

# NEW EXERCISE 2: Application Packaging & Deployment with Helm

## Step 1: Install Helm on the VM :

```
tlxp@ip-172-31-43-62: ~/yaml
ConfigMapName: kube-root-ca.crt
Optional: false
DownwardAPI: true
Class: BestEffort
Labels: <none>
Labels-Selectors: node.kubernetes.io/not-ready:NoExecute op=Exists for 300s
Labels: node.kubernetes.io/unreachable:NoExecute op=Exists for 300s
Events:
Type Reason Age From Message
----
Normal Scheduled 31s default-scheduler Successfully assigned default/my-5gc-pod to minikube
Normal Pulling 30s kubelet spec.containers{my-5gc-container}: Pulling image "nginx:latest"
Normal Pulled 28s kubelet spec.containers{my-5gc-container}: Successfully pulled image "nginx:latest" in 1.788s (1.788s including waiting). Image size 151914258 bytes.
Normal Created 28s kubelet spec.containers{my-5gc-container}: Created container: my-5gc-container
Normal Started 28s kubelet spec.containers{my-5gc-container}: Started container my-5gc-container
tlxp@ip-172-31-43-62:~/yaml_files$ curl https://raw.githubusercontent.com/helm/helm/main/scripts/get-helm-3 | bash
% Total % Received % Xferd Average Speed Time Time Time Current
Dload Upload Total Spent Left Speed
0 11929 100 11929 0 0 157k 0 --:--:-- --:--:-- --:--:-- 159k
Downloading https://get.helm.sh/helm-v3.19.4-linux-amd64.tar.gz
Verifying checksum... Done.
Preparing to install helm into /usr/local/bin
sudo! password for tlxp:
helm installed into /usr/local/bin/helm
tlxp@ip-172-31-43-62:~/yaml_files$ helm --version
Error: unknown flag: --version
tlxp@ip-172-31-43-62:~/yaml_files$ helm version
version.BuildInfo{Version:"v3.19.4", GitCommit:"7c7b6e486dac026202556836bb910c37d847793e", GitTreeState:"clean", GoVersion:"go1.24.11"}
tlxp@ip-172-31-43-62:~/yaml_files$ helm create my-5gc-nginx
Creating my-5gc-nginx
tlxp@ip-172-31-43-62:~/yaml_files$ ls
~5gc-clusterip.yaml my-5gc-namespace.yaml my-5gc-secret.yaml
~5gc-configmap.yaml my-5gc-nginx nginx-deployment.yaml
~5gc-deployment.yaml my-5gc-nodeport.yaml replicaset.yaml
~5gc-externalname.yaml my-5gc-pod.yaml
~5gc-ingress.yaml my-5gc-replicaset.yaml
tlxp@ip-172-31-43-62:~/yaml_files$ cd my-5gc-nginx
```

