Test report – Centaurus dashboard deployment & deployment of Arktos Cluster without Mizar CNI on Premise

This document captures the steps to deploy an Arktos cluster lab without Mizar CNI. The machine in this lab used are **16 GB RAM, 16 vCPUs, 128 GB storage, and Ubuntu 18.04 LTS.**

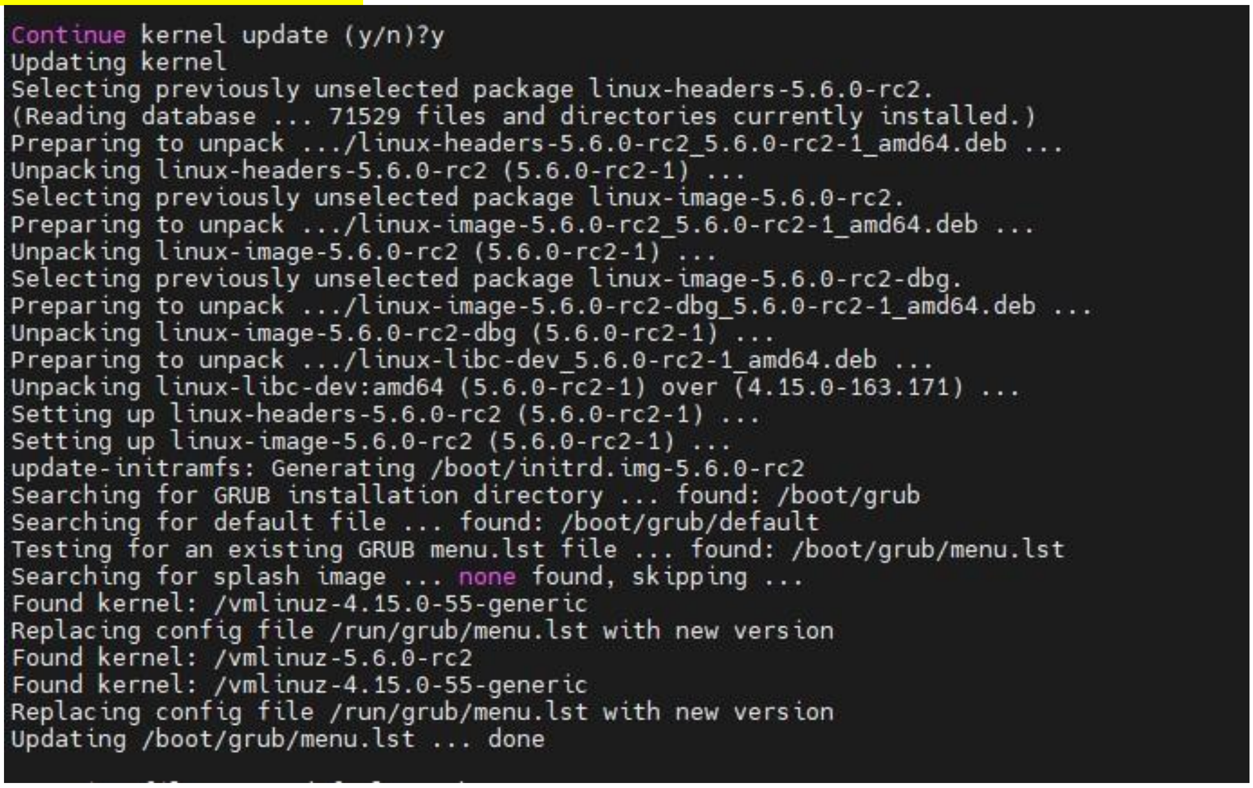
Date-28 Dec. 2021

Step-1: Update kernel (If required)

To check kernel, run following command

```
uname -a
```

```
wget https://raw.githubusercontent.com/CentaurusInfra/mizar/dev-next/kernelupdate.sh

sudo bash kernelupdate.sh
```



```
Continue kernel update (y/n)?y
Updating kernel
Selecting previously unselected package linux-headers-5.6.0-rc2.
(Reading database ... 71529 files and directories currently installed.)
Preparing to unpack .../linux-headers-5.6.0-rc2_5.6.0-rc2-1_amd64.deb ...
Unpacking linux-headers-5.6.0-rc2 (5.6.0-rc2-1) ...
Selecting previously unselected package linux-image-5.6.0-rc2.
Preparing to unpack .../linux-image-5.6.0-rc2_5.6.0-rc2-1_amd64.deb ...
Unpacking linux-image-5.6.0-rc2 (5.6.0-rc2-1) ...
Selecting previously unselected package linux-image-5.6.0-rc2-dbg.
Preparing to unpack .../linux-image-5.6.0-rc2-dbg_5.6.0-rc2-1_amd64.deb ...
Unpacking linux-image-5.6.0-rc2-dbg (5.6.0-rc2-1) ...
Preparing to unpack .../linux-libc-dev_5.6.0-rc2-1_amd64.deb ...
Unpacking linux-libc-dev:amd64 (5.6.0-rc2-1) over (4.15.0-163.171) ...
Setting up linux-headers-5.6.0-rc2 (5.6.0-rc2-1) ...
Setting up linux-image-5.6.0-rc2 (5.6.0-rc2-1) ...
update-initramfs: Generating /boot/initrd.img-5.6.0-rc2
Searching for GRUB installation directory ... found: /boot/grub
Searching for default file ... found: /boot/grub/default
Testing for an existing GRUB menu.lst file ... found: /boot/grub/menu.lst
Searching for splash image ... none found, skipping ...
Found kernel: /vmlinuz-4.15.0-55-generic
Replacing config file /run/grub/menu.lst with new version
Found kernel: /vmlinuz-5.6.0-rc2
Found kernel: /vmlinuz-4.15.0-55-generic
Replacing config file /run/grub/menu.lst with new version
Updating /boot/grub/menu.lst ... done
```

