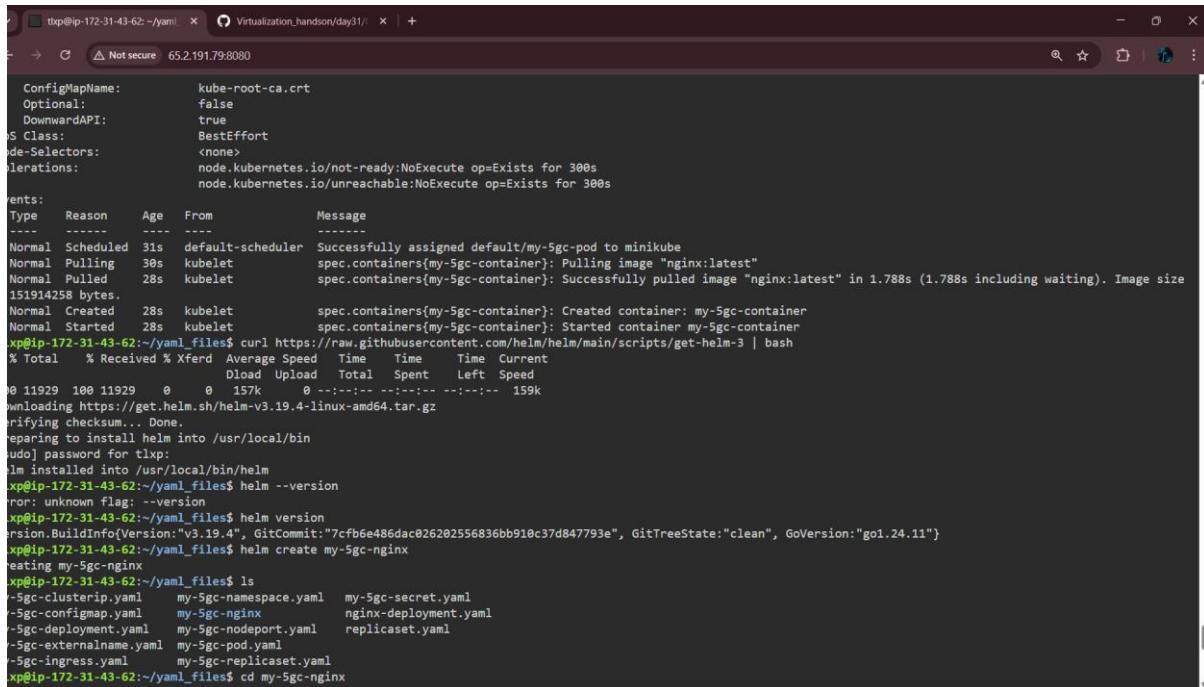


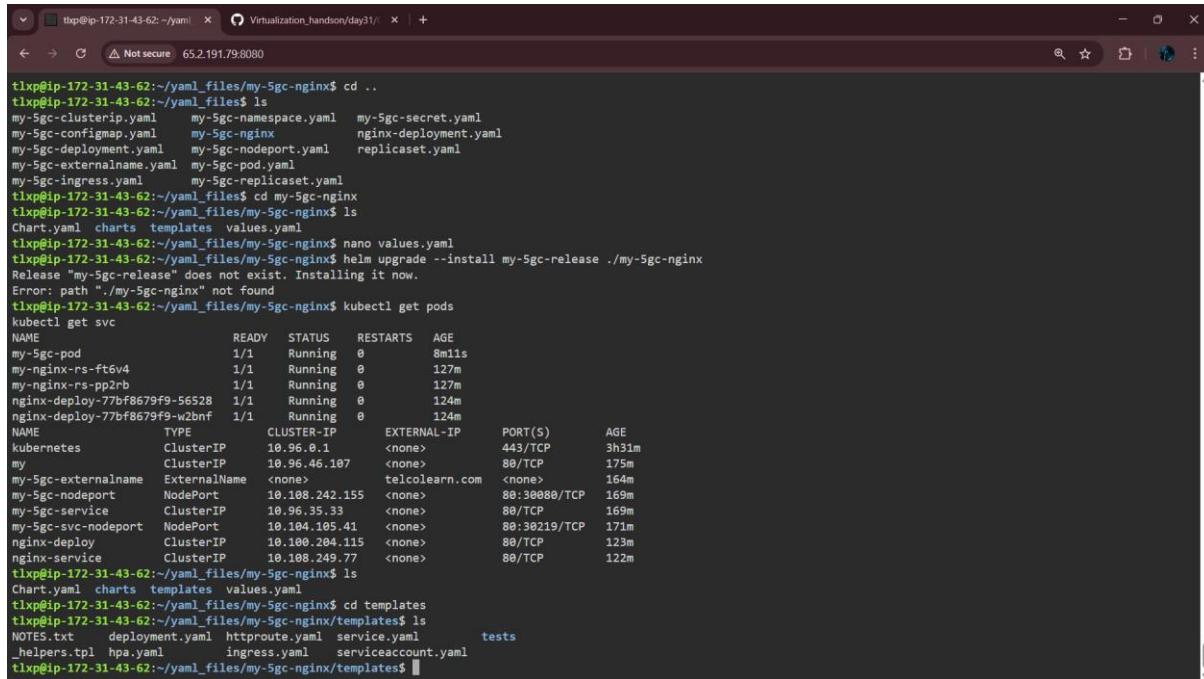
# NEW EXERCISE 2: Application Packaging & Deployment with Helm

