Student: ANGEL EFRAIN ORDONEZ GONZALEZ **Professor: Keerthi Nelaturu**

ID Number: 101483544 **BCDV 4032 Building Scalable Blockchain Apps**

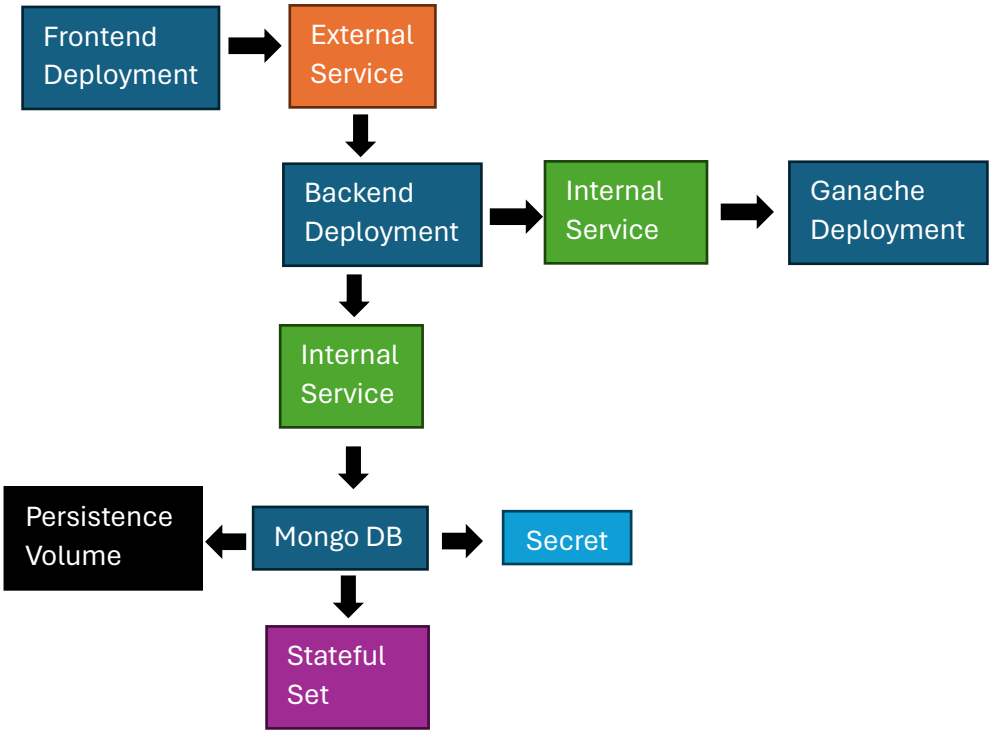
Lab 4

Instructions

In this lab, you will use the docker-ethereum repo to apply all the learnings from this week.

Submission:

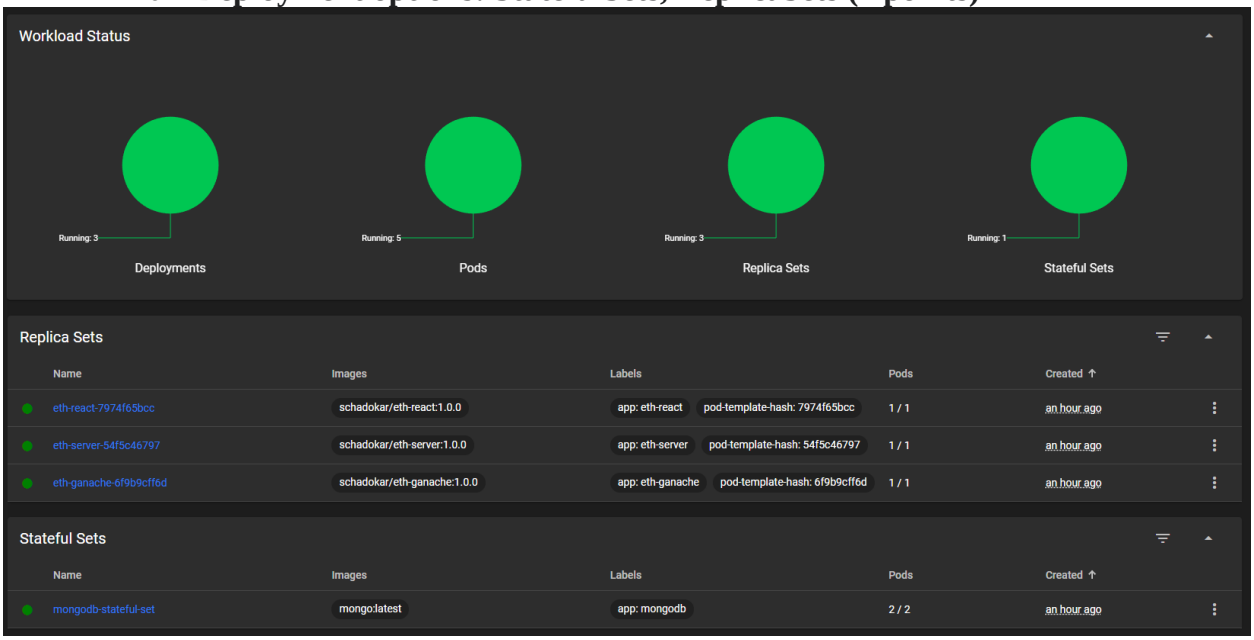
1. **Design document detailing a Kubernetes Deployment Architecture for the docker-ethereum application. Also, include the design rationale for each of the items below. Ex: Why did you pick the pod to be stateful or stateless for the backend environment? etc., (3 points)**