Step-2: Install dependencies

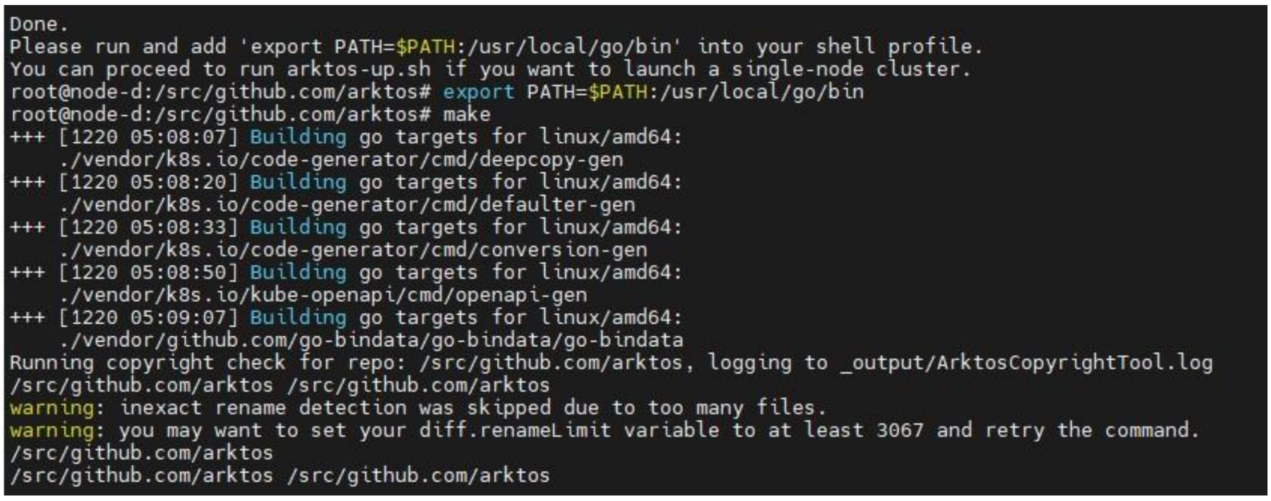
Run the following steps to install dependencies required for arktos deployment:

git clone https://github.com/Click2Cloud-Centaurus/arktos.git

~/go/src/k8s.io/arktos

cd ~/go/src/k8s.io/arktos

sudo bash ./hack/setup-dev-node.sh



```
Done.
Please run and add 'export PATH=$PATH:/usr/local/go/bin' into your shell profile.
You can proceed to run arktos-up.sh if you want to launch a single-node cluster.
root@node-d:/src/github.com/arktos# export PATH=$PATH:/usr/local/go/bin
root@node-d:/src/github.com/arktos# make
+++ [1220 05:08:07] Building go targets for linux/amd64:
    ./vendor/k8s.io/code-generator/cmd/deepcopy-gen
+++ [1220 05:08:20] Building go targets for linux/amd64:
    ./vendor/k8s.io/code-generator/cmd/defaulter-gen
+++ [1220 05:08:33] Building go targets for linux/amd64:
    ./vendor/k8s.io/code-generator/cmd/conversion-gen
+++ [1220 05:08:50] Building go targets for linux/amd64:
    ./vendor/k8s.io/kube-openapi/cmd/openapi-gen
+++ [1220 05:09:07] Building go targets for linux/amd64:
    ./vendor/github.com/go-bindata/go-bindata/go-bindata
Running copyright check for repo: /src/github.com/arktos, logging to _output/ArktosCopyrightTool.log
/src/github.com/arktos /src/github.com/arktos
warning: inexact rename detection was skipped due to too many files.
warning: you may want to set your diff.renameLimit variable to at least 3067 and retry the command.
/src/github.com/arktos
/src/github.com/arktos /src/github.com/arktos
```

