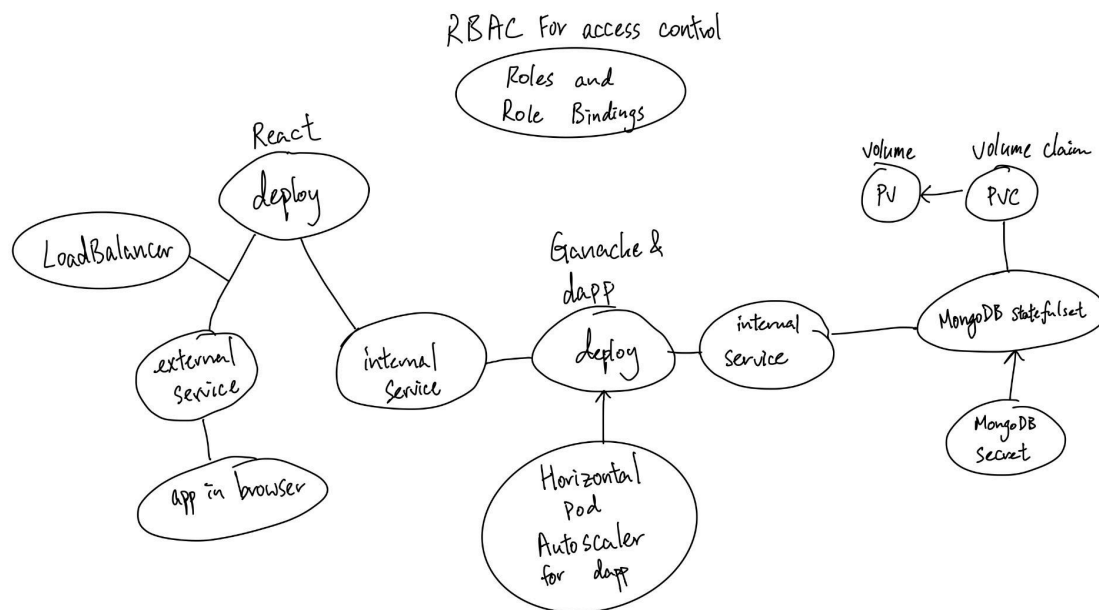


Name: Lo Ching Hei  
ID: 101486171

## Lab4: Design Kubernetes Deployment Architecture

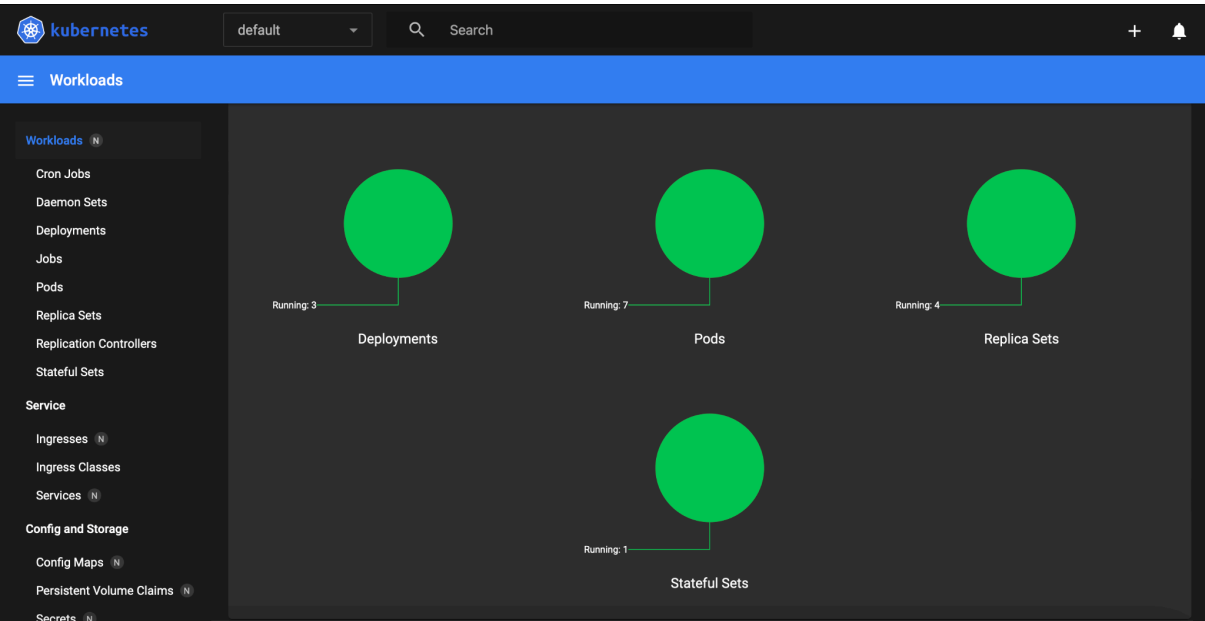


There are a total of three Deployments and one deployment option with StatefulSets. In this assignment, I added the mongodb as the database to manage data storage in the future application. The deployment option for mongodb is statefulset, because statefulset can provide stable network identities and persistent storage for each pod in the set. The stable hostname is well suited to mongodb to manage data because it allows other applications to reliably connect to a specific database pod, even if the pod is rescheduled or restarted. Also, statefulset supports the use of Persistent Volumes and Persistent Volume Claims, which was used in this application as well as storage. The Persistent storage ensures that data is not lost when a pod is terminated or rescheduled, which fits the purpose of using mongodb.