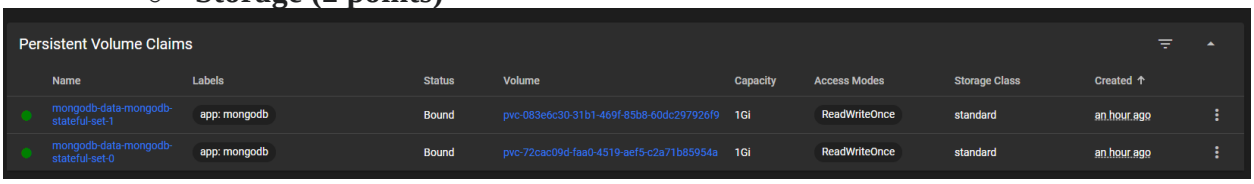
In the architecture, we can see three deployments and Mongo DB. MongoDB is chosen to be stateful as it needs to persist data reliably and roles. This is because MongoDB needs data consistency and availability even in a pod failure. Also, secrets are in MongoDB because it is necessary to save sensitive data such as users, passwords, etc. This ensures that sensitive information is not exposed and follows best security practices.

Also, there are replicas to ensure the website runs with balanced performance and uses a horizontal pod autoscaler with a maximum of 5 pods.

2. **The elements to include in this architecture:**
    - **Deployment options: StatefulSets, ReplicaSets (2 points)**



    - **Storage (2 points)**



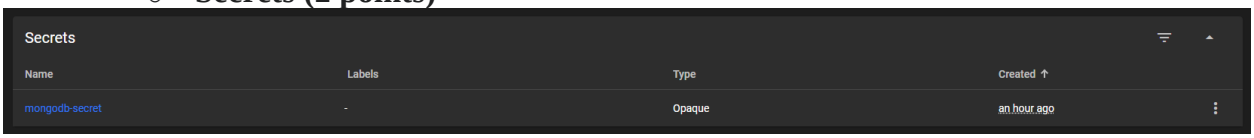
    - **Scaling (2 points)**

```
PS C:\Users\angel\OneDrive\Desktop\BCDV-4032\Lab4> kubectl get hpa eth-ganache-hpa
NAME               REFERENCE                   TARGETS         MINPODS   MAXPODS   REPLICAS   AGE
eth-ganache-hpa    Deployment/eth-ganache      <unknown>/80%   1         5         1          7m42s
```

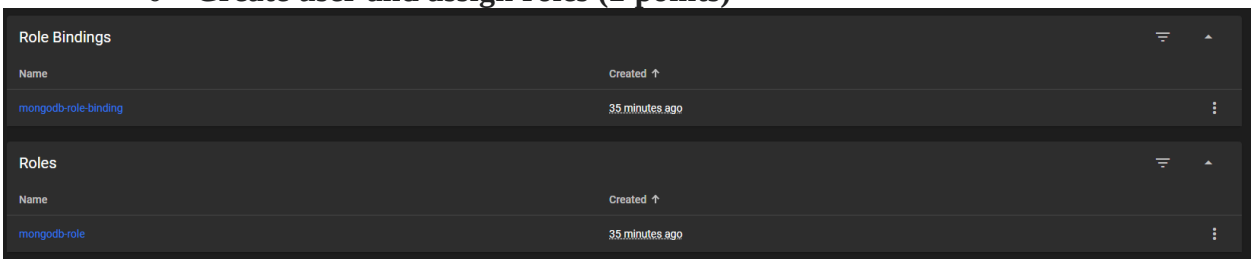
    - **Load Balancing (2 points)**

```
PS C:\Users\angel\OneDrive\Desktop\BCDV-4032\Lab4> kubectl get services
NAME              TYPE           CLUSTER-IP       EXTERNAL-IP   PORT(S)          AGE
eth-ganache       ClusterIP      10.97.113.50     <none>        8545/TCP         112m
eth-react         LoadBalancer   10.103.203.127   <pending>     5000:31165/TCP   111m
eth-server        LoadBalancer   10.103.6.142     <pending>     4000:32657/TCP   111m
mongodb-service   ClusterIP      10.107.70.185    <none>        27017/TCP        112m
PS C:\Users\angel\OneDrive\Desktop\BCDV-4032\Lab4>
```

- **Secrets (2 points)**



- **Create user and assign roles (2 points)**



3. **Create all the required YAML files to implement the design. Apply them to Minikube's local environment. Submit screenshots from the dashboard showing the working application.**