Run Arktos

The easiest way to run Arktos is to bring up a single-node cluster in your local development box:

echo export PATH=$PATH:/usr/local/go/bin\ >>

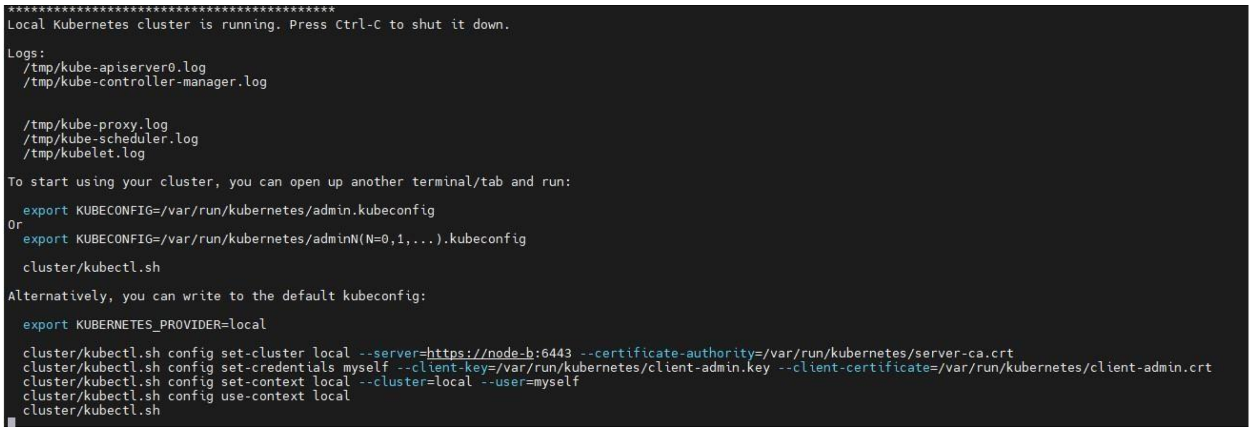
~/.profile

echo cd \$HOME/go/src/k8s.io/arktos >> ~/.profile

git checkout -b master

source ~/.profile

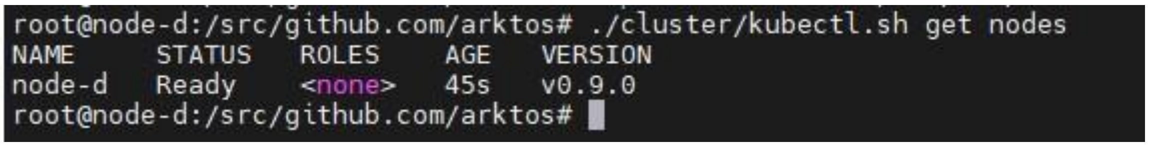
hack/arktos-up.sh



```
*********************************************
Local Kubernetes cluster is running. Press Ctrl-C to shut it down.

Logs:
  /tmp/kube-apiserver0.log
  /tmp/kube-controller-manager.log


  /tmp/kube-proxy.log
  /tmp/kube-scheduler.log
  /tmp/kubelet.log

To start using your cluster, you can open up another terminal/tab and run:

  export KUBECONFIG=/var/run/kubernetes/admin.kubeconfig
Or
  export KUBECONFIG=/var/run/kubernetes/adminN(N=0,1,...).kubeconfig

  cluster/kubectl.sh

Alternatively, you can write to the default kubeconfig:

  export KUBERNETES_PROVIDER=local

  cluster/kubectl.sh config set-cluster local --server=https://node-b:6443 --certificate-authority=/var/run/kubernetes/server-ca.crt
  cluster/kubectl.sh config set-credentials myself --client-key=/var/run/kubernetes/client-admin.key --client-certificate=/var/run/kubernetes/client-admin.crt
  cluster/kubectl.sh config set-context local --cluster=local --user=myself
  cluster/kubectl.sh config use-context local
  cluster/kubectl.sh
```

1) Check nodes status:

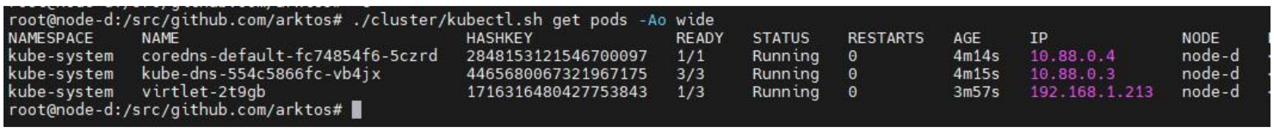
./cluster/kubectl.sh get nodes



```
root@node-d:/src/github.com/arktos# ./cluster/kubectl.sh get nodes
NAME     STATUS   ROLES    AGE   VERSION
node-d   Ready    <none>   45s   v0.9.0
root@node-d:/src/github.com/arktos#
```

2) Check pods status:

./cluster/kubectl.sh get pods -Ao wide



```
root@node-d:/src/github.com/arktos# ./cluster/kubectl.sh get pods -Ao wide
NAMESPACE     NAME                           HASHKEY               READY   STATUS    RESTARTS   AGE    IP              NODE
kube-system   coredns-default-fc74854f6-5czrd   2848153121546700097   1/1     Running   0          4m14s   10.88.0.4       node-d
kube-system   kube-dns-554c5866fc-vb4jx         4465680067321967175   3/3     Running   0          4m15s   10.88.0.3       node-d
kube-system   virtlet-2t9gb                     1716316480427753843   1/3     Running   0          3m57s   192.168.1.213   node-d
root@node-d:/src/github.com/arktos#
```

