

# Fornax: Deployment (ON Premise)

Date: 9 Dec. 2021

## Machine Preparation

1. Prepare 4 machines, 16 Gb RAM, 8 Vcpu, 80G storage, ubuntu 18.04, for the clusters of A, B, C and D.
2. Open the port of 10000 & 10002 in the security group of machine A, B and C.
3. Open the port of 6443 in the security group of machine A, B, C and D.
4. In machine A, B, C, create a Kubernetes cluster following doc <https://kubernetes.io/docs/setup/productionenvironment/tools/kubeadm/create-cluster-kubeadm/>.
5. In machine D, clone the repo [arktos/arktos-with-mizar-cni.md at guide-cni-updates · Click2Cloud-Centaurus/arktos \(github.com\)](#) and start an Arktos with mizar CNI cluster by running the script arktos-up.sh.
6. Install golang 1.13.9 version- all nodes

**MachineA: (root operator machine)- IP: 192.168.1.210**

**MachineB: IP: 192.168.1.211**

**MachineC: IP: 192.168.1.212**

**MachineD: IP : 192.168.1.213**

### Setup Fornax: Machine A

1. Make sure Kubernetes cluster is ready:

**KubectI get nodes**

Output:

```

root@node-a:~# kubectl get nodes
NAME        STATUS    ROLES                  AGE     VERSION
node-a     Ready     control-plane,master   46m     v1.21.1
root@node-a:~#

```

2. Clone a repo of <https://github.com/CentaurusInfra/fornax>, sync to the branch/commit to test.

```

git clone https://github.com/CentaurusInfra/fornax.git
cd fornax

```

Output:

```

root@node-a:~# git clone https://github.com/CentaurusInfra/fornax.git
Cloning into 'fornax'...
git clone https://github.com/CentaurusInfra/fornax.gitremote: Enumerating objects: 50967, done.
remote: Counting objects: 100% (781/781), done.
remote: Compressing objects: 100% (385/385), done.
remote: Total 50967 (delta 429), reused 664 (delta 362), pack-reused 50186
Receiving objects: 100% (50967/50967), 114.10 MiB | 5.69 MiB/s, done.
Resolving deltas: 100% (28074/28074), done.
Checking out files: 100% (8784/8784), done.
root@node-a:~# cd fornax/
root@node-a:~/fornax#

```

3. Build the binaries of edgecore and cloudcore using the commands:

```
make WHAT=cloudcore
```

Output:

```

root@node-a:~/fornax# make WHAT=cloudcore
hack/verify-golang.sh
go version: go version go1.13.9 linux/amd64
KUBEEDGE_OUTPUT_SUBPATH= output/local hack/rules/build.sh cloudcore
building github.com/kubeedge/kubeedge/cloud/cmd/cloudcore
+ go build -o /root/.fornax/output/local/bin/cloudcore -gcflags=-ldflags '-x -x -buildid= -x github.com/kubeedge/kubeedge/pkg/version.buildDate=2021-10-14T09:26:58Z -x github.com/kubeedge/kubeedge/pkg/version.gitCommit=7f966d4e4d4097b43b9c4b0b07f1f59ab -x github.com/kubeedge/kubeedge/pkg/version.gitTreeState=clean -x github.com/kubeedge/kubeedge/pkg/version.gitVersion=v0.2.1-47966d49c40460 -x github.com/kubeedge/kubeedge/pkg/version.gitMinor=0 -x github.com/kubeedge/kubeedge/pkg/version.gitTreeState=clean' github.com/kubeedge/kubeedge/cloud/cmd/cloudcore
go: downloading github.com/k8s.io/component-base v0.19.10
go: downloading github.com/k8s.io/api v0.19.10
go: downloading k8s.io/apimachinery v0.19.10
go: downloading github.com/gorilla/mux v1.7.3
go: downloading sigs.k8s.io/yaml v1.2.0
go: downloading k8s.io/klog v1.0.0
go: downloading k8s.io/client-go v0.19.10
go: extracting github.com/gorilla/mux v1.7.3
go: extracting sigs.k8s.io/yaml v1.2.0
go: extracting k8s.io/klog v1.0.0
go: extracting github.com/spf13/cobra v1.0.0
go: downloading k8s.io/klog/v2 v2.2.0
go: extracting k8s.io/component-base v0.19.10
go: extracting k8s.io/apiextensions-apiserver v0.19.10
go: extracting k8s.io/client-go v0.19.10
go: downloading gopkg.in/yaml.v2 v2.2.8
go: downloading github.com/spf13/pflag v1.0.5
go: downloading github.com/satori/go.uuid v1.2.0
go: downloading github.com/gorilla/websocket v1.4.0
go: extracting k8s.io/klog/v2 v2.2.0
go: downloading sigs.k8s.io/structured-merge-diff v0.0.0-20190525122527-15d366b2352e
go: downloading github.com/gogo/protobuf v1.3.2
go: downloading k8s.io/api v0.19.10
go: extracting gopkg.in/yaml.v2 v2.2.8
go: extracting github.com/gorilla/websocket v1.4.0
go: extracting github.com/spf13/pflag v1.0.5
go: extracting github.com/satori/go.uuid v1.2.0
go: downloading github.com/google/go-cmp v0.4.0
go: extracting github.com/go-logr/logr v0.0.0-20190525122527-15d366b2352e
go: extracting github.com/go-logr/logr v0.2.0
go: downloading github.com/dgrijalva/jwt-go v3.2.0+incompatible
go: downloading sigs.k8s.io/structured-merge-diff v0.0.0-20190525122527-15d366b2352e
go: extracting github.com/gogo/protobuf v1.3.2
go: extracting k8s.io/api v0.19.10
go: downloading github.com/google/go-cmp v0.4.0
go: downloading github.com/emicklei/go-restful v2.9.6+incompatible
go: extracting github.com/dgrijalva/jwt-go v3.2.0+incompatible
go: extracting sigs.k8s.io/structured-merge-diff v0.0.0-20190525122527-15d366b2352e
go: extracting github.com/emicklei/go-restful v2.9.6+incompatible
go: downloading github.com/google/gofuzz v1.1.0
go: downloading go.uber.org/zap v1.10.0
go: downloading github.com/google/uuid v1.1.1
go: downloading k8s.io/utils v0.0.0-20200729134348-d5654de09c73
go: downloading github.com/davecgh/go-spew v1.1.1
go: downloading github.com/json-iterator/go v1.1.10