## Step 1: Install Helm on the VM :



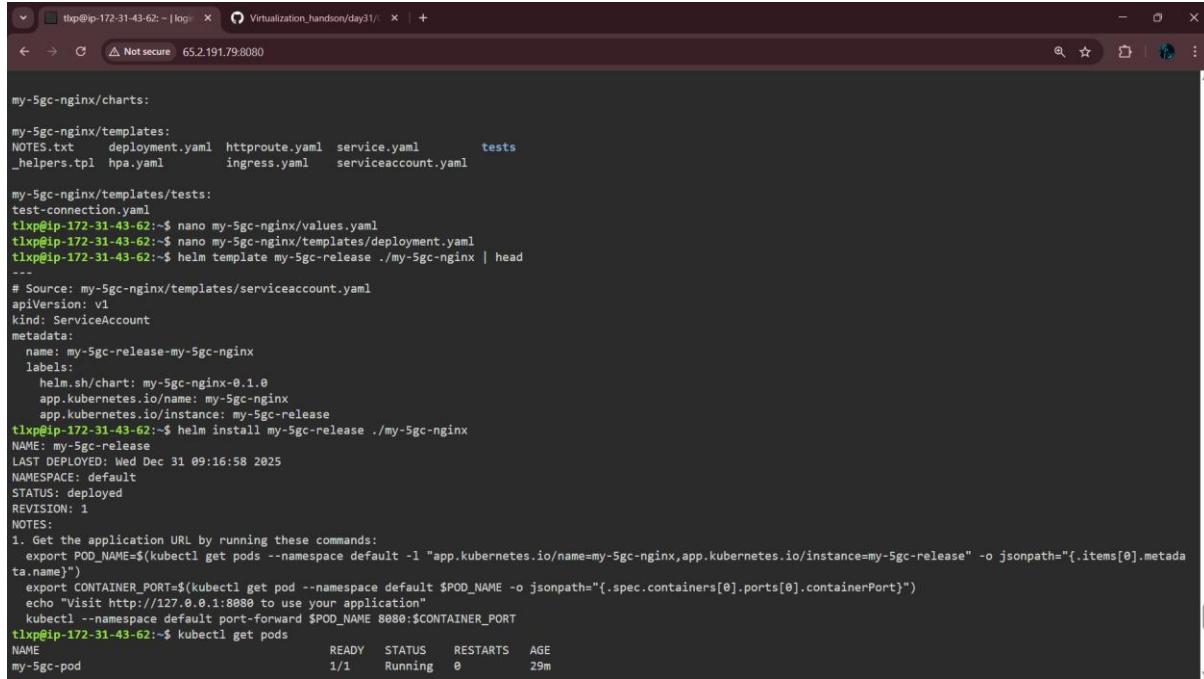
```
txp@ip-172-31-43-62:~/yaml_files$ curl https://raw.githubusercontent.com/helm/helm/main/scripts/get-helm-3 | bash
txp@ip-172-31-43-62:~/yaml_files$ helm --version
Version: v3.19.4
GitCommit: 7cfb6e486dac026202556836bb910c37d847793e
GitTreeState: clean
GoVersion: go1.24.11
txp@ip-172-31-43-62:~/yaml_files$ helm create my-5gc-nginx
Creating my-5gc-nginx
txp@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-inginx  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
txp@ip-172-31-43-62:~/yaml_files$ cd my-5gc-nginx
txp@ip-172-31-43-62:~/yaml_files$ ls
Chart.yaml  charts  templates  values.yaml
txp@ip-172-31-43-62:~/yaml_files$ nano values.yaml
txp@ip-172-31-43-62:~/yaml_files$ 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
txp@ip-172-31-43-62:~/yaml_files$ kubectl get pods
kubernetes
  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
  kubernetes
  NAME        TYPE        CLUSTER-IP       EXTERNAL-IP      PORT(S)        AGE
  my           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>          80:30808/TCP  169m
  my-5gc-service  ClusterIP   10.96.35.33     <none>          80/TCP        169m
  my-5gc-svc-nodeport  NodePort     10.104.105.41   <none>          80:38219/TCP  173m
  nginx-deploy  ClusterIP   10.108.204.115  <none>          80/TCP        123m
  nginx-service  ClusterIP   10.108.249.77   <none>          80/TCP        122m
  txp@ip-172-31-43-62:~/yaml_files$ ls
  Chart.yaml  charts  templates  values.yaml
  txp@ip-172-31-43-62:~/yaml_files$ cd templates
  txp@ip-172-31-43-62:~/yaml_files$ ls
  NOTES.txt  deployment.yaml  httproute.yaml  service.yaml
  _helpers.tpl  hpa.yaml  ingress.yaml  serviceaccount.yaml
  txp@ip-172-31-43-62:~/yaml_files$
```