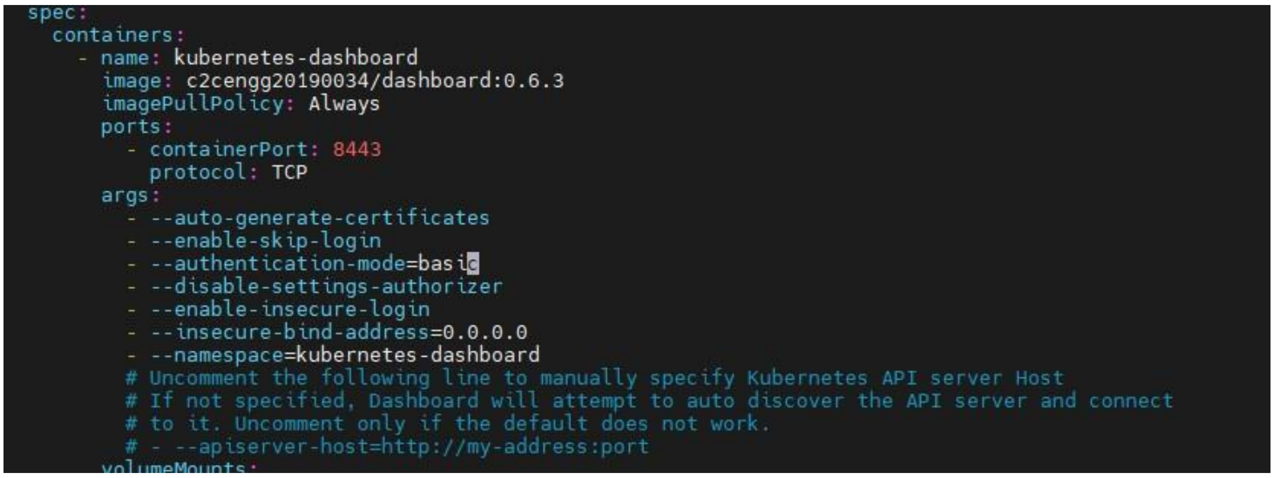
Deployment of Centaurus dashboard:

Link for YAML file of the dashboard:

https://click2cloud-my.sharepoint.com/:u:/g/personal/amit_nagpure_click2cloud_net/EdmJx0itP0RGl8WqAVVplbwBurpul2EhSi3_Uj-d8xy7zQ?e=RBij9E

Create YAML file naming ‘kubernetes-dashboard.yaml’ change image c2c/…..0.6.4

and in args input ‘—authentication-mode=basic’



```
spec:
  containers:
    - name: kubernetes-dashboard
      image: c2cengg20190034/dashboard:0.6.3
      imagePullPolicy: Always
      ports:
        - containerPort: 8443
          protocol: TCP
      args:
        - --auto-generate-certificates
        - --enable-skip-login
        - --authentication-mode=basic
        - --disable-settings-authorizer
        - --enable-insecure-login
        - --insecure-bind-address=0.0.0.0
        - --namespace=kubernetes-dashboard
        # Uncomment the following line to manually specify Kubernetes API server Host
        # If not specified, Dashboard will attempt to auto discover the API server and connect
        # to it. Uncomment only if the default does not work.
        # - --apiserver-host=http://my-address:port
      volumeMounts:
```

Input the following commands before deploying the dashboard:

git checkout -b test

sudo sed -i '0,/RANDFILE/{s/RANDFILE/\#&/}' /etc/ssl/openssl.cnf

openssl genrsa -out dashboard.key 2048

openssl rsa -in dashboard.key -out dashboard.key

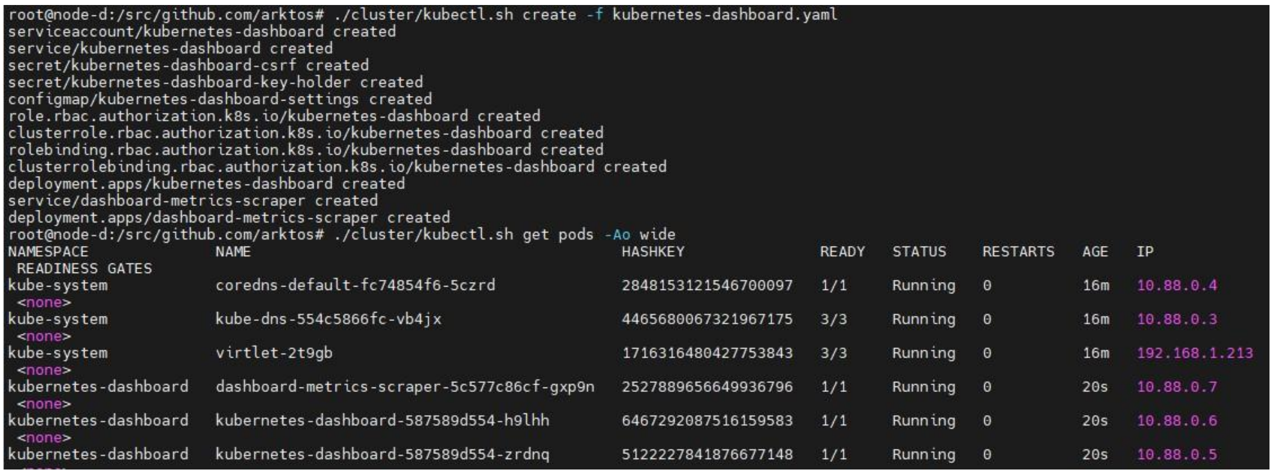
openssl req -sha256 -new -key dashboard.key -out dashboard.csr -subj "/CN=$(hostname -I | awk '{print $1}')"