## Step 2: Create a Helm Chart:

```
tlxp@ip-172-31-43-62:~/yaml_files/my-5gc-nginx$ cd ..
tlxp@ip-172-31-43-62:~/yaml_files$ ls
my-5gc-clusterip.yaml my-5gc-namespace.yaml my-5gc-secret.yaml
my-5gc-configmap.yaml my-5gc-nginx nginx-deployment.yaml
my-5gc-deployment.yaml my-5gc-nodeport.yaml replicaset.yaml
my-5gc-externalname.yaml my-5gc-pod.yaml
my-5gc-ingress.yaml my-5gc-replicaset.yaml
tlxp@ip-172-31-43-62:~/yaml_files$ cd my-5gc-nginx
tlxp@ip-172-31-43-62:~/yaml_files/my-5gc-nginx$ ls
Chart.yaml charts templates values.yaml
tlxp@ip-172-31-43-62:~/yaml_files/my-5gc-nginx$ nano values.yaml
tlxp@ip-172-31-43-62:~/yaml_files/my-5gc-nginx$ helm upgrade --install my-5gc-release ./my-5gc-nginx
Release "my-5gc-release" does not exist. Installing it now.
Error: path "/my-5gc-nginx" not found
tlxp@ip-172-31-43-62:~/yaml_files/my-5gc-nginx$ kubectl get pods
kubectl get svc
NAME READY STATUS RESTARTS AGE
my-5gc-pod 1/1 Running 0 8m11s
my-nginx-rs-ft6v4 1/1 Running 0 127m
my-nginx-rs-pp2rb 1/1 Running 0 127m
nginx-deploy-77bf8679f9-56528 1/1 Running 0 124m
nginx-deploy-77bf8679f9-w2bnf 1/1 Running 0 124m
NAME TYPE CLUSTER-IP EXTERNAL-IP PORT(S) AGE
kubernetes ClusterIP 10.96.0.1 <none> 443/TCP 3h31m
my ClusterIP 10.96.46.107 <none> 80/TCP 175m
my-5gc-externalname ExternalName <none> telcolearn.com <none> 164m
my-5gc-nodeport NodePort 10.108.242.155 <none> 80:30080/TCP 169m
my-5gc-service ClusterIP 10.96.35.33 <none> 80/TCP 169m
my-5gc-svc-nodeport NodePort 10.104.105.41 <none> 80:30219/TCP 171m
nginx-deploy ClusterIP 10.100.204.115 <none> 80/TCP 123m
nginx-service ClusterIP 10.108.249.77 <none> 80/TCP 122m
tlxp@ip-172-31-43-62:~/yaml_files/my-5gc-nginx$ ls
Chart.yaml charts templates values.yaml
tlxp@ip-172-31-43-62:~/yaml_files/my-5gc-nginx$ cd templates
tlxp@ip-172-31-43-62:~/yaml_files/my-5gc-nginx/templates$ ls
NOTES.txt deployment.yaml httproute.yaml service.yaml tests
_helpers.tpl hpa.yaml ingress.yaml serviceaccount.yaml
tlxp@ip-172-31-43-62:~/yaml_files/my-5gc-nginx/templates$
```

## Step 3: Customize values.yaml :

```
my-5gc-nginx/charts:

my-5gc-nginx/templates:
NOTES.txt      deployment.yaml  httproute.yaml  service.yaml    tests
_helpers.tpl   hpa.yaml          ingress.yaml    serviceaccount.yaml

my-5gc-nginx/templates/tests:
test-connection.yaml

tlxp@ip-172-31-43-62:~$ nano my-5gc-nginx/values.yaml
tlxp@ip-172-31-43-62:~$ nano my-5gc-nginx/templates/deployment.yaml
tlxp@ip-172-31-43-62:~$ helm template my-5gc-release ./my-5gc-nginx | head
---
# Source: my-5gc-nginx/templates/serviceaccount.yaml
apiVersion: v1
kind: ServiceAccount
metadata:
  name: my-5gc-release-my-5gc-nginx
  labels:
    helm.sh/chart: my-5gc-nginx-0.1.0
    app.kubernetes.io/name: my-5gc-nginx
    app.kubernetes.io/instance: my-5gc-release
tlxp@ip-172-31-43-62:~$ helm install my-5gc-release ./my-5gc-nginx
NAME: my-5gc-release
LAST DEPLOYED: Wed Dec 31 09:16:58 2025
NAMESPACE: default
STATUS: deployed
REVISION: 1
NOTES:
1. Get the application URL by running these commands:
  export POD_NAME=$(kubectl get pods --namespace default -l "app.kubernetes.io/name=my-5gc-nginx,app.kubernetes.io/instance=my-5gc-release" -o jsonpath="{.items[0].metadata.name}")
  export CONTAINER_PORT=$(kubectl get pod --namespace default $POD_NAME -o jsonpath="{.spec.containers[0].ports[0].containerPort}")
  echo "Visit http://127.0.0.1:8080 to use your application"
  kubectl --namespace default port-forward $POD_NAME 8080:$CONTAINER_PORT
tlxp@ip-172-31-43-62:~$ kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE
my-5gc-pod                          1/1     Running   0           29m
```

