Using Helm to Deploy Micro-Services Application

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I.1. Target

The document shows readers how to deploy applications with **Helm.**

I.2. Demo Overview

In using Helm, we can simplify the process of application deployment.

In this demo, we will create the application on EKS.

The project used in this demo consists of 3 services:

- database
- backend
- frontend

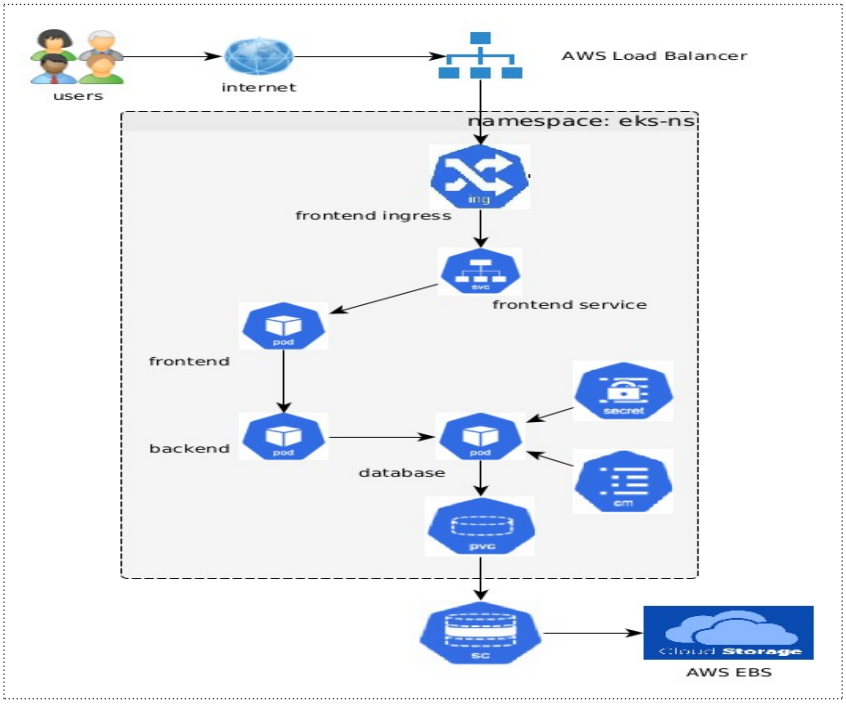


Figure 1: Application Components

We will deploy a helm chart that consists of 3 subcharts (frontend, backend and mongo) and 1 dependency (NGINX controller). They can be found in "Demo source code"

Note: For the production environment, the database should be an external database service.

I.3. Prequiresites

- Helm CLI is locally installed
- EKS cluster is already created (refer to Create EKS Cluster).
- Kubernetes CLI gets configured (kubectl) (refer Configure kubectl)

II. Instruction

II.1. General steps

In order to get the application running, the following steps are required:

- Deploy the helm chart
- Verify the chart installation

II.2. Execution

- **Deploy the helm chart:**

  # in the root folder, run to fetch the dependene (nginx controler)

  helm dependency build

```
hatnguyencanh@vnlap03333:~/Documents/HP/NT/NT_GitHub/azure-devops-ci-cd/helm/apps$ helm dependency build
Hang tight while we grab the latest from your chart repositories...
...Successfully got an update from the "ingress-nginx" chart repository
...Successfully got an update from the "nginx-stable" chart repository
...Successfully got an update from the "stable" chart repository
Update Complete. ⎈Happy Helming!⎈
Saving 1 charts
Downloading ingress-nginx from repo https://kubernetes.github.io/ingress-nginx
Deleting outdated charts
```

  helm install my-release .

```
NAME: my-release
LAST DEPLOYED: Tue Sep  5 16:50:42 2023
NAMESPACE: default
STATUS: deployed
REVISION: 1
TEST SUITE: None
```

- **Verify the chart installation**

verify the release

helm list

```
NAME            NAMESPACE       REVISION        UPDATED                                 STATUS          CHART           APP VERSION
my-release      default         1               2023-09-05 17:13:40.864098954 +0700 +07 deployed        apps-0.1.0      1.16.0
```