openssl x509 -req -sha256 -days 365 -in dashboard.csr -signkey dashboard.key -out dashboard.crt

./cluster/kubectl.sh create namespace kubernetes-dashboard

./cluster/kubectl.sh create secret generic kubernetes-dashboard-certs --fromfile=$HOME/dashboard.key --from-file=$HOME/dashboard.crt -n kubernetes-dashboard

./cluster/kubectl.sh create -f kubernetes-dashboard.yaml



```
root@node-d:/src/github.com/arktos# ./cluster/kubectl.sh create -f kubernetes-dashboard.yaml
serviceaccount/kubernetes-dashboard created
service/kubernetes-dashboard created
secret/kubernetes-dashboard-csrf created
secret/kubernetes-dashboard-key-holder created
configmap/kubernetes-dashboard-settings created
role.rbac.authorization.k8s.io/kubernetes-dashboard created
clusterrole.rbac.authorization.k8s.io/kubernetes-dashboard created
rolebinding.rbac.authorization.k8s.io/kubernetes-dashboard created
clusterrolebinding.rbac.authorization.k8s.io/kubernetes-dashboard created
deployment.apps/kubernetes-dashboard created
service/dashboard-metrics-scraper created
deployment.apps/dashboard-metrics-scraper created
root@node-d:/src/github.com/arktos# ./cluster/kubectl.sh get pods -Ao wide
NAMESPACE              NAME                                         HASHKEY               READY   STATUS    RESTARTS   AGE   IP
 READINESS GATES
kube-system            coredns-default-fc74854f6-5czrd              2848153121546700097   1/1     Running   0          16m   10.88.0.4
 <none>
kube-system            kube-dns-554c5866fc-vb4jx                    4465680067321967175   3/3     Running   0          16m   10.88.0.3
 <none>
kube-system            virtlet-2t9gb                                1716316480427753843   3/3     Running   0          16m   192.168.1.213
 <none>
kubernetes-dashboard   dashboard-metrics-scraper-5c577c86cf-gxp9n   2527889656649936796   1/1     Running   0          20s   10.88.0.7
 <none>
kubernetes-dashboard   kubernetes-dashboard-587589d554-h9lhh        6467292087516159583   1/1     Running   0          20s   10.88.0.6
 <none>
kubernetes-dashboard   kubernetes-dashboard-587589d554-zrdnq        5122227841876677148   1/1     Running   0          20s   10.88.0.5
```

Create the Kubernetes Dashboard password file:

```
mkdir -p /etc/kubernetes/auth
```

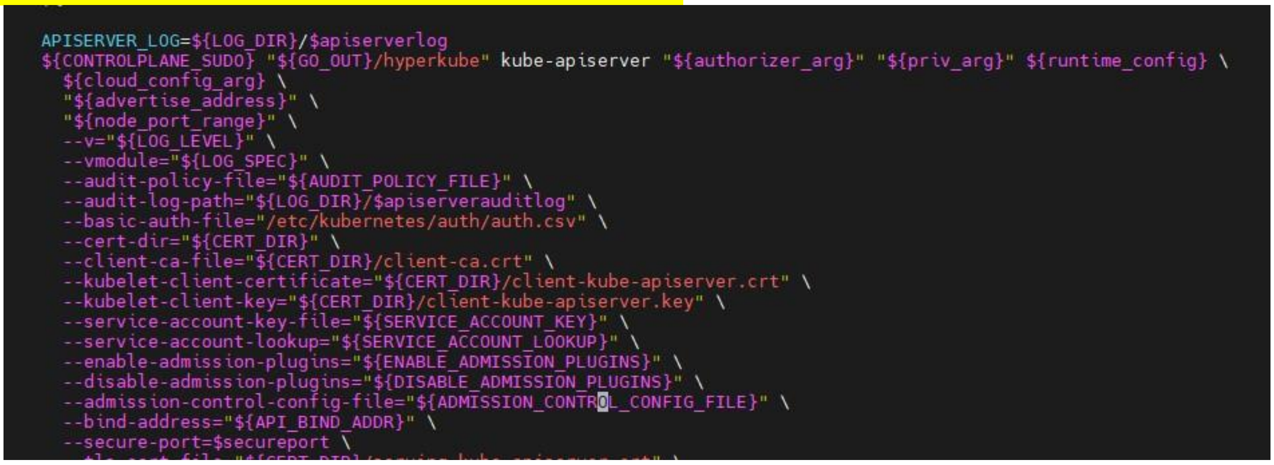
```
vi /etc/kubernetes/auth/auth.csv
```