Besides, the Secret object is also used in the mongodb that allows to store and manage the username and password that are used as the authentication for connecting the database. Also, it is noted that images for dapp, react and ganache were loaded from local docker images built with ethereum-docker.

Name: Lo Ching Hei  
ID: 101486171

Screenshots from the dashboard



Deployments				
Name	Images	Labels	Pods	Created ↑
ganache	aratrika1996/docker-eth-ganache:latest	io.kompose.service: ganache	1 / 1	6 minutes ago
dapp	aratrika1996/docker-eth-server:latest	io.kompose.service: dapp	2 / 2	7 minutes ago
react	aratrika1996/docker-eth-frontend	io.kompose.service: react	2 / 2	12 minutes ago

Replica Sets				
Name	Images	Labels	Pods	Created ↑
ganache-fd7d6bbcd	aratrika1996/docker-eth-ganache:latest	io.kompose.network/docker-ethereum-default: true io.kompose.service: ganache pod-template-hash: fd7d6bbcd	1 / 1	6 minutes ago
dapp-75c59d4c68	aratrika1996/docker-eth-server:latest	io.kompose.network/docker-ethereum-default: true io.kompose.service: dapp pod-template-hash: 75c59d4c68	2 / 2	6 minutes ago
react-764bc67668	aratrika1996/docker-eth-frontend	io.kompose.network/docker-ethereum-default: true io.kompose.service: react pod-template-hash: 764bc67668	2 / 2	10 minutes ago

Name: Lo Ching Hei  
ID: 101486171

Stateful Sets

Name	Images	Labels	Pods	Created ↑
<a href="#">mongodb-stateful-set</a>	mongo:latest	app: mongodb	3 / 3	55 minutes ago

Persistent Volumes

Name	Capacity	Access Modes	Reclaim Policy	Status	Claim	Storage Class	Reason	Created
<a href="#">pvc-90841155-9c99-4fdc-af68-df1c83c416cb</a>	storage: 1 Gi	ReadWriteOnce	Delete	Bound	<a href="#">default/mongodb-data-mongodb-stateful-set-2</a>	standard	-	24 minutes ago
<a href="#">pvc-e53e775a-399f-4dc8-841f-0ff18cafee59</a>	storage: 1 Gi	ReadWriteOnce	Delete	Bound	<a href="#">default/mongodb-data-mongodb-stateful-set-1</a>	standard	-	54 minutes ago
<a href="#">pvc-ad82873c-50f3-4d12-9a57-971efd73fdb6</a>	storage: 1 Gi	ReadWriteOnce	Delete	Bound	<a href="#">default/mongodb-data-mongodb-stateful-set-0</a>	standard	-	54 minutes ago

Persistent Volume Claims

Name	Labels	Status	Volume	Capacity	Access Modes	Storage Class	Created ↑
<a href="#">mongodb-data-mongodb-stateful-set-2</a>	app: mongodb	Bound	<a href="#">pvc-90841155-9c99-4fdc-af68-df1c83c416cb</a>	1Gi	ReadWriteOnce	standard	25 minutes ago
<a href="#">mongodb-data-mongodb-stateful-set-1</a>	app: mongodb	Bound	<a href="#">pvc-e53e775a-399f-4dc8-841f-0ff18cafee59</a>	1Gi	ReadWriteOnce	standard	55 minutes ago
<a href="#">mongodb-data-mongodb-stateful-set-0</a>	app: mongodb	Bound	<a href="#">pvc-ad82873c-50f3-4d12-9a57-971efd73fdb6</a>	1Gi	ReadWriteOnce	standard	57 minutes ago

Metadata

Name

mongodb-secret

Namespace

default

Created

Jan 26, 2024

Age

57 minutes ago

UID

4c0403a9-8883-467a-8799-a44c7cc33d90

Annotations

[kubectrl.kubernetes.io/last-applied-configuration](#)

Data

password

8 bytes

username

5 bytes

In total, 7 pods were created with 4 replica Sets, where react and dapp have 2 replicas. The replica makes sure two pods are running all the time. The replicas also allowed load balancing to perform. In this case, LoadBalancer was used to distribute incoming load to organize healthy replicas, preventing any single instance from becoming a bottleneck.

For the dapp deployment, there is a Horizontal Pod Autoscaler to control the number of pods in order to handle the additional load. In this application, the maximum replicas for HPA is assigned to be 5.

Name: Lo Ching Hei  
ID: 101486171

Horizontal Pod Autoscalers				
Name	Min Replicas	Max Replicas	Reference	Created ↑
dapp-hpa	1	5	Deployment / dapp	4 hours ago

LoadBalancer is also used to manage pod load. LoadBalancer was used because it is a convenient and effective choice for exposing services externally.

Role Bindings	
Name	Created ↑
react-role-binding	9 minutes ago

Roles	
Name	Created ↑
react-reader	3 minutes ago

For creating users and assigning roles, two YAML files define Kubernetes RBAC (Role-Based Access Control) resources (role.yaml and RoleBinding.yaml). The RoleBinding binds the react-service-account to the react-reader role, granting the specified permissions to that service account, in this situation ["get", "watch", "list"].