'
                    sh 'sudo docker push ronn0022/devopsproject02'

                }
            }
            stage('Kubernetes') {
                agent {
                    label 'kube-master'
                }

                steps {
                    sh "kubectl create -f deploy.yml"
                    sh "kubectl create -f svc.yml"
                }
            }

        }
}
```

Pipeline view :-



After Successful Deployment :-