Here is the file content:

```
adminpass,admin,admin,system:masters
```

we need to configure while deploying the arktos the following entry in ‘common.sh’

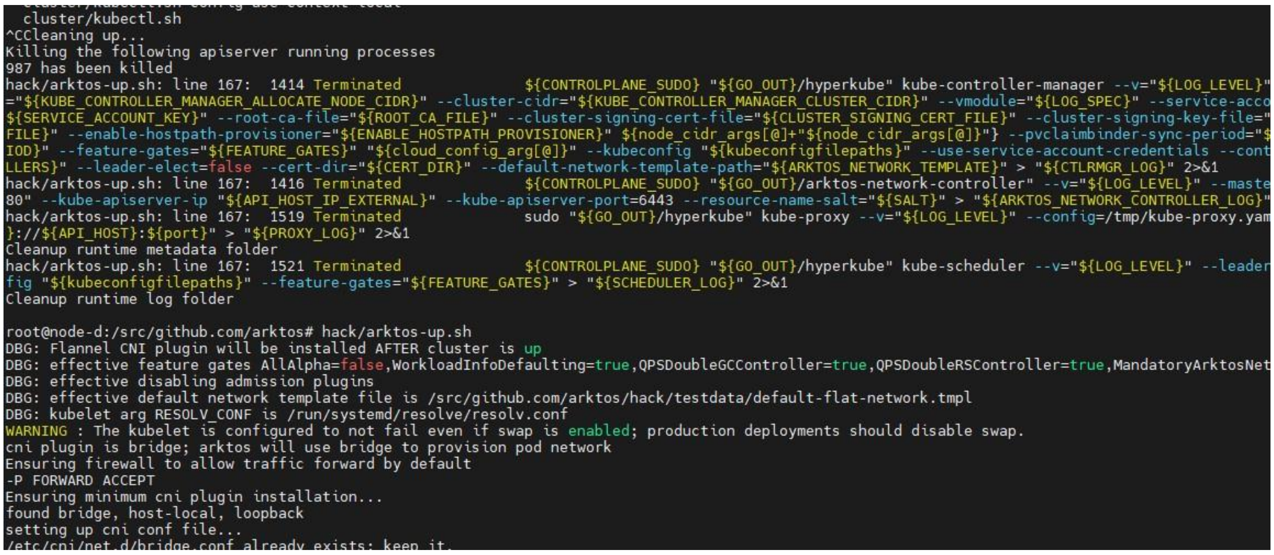
```
vi /hack/lib/common.sh
350    - --basic-auth-file=/etc/kubernetes/auth/auth.csv
```



```
    APISERVER_LOG=${LOG_DIR}/$apiserverlog
    ${CONTROLPLANE_SUDO} "${GO_OUT}/hyperkube" kube-apiserver "${authorizer_arg}" "${priv_arg}" ${runtime_config} \
      ${cloud_config_arg} \
      "${advertise_address}" \
      "${node_port_range}" \
      --v="${LOG_LEVEL}" \
      --vmodule="${LOG_SPEC}" \
      --audit-policy-file="${AUDIT_POLICY_FILE}" \
      --audit-log-path="${LOG_DIR}/$apiserverauditlog" \
      --basic-auth-file="/etc/kubernetes/auth/auth.csv" \
      --cert-dir="${CERT_DIR}" \
      --client-ca-file="${CERT_DIR}/client-ca.crt" \
      --kubelet-client-certificate="${CERT_DIR}/client-kube-apiserver.crt" \
      --kubelet-client-key="${CERT_DIR}/client-kube-apiserver.key" \
      --service-account-key-file="${SERVICE_ACCOUNT_KEY}" \
      --service-account-lookup="${SERVICE_ACCOUNT_LOOKUP}" \
      --enable-admission-plugins="${ENABLE_ADMISSION_PLUGINS}" \
      --disable-admission-plugins="${DISABLE_ADMISSION_PLUGINS}" \
      --admission-control-config-file="${ADMISSION_CONTROL_CONFIG_FILE}" \
      --bind-address="${API_BIND_ADDR}" \
      --secure-port=$secureport \
```