## Step 2: Create a Helm Chart:



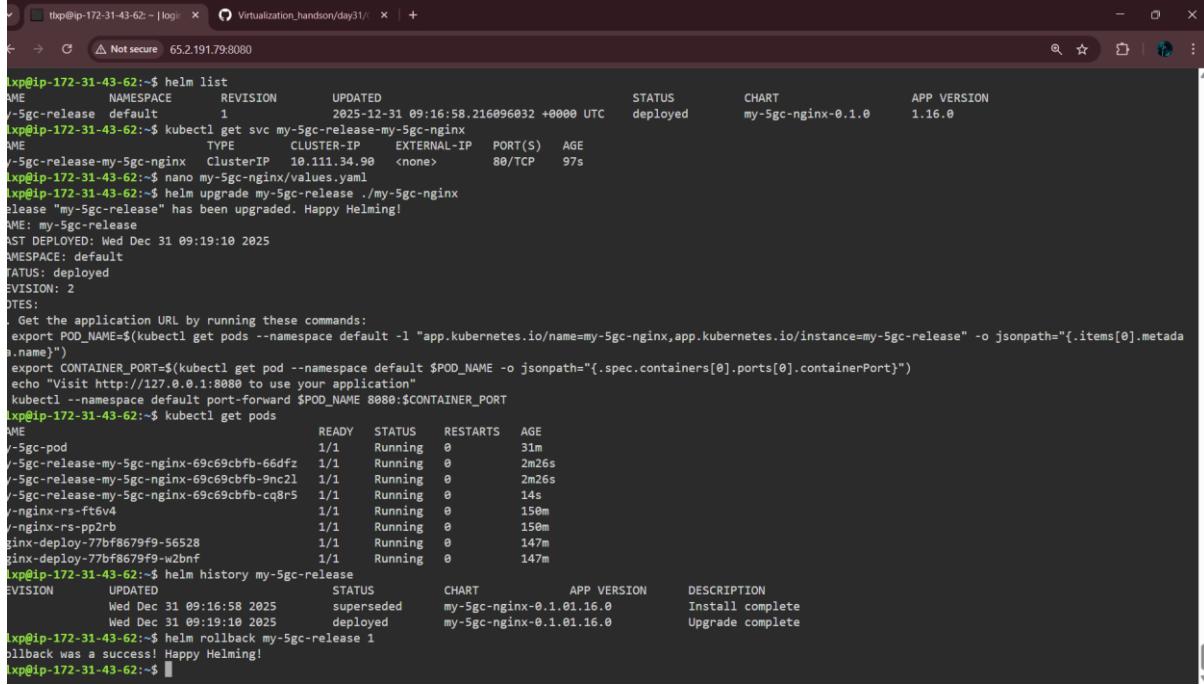
```
txp@ip-172-31-43-62:~/yaml_files/my-5gc-nginx$ cd ..
txp@ip-172-31-43-62:~/yaml_files$ ls
my-5gc-clusterip.yaml  my-5gc-namespace.yaml  my-5gc-secret.yaml
my-5gc-configmap.yaml  my-5gc-inginx  nginx-deployment.yaml
my-5gc-deployment.yaml  my-5gc-nodeport.yaml  replicaset.yaml
my-5gc-externalname.yaml  my-5gc-pod.yaml
my-5gc-ingress.yaml  my-5gc-replicaset.yaml
txp@ip-172-31-43-62:~/yaml_files$ cd my-5gc-nginx
txp@ip-172-31-43-62:~/yaml_files$ ls
Chart.yaml  charts  templates  values.yaml
txp@ip-172-31-43-62:~/yaml_files$ nano values.yaml
txp@ip-172-31-43-62:~/yaml_files$ 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
txp@ip-172-31-43-62:~/yaml_files$ kubectl get pods
kubernetes
  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
  kubernetes
  NAME        TYPE        CLUSTER-IP       EXTERNAL-IP      PORT(S)        AGE
  my           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>          80:30808/TCP  169m
  my-5gc-service  ClusterIP   10.96.35.33     <none>          80/TCP        169m
  my-5gc-svc-nodeport  NodePort     10.104.105.41   <none>          80:38219/TCP  173m
  nginx-deploy  ClusterIP   10.108.204.115  <none>          80/TCP        123m
  nginx-service  ClusterIP   10.108.249.77   <none>          80/TCP        122m
  txp@ip-172-31-43-62:~/yaml_files$ ls
  Chart.yaml  charts  templates  values.yaml
  txp@ip-172-31-43-62:~/yaml_files$ cd templates
  txp@ip-172-31-43-62:~/yaml_files$ ls
  NOTES.txt  deployment.yaml  httproute.yaml  service.yaml
  _helpers.tpl  hpa.yaml  ingress.yaml  serviceaccount.yaml
  txp@ip-172-31-43-62:~/yaml_files$
```