verify the application resources

kubectl get all

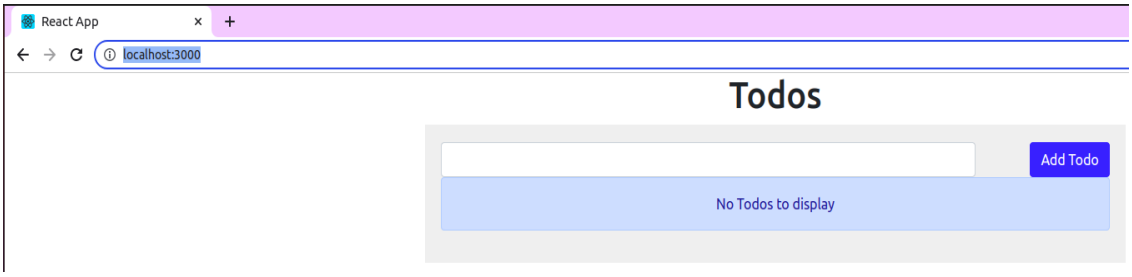
```
NAME                                                  READY   STATUS    RESTARTS   AGE
pod/backend-app-58f958b745-cvzr5                      1/1     Running   0          2m2s
pod/backend-app-58f958b745-q2spk                      1/1     Running   0          2m2s
pod/backend-app-58f958b745-tk7zw                      1/1     Running   0          2m2s
pod/database-0                                        1/1     Running   0          2m2s
pod/frontend-app-79dc46ddb5-7w4np                     1/1     Running   0          2m2s
pod/frontend-app-79dc46ddb5-94thd                     1/1     Running   0          2m2s
pod/frontend-app-79dc46ddb5-rsrhb                     1/1     Running   0          2m2s
pod/my-release-ingress-nginx-controller-b9f8867b6-9nzcc   1/1     Running   0          2m2s

NAME                                                  TYPE           CLUSTER-IP       EXTERNAL-IP                                                                    PORT(S)                      AGE
service/backend                                       ClusterIP      10.100.39.61     <none>                                                                         3000/TCP                     2m3s
service/frontend                                      ClusterIP      10.100.197.186   <none>                                                                         3000/TCP                     2m3s
service/kubernetes                                    ClusterIP      10.100.0.1       <none>                                                                         443/TCP                      5h4m
service/mongo                                         ClusterIP      10.100.140.218   <none>                                                                         27017/TCP                    2m3s
service/my-release-ingress-nginx-controller           LoadBalancer   10.100.113.93    a6c4199044e434b6db0057b1a6be194d-1726000723.ap-southeast-1.elb.amazonaws.com   80:31017/TCP,443:32542/TCP   2m3s
service/my-release-ingress-nginx-controller-admission   ClusterIP      10.100.116.158   <none>                                                                         443/TCP                      2m3s

NAME                                                  READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/backend-app                           3/3     3            3           2m4s
deployment.apps/frontend-app                          3/3     3            3           2m4s
deployment.apps/my-release-ingress-nginx-controller   1/1     1            1           2m4s

NAME                                                        DESIRED   CURRENT   READY   AGE
replicaset.apps/backend-app-58f958b745                      3         3         3       2m5s
replicaset.apps/frontend-app-79dc46ddb5                     3         3         3       2m5s
replicaset.apps/my-release-ingress-nginx-controller-b9f8867b6   1         1         1       2m5s

NAME                                READY   AGE
statefulset.apps/database           1/1     2m5s
```

expose frontend service to access application

kubectl port-forward service/frontend 3000:3000

```
hatnguyencanh@vnlap03333:~/Documents/K8s/DEMO/k8s$ kubectl port-forward service/frontend 3000:3000
Forwarding from 127.0.0.1:3000 -> 3000
Forwarding from [::1]:3000 -> 3000
```

open browser to access application at URL: locahost:3000

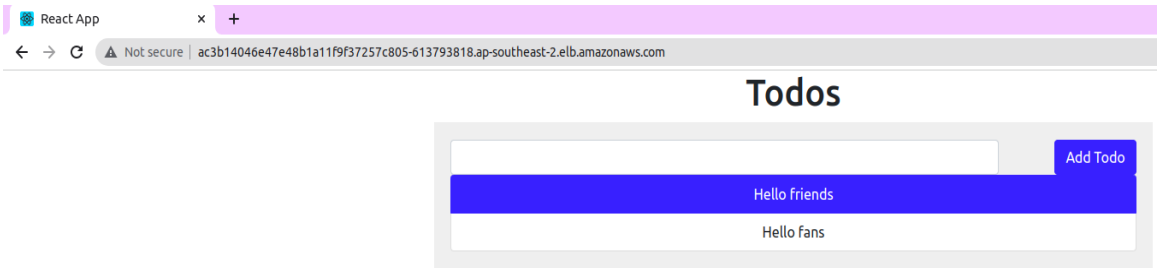


verify application ingress

kubectl get ingress -o wide

```
hatnguyencanh@vnlap03333:~/Documents/K8s/DEMO/k8s$ kubectl get ingress -o wide
NAME      CLASS   HOSTS   ADDRESS                                                                 PORTS   AGE
ingress   nginx   *       ac3b14046e47e48b1a11f9f37257c805-613793818.ap-southeast-2.elb.amazonaws.com   80      42s
```

open browser to access application at URL created by ingress controller (e.g: ac3b14046e47e48b1a11f9f37257c805-613793818.ap-southeast-2.elb.amazonaws.com)



III. Frequently Asked Questions

III.1. Demo source code

- https://github.com/nashtech-garage/azure-devops-ci-cd/tree/main/helm

IV. References

- Source code for application: https://github.com/docker/awesome-compose/tree/master/react-express-mongodb