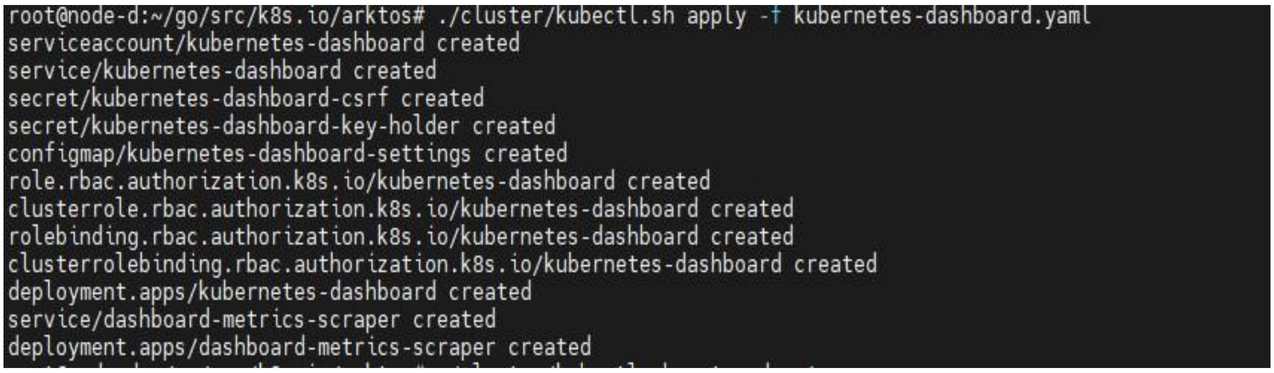
Now re-run the arktos script:

```
hack/arktos-up.sh
```



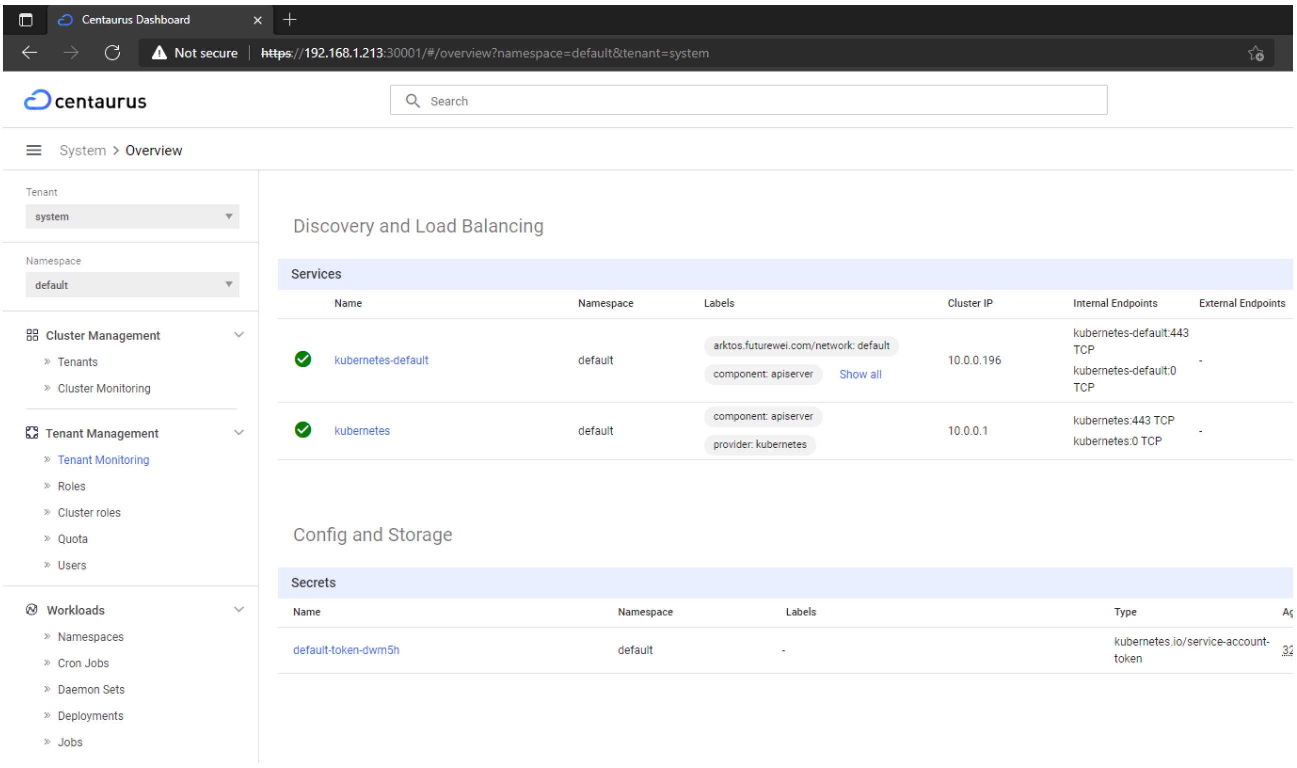
```
  cluster/kubectl.sh
^CCleaning up...
Killing the following apiserver running processes
987 has been killed
hack/arktos-up.sh: line 167:  1414 Terminated              ${CONTROLPLANE_SUDO} "${GO_OUT}/hyperkube" kube-controller-manager --v="${LOG_LEVEL}"
="${KUBE_CONTROLLER_MANAGER_ALLOCATE_NODE_CIDR}" --cluster-cidr="${KUBE_CONTROLLER_MANAGER_CLUSTER_CIDR}" --vmodule="${LOG_SPEC}" --service-acco
${SERVICE_ACCOUNT_KEY}" --root-ca-file="${ROOT_CA_FILE}" --cluster-signing-cert-file="${CLUSTER_SIGNING_CERT_FILE}" --cluster-signing-key-file="
FILE}" --enable-hostpath-provisioner="${ENABLE_HOSTPATH_PROVISIONER}" ${node_cidr_args[@]+"${node_cidr_args[@]}"} --pvclaimbinder-sync-period="$
IOD}" --feature-gates="${FEATURE_GATES}" "${cloud_config_arg[@]}" --kubeconfig "${kubeconfigfilepaths}" --use-service-account-credentials --cont
LLERS}" --leader-elect=false --cert-dir="${CERT_DIR}" --default-network-template-path="${ARKTOS_NETWORK_TEMPLATE}" > "${CTLRMGR_LOG}" 2>&1
hack/arktos-up.sh: line 167:  1416 Terminated              ${CONTROLPLANE_SUDO} "${GO_OUT}/arktos-network-controller" --v="${LOG_LEVEL}" --maste
80" --kube-apiserver-ip "${API_HOST_IP_EXTERNAL}" --kube-apiserver-port=6443 --resource-name-salt="${SALT}" > "${ARKTOS_NETWORK_CONTROLLER_LOG}"
hack/arktos-up.sh: line 167:  1519 Terminated              sudo "${GO_OUT}/hyperkube" kube-proxy --v="${LOG_LEVEL}" --config=/tmp/kube-proxy.yam
}://${API_HOST}:${port}" > "${PROXY_LOG}" 2>&1
Cleanup runtime metadata folder
hack/arktos-up.sh: line 167:  1521 Terminated              ${CONTROLPLANE_SUDO} "${GO_OUT}/hyperkube" kube-scheduler --v="${LOG_LEVEL}" --leader
fig "${kubeconfigfilepaths}" --feature-gates="${FEATURE_GATES}" > "${SCHEDULER_LOG}" 2>&1
Cleanup runtime log folder

root@node-d:/src/github.com/arktos# hack/arktos-up.sh
DBG: Flannel CNI plugin will be installed AFTER cluster is up
DBG: effective feature gates AllAlpha=false,WorkloadInfoDefaulting=true,QPSDoubleGCController=true,QPSDoubleRSController=true,MandatoryArktosNet
DBG: effective disabling admission plugins
DBG: effective default network template file is /src/github.com/arktos/hack/testdata/default-flat-network.tmpl
DBG: kubelet arg RESOLV_CONF is /run/systemd/resolve/resolv.conf
WARNING : The kubelet is configured to not fail even if swap is enabled; production deployments should disable swap.
cni plugin is bridge; arktos will use bridge to provision pod network
Ensuring firewall to allow traffic forward by default
-P FORWARD ACCEPT
Ensuring minimum cni plugin installation...
found bridge, host-local, loopback
setting up cni conf file...
/etc/cni/net.d/bridge.conf already exists; keep it.
```