## Step 3: Customize values.yaml :



```
my-5gc-nginx/charts:  
my-5gc-nginx/templates:  
  deployment.yaml  httproute.yaml  service.yaml      tests  
  _helpers.tpl  hpa.yaml  ingress.yaml  serviceaccount.yaml  
  
my-5gc-nginx/templates/tests:  
  test-connection.yaml  
tlxpx@ip-172-31-43-62:~$ nano my-5gc-nginx/values.yaml  
tlxpx@ip-172-31-43-62:~$ nano my-5gc-nginx/templates/deployment.yaml  
tlxpx@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-0.1.8  
    app.kubernetes.io/name: my-5gc-nginx  
    app.kubernetes.io/instance: my-5gc-release  
tlxpx@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=$(kubectl get pods --namespace default -l "app.kubernetes.io/name=my-5gc-nginx,app.kubernetes.io/instance=my-5gc-release" -o jsonpath=".items[0].meta  
ta.name")  
  export CONTAINER_PORT=$(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  
tlxpx@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) :



```
tlxpx@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  
tlxpx@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  10.111.34.98 <none>       80/TCP    97s  
tlxpx@ip-172-31-43-62:~$ nano my-5gc-nginx/values.yaml  
tlxpx@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:  
. Get the application URL by running these commands:  
  export POD_NAME=$(kubectl get pods --namespace default -l "app.kubernetes.io/name=my-5gc-nginx,app.kubernetes.io/instance=my-5gc-release" -o jsonpath=".items[0].meta  
na.name")  
  export CONTAINER_PORT=$(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  
tlxpx@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  
tlxpx@ip-172-31-43-62:~$ helm history my-5gc-release  
REVISION  UPDATED             STATUS    CHART           APP VERSION   DESCRIPTION  
        Wed Dec 31 09:16:58 2025  superseded  my-5gc-nginx-0.1.0.16.0  Install complete  
        Wed Dec 31 09:19:10 2025  deployed    my-5gc-nginx-0.1.0.16.0  Upgrade complete  
tlxpx@ip-172-31-43-62:~$ helm rollback my-5gc-release 1  
rollback was a success! Happy Helming!  
tlxpx@ip-172-31-43-62:~$
```

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

```
ttxp@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
ttxp@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  10.111.34.98 <none>        80/TCP       97s
ttxp@ip-172-31-43-62:~$ nano my-5gc-nginx/values.yaml
ttxp@ip-172-31-43-62:~$ helm upgrade my-5gc-release ./my-5gc-nginx
Helm 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:
  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
ttxp@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-ns-ft6v4      1/1     Running   0          150m
my-nginx-ns-pp2rb      1/1     Running   0          150m
nginx-deploy-77bf8679f9-56528 1/1     Running   0          147m
nginx-deploy-77bf8679f9-w2bnf 1/1     Running   0          147m
ttxp@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
ttxp@ip-172-31-43-62:~$ helm rollback my-5gc-release 1
Rollback was a success! Happy Helming!
ttxp@ip-172-31-43-62:~$
```

## Step 6: Uninstall the Application

```
ttxp@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-ns-ft6v4      1/1     Running   0          150m
my-nginx-ns-pp2rb      1/1     Running   0          150m
nginx-deploy-77bf8679f9-56528 1/1     Running   0          147m
nginx-deploy-77bf8679f9-w2bnf 1/1     Running   0          147m
ttxp@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
ttxp@ip-172-31-43-62:~$ helm rollback my-5gc-release 1
Rollback was a success! Happy Helming!
ttxp@ip-172-31-43-62:~$ helm uninstall my-5gc-release
release "my-5gc-release" uninstalled
ttxp@ip-172-31-43-62:~$ kubectl get pods
NAME          READY   STATUS    RESTARTS   AGE
my-5gc-pod    1/1     Running   0          37m
my-nginx-ns-ft6v4      1/1     Running   0          157m
my-nginx-ns-pp2rb      1/1     Running   0          157m
nginx-deploy-77bf8679f9-56528 1/1     Running   0          153m
nginx-deploy-77bf8679f9-w2bnf 1/1     Running   0          153m
ttxp@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>        80:30880/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
ttxp@ip-172-31-43-62:~$ helm list
NAME          NAMESPACE      REVISION      UPDATED             STATUS        CHART           APP VERSION
ttxp@ip-172-31-43-62:~$
```