## Step 4: Upgrade the Application (Rolling Update) :

```
tlxp@ip-172-31-43-62:~$ helm list
NAME      NAMESPACE   REVISION   UPDATED                               STATUS   CHART           APP VERSION
my-5gc-release default      1          2025-12-31 09:16:58.216096032 +0000 UTC deployed my-5gc-nginx-0.1.0 1.16.0

tlxp@ip-172-31-43-62:~$ kubectl get svc my-5gc-release-my-5gc-nginx
NAME      TYPE           CLUSTER-IP   EXTERNAL-IP   PORT(S)   AGE
my-5gc-release-my-5gc-nginx ClusterIP      10.111.34.90   <none>        80/TCP    97s

tlxp@ip-172-31-43-62:~$ nano my-5gc-nginx/values.yaml
tlxp@ip-172-31-43-62:~$ helm upgrade my-5gc-release ./my-5gc-nginx
Release "my-5gc-release" has been upgraded. Happy Helming!
NAME: my-5gc-release
LAST DEPLOYED: Wed Dec 31 09:19:10 2025
NAMESPACE: default
STATUS: deployed
REVISION: 2
NOTES:
1. Get the application URL by running these commands:
  export POD_NAME=$(kubectl get pods --namespace default -l "app.kubernetes.io/name=my-5gc-nginx,app.kubernetes.io/instance=my-5gc-release" -o jsonpath="{.items[0].metadata.name}")
  export CONTAINER_PORT=$(kubectl get pod --namespace default $POD_NAME -o jsonpath="{.spec.containers[0].ports[0].containerPort}")
  echo "Visit http://127.0.0.1:8080 to use your application"
  kubectl --namespace default port-forward $POD_NAME 8080:$CONTAINER_PORT
tlxp@ip-172-31-43-62:~$ kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE
my-5gc-pod                          1/1     Running   0           31m
my-5gc-release-my-5gc-nginx-69c69cbfb-66dfz  1/1     Running   0           2m26s
my-5gc-release-my-5gc-nginx-69c69cbfb-9nc2l  1/1     Running   0           2m26s
my-5gc-release-my-5gc-nginx-69c69cbfb-cq8r5  1/1     Running   0           14s
my-nginx-rs-ft6v4                     1/1     Running   0           150m
my-nginx-rs-pp2rb                     1/1     Running   0           150m
nginx-deploy-77bf8679f9-56528          1/1     Running   0           147m
nginx-deploy-77bf8679f9-w2bnf          1/1     Running   0           147m

tlxp@ip-172-31-43-62:~$ helm history my-5gc-release
REVISION   UPDATED              STATUS   CHART           APP VERSION   DESCRIPTION
1          Wed Dec 31 09:16:58 2025    superseded my-5gc-nginx-0.1.01.16.0  Install complete
2          Wed Dec 31 09:19:10 2025    deployed  my-5gc-nginx-0.1.01.16.0  Upgrade complete

tlxp@ip-172-31-43-62:~$ helm rollback my-5gc-release 1
Rollback was a success! Happy Helming!
tlxp@ip-172-31-43-62:~$
```

## Step 5: Rollback (Very Important for CKA Understanding)

```
tlxp@ip-172-31-43-62:~$ helm list
NAME          NAMESPACE   REVISION   UPDATED                               STATUS   CHART          APP VERSION
my-5gc-release default      1          2025-12-31 09:16:58.216096032 +0000 UTC deployed my-5gc-nginx-0.1.0 1.16.0

tlxp@ip-172-31-43-62:~$ kubectl get svc my-5gc-release-my-5gc-nginx
NAME          TYPE          CLUSTER-IP   EXTERNAL-IP   PORT(S)   AGE
my-5gc-release-my-5gc-nginx ClusterIP      10.111.34.90   <none>        80/TCP    97s

tlxp@ip-172-31-43-62:~$ nano my-5gc-nginx/values.yaml
tlxp@ip-172-31-43-62:~$ helm upgrade my-5gc-release ./my-5gc-nginx
Release "my-5gc-release" has been upgraded. Happy Helming!
NAME: my-5gc-release
LAST DEPLOYED: Wed Dec 31 09:19:10 2025
NAMESPACE: default
STATUS: deployed
REVISION: 2
NOTES:
1. Get the application URL by running these commands:
export POD_NAME=$(kubectl get pods --namespace default -l "app.kubernetes.io/name=my-5gc-nginx,app.kubernetes.io/instance=my-5gc-release" -o jsonpath="{.items[0].metadata.name}")
export CONTAINER_PORT=$(kubectl get pod --namespace default $POD_NAME -o jsonpath="{.spec.containers[0].ports[0].containerPort}")
echo "Visit http://127.0.0.1:8080 to use your application"
kubectl --namespace default port-forward $POD_NAME 8080:$CONTAINER_PORT

tlxp@ip-172-31-43-62:~$ kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE
my-5gc-pod                          1/1     Running   0           31m
my-5gc-release-my-5gc-nginx-69c69cbfb-66dfz 1/1     Running   0           2m26s
my-5gc-release-my-5gc-nginx-69c69cbfb-9nc2l 1/1     Running   0           2m26s
my-5gc-release-my-5gc-nginx-69c69cbfb-cq8r5 1/1     Running   0           14s
my-nginx-rs-ft6v4                   1/1     Running   0           150m
my-nginx-rs-pp2rb                   1/1     Running   0           150m
nginx-deploy-77bf8679f9-56528       1/1     Running   0           147m
nginx-deploy-77bf8679f9-w2bnf       1/1     Running   0           147m

tlxp@ip-172-31-43-62:~$ helm history my-5gc-release
REVISION   UPDATED                               STATUS   CHART          APP VERSION   DESCRIPTION
1          Wed Dec 31 09:16:58 2025             superseded my-5gc-nginx-0.1.0 1.16.0       Install complete
2          Wed Dec 31 09:19:10 2025             deployed  my-5gc-nginx-0.1.0 1.16.0       Upgrade complete

tlxp@ip-172-31-43-62:~$ helm rollback my-5gc-release 1
Rollback was a success! Happy Helming!
tlxp@ip-172-31-43-62:~$
```