Now re-deploy the kubernetes-dashboard file:



```
root@node-d:~/go/src/k8s.io/arktos# ./cluster/kubectl.sh apply -f kubernetes-dashboard.yaml
serviceaccount/kubernetes-dashboard created
service/kubernetes-dashboard created
secret/kubernetes-dashboard-csrf created
secret/kubernetes-dashboard-key-holder created
configmap/kubernetes-dashboard-settings created
role.rbac.authorization.k8s.io/kubernetes-dashboard created
clusterrole.rbac.authorization.k8s.io/kubernetes-dashboard created
rolebinding.rbac.authorization.k8s.io/kubernetes-dashboard created
clusterrolebinding.rbac.authorization.k8s.io/kubernetes-dashboard created
deployment.apps/kubernetes-dashboard created
service/dashboard-metrics-scraper created
deployment.apps/dashboard-metrics-scraper created
```

The Dashboard will be accessible at `https://<host_machine_ip>:30001` and you can log in using `username` & `password` used in `auth.csv`



Centaurus Dashboard

Not secure | ~~https~~://192.168.1.213:30001/#/overview?namespace=default&tenant=system

centaurus

Search

System > Overview

Tenant: system

Namespace: default

Cluster Management
- Tenants
- Cluster Monitoring

Tenant Management
- Tenant Monitoring
- Roles
- Cluster roles
- Quota
- Users

Workloads
- Namespaces
- Cron Jobs
- Daemon Sets
- Deployments
- Jobs

Discovery and Load Balancing

Services

	Name	Namespace	Labels	Cluster IP	Internal Endpoints	External Endpoints
✓	kubernetes-default	default	arktos.futurewei.com/network: default component: apiserver Show all	10.0.0.196	kubernetes-default:443 TCP kubernetes-default:0 TCP	-
✓	kubernetes	default	component: apiserver provider: kubernetes	10.0.0.1	kubernetes:443 TCP kubernetes:0 TCP	-

Config and Storage

Secrets

Name	Namespace	Labels	Type	Ag
default-token-dwm5h	default	-	kubernetes.io/service-account-token	32