## Step 6: Uninstall the Application

```
tlxp@ip-172-31-43-62:~$ kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE
my-5gc-pod                          1/1     Running   0           31m
my-5gc-release-my-5gc-nginx-69c69cbfb-66dfz 1/1     Running   0           2m26s
my-5gc-release-my-5gc-nginx-69c69cbfb-9nc2l 1/1     Running   0           2m26s
my-5gc-release-my-5gc-nginx-69c69cbfb-cq8r5 1/1     Running   0           14s
my-nginx-rs-ft6v4                   1/1     Running   0           150m
my-nginx-rs-pp2rb                   1/1     Running   0           150m
nginx-deploy-77bf8679f9-56528       1/1     Running   0           147m
nginx-deploy-77bf8679f9-w2bnf       1/1     Running   0           147m

tlxp@ip-172-31-43-62:~$ helm history my-5gc-release
REVISION   UPDATED                               STATUS   CHART          APP VERSION   DESCRIPTION
1          Wed Dec 31 09:16:58 2025             superseded my-5gc-nginx-0.1.0 1.16.0       Install complete
2          Wed Dec 31 09:19:10 2025             deployed  my-5gc-nginx-0.1.0 1.16.0       Upgrade complete

tlxp@ip-172-31-43-62:~$ helm rollback my-5gc-release 1
Rollback was a success! Happy Helming!
tlxp@ip-172-31-43-62:~$ helm uninstall my-5gc-release
Release "my-5gc-release" uninstalled
tlxp@ip-172-31-43-62:~$ kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE
my-5gc-pod                          1/1     Running   0           37m
my-nginx-rs-ft6v4                   1/1     Running   0           157m
my-nginx-rs-pp2rb                   1/1     Running   0           157m
nginx-deploy-77bf8679f9-56528       1/1     Running   0           153m
nginx-deploy-77bf8679f9-w2bnf       1/1     Running   0           153m

tlxp@ip-172-31-43-62:~$ kubectl get svc
NAME          TYPE          CLUSTER-IP   EXTERNAL-IP   PORT(S)   AGE
kubernetes    ClusterIP      10.96.0.1     <none>        443/TCP   4h1m
my             ClusterIP      10.96.46.107   <none>        80/TCP    3h25m
my-5gc-externalname ExternalName    <none>        telcolearn.com <none>    3h14m
my-5gc-nodeport NodePort       10.108.242.155 <none>        80:30080/TCP 3h19m
my-5gc-service ClusterIP      10.96.35.33    <none>        80/TCP    3h19m
my-5gc-svc-nodeport NodePort       10.104.105.41 <none>        80:30219/TCP 3h21m
nginx-deploy   ClusterIP      10.100.204.115 <none>        80/TCP    153m
nginx-service  ClusterIP      10.108.249.77   <none>        80/TCP    152m

tlxp@ip-172-31-43-62:~$ helm list
NAME          NAMESPACE   REVISION   UPDATED                               STATUS   CHART          APP VERSION
tlxp@ip-172-31-43-62:~$
```