```

```
make WHAT=edgecore
```

Output:

```
root@node-a:~/fornax# make WHAT=edgcore
hack/verify-golang.sh
go detail version: go version go1.13.9 linux/amd64
go version: 1.13.9
KUBEEDGE_OUTPUT_SUBPATH=_output/local hack/make-rules/build.sh edgcore
building github.com/kubeedge/kubeedge/edge/cmd/edgcore
+ go build -o /root/fornax/_output/local/bin/edgcore -gcflags=-ldflags '-s -w -buildid= -X github.com/kubeedge/kubeedge/pkg/version.buildDate=2021-10-14T09:34:58Z -X github.com/kubeedge/kubeedge/pkg/version.gitCommit=47966d49c4d4d0607b843e0cddb0b92fe1f59ab -X github.com/kubeedge/kubeedge/pkg/version.gitTreeState=clean -X github.com/kubeedge/kubeedge/pkg/version.gitVersion=v0.2.1-47966d49c4d4d0 -X github.com/kubeedge/kubeedge/pkg/version.golang.org/grpc=1.27.0' github.com/kubeedge/kubeedge/edge/cmd/edgcore
go: downloading github.com/mitchellh/go-ps v0.0.0-20190716172923-621e5597135b
go: downloading k8s.io/kubernetes v1.19.10
go: downloading github.com/container-storage-interface/spec v1.2.0
go: extracting github.com/mitchellh/go-ps v0.0.0-20190716172923-621e5597135b
go: extracting github.com/container-storage-interface/spec v1.2.0
go: downloading google.golang.org/grpc v1.27.0
go: extracting google.golang.org/grpc v1.27.0
go: extracting k8s.io/kubernetes v1.19.10
go: downloading github.com/fsnotify/fsnotify v1.4.0
go: downloading k8s.io/crt-api v0.19.10
go: downloading k8s.io/cloud-provider v0.19.10
go: downloading k8s.io/kubelet v0.19.10
go: downloading github.com/opencontainers/selinux v1.5.2
go: downloading github.com/docker/go-connections v0.4.0
go: downloading github.com/docker/docker v1.4.2-0.20200309214505-a6a9891b09c
go: downloading github.com/google/cadvisor v0.37.5
go: downloading k8s.io/csi-translation-lib v0.19.10
go: extracting github.com/fsnotify/fsnotify v1.4.0
go: extracting github.com/docker/go-connections v0.4.0
go: downloading github.com/containernetworking/cni v0.8.0
go: extracting k8s.io/crt-api v0.19.10
go: extracting k8s.io/cloud-provider v0.19.10
go: extracting github.com/opencontainers/selinux v1.5.2
go: extracting k8s.io/kubelet v0.19.10
go: extracting k8s.io/csi-translation-lib v0.19.10
go: downloading github.com/golang/grouper v0.0.0-20191227052852-215e87163ea7
go: downloading github.com/aron/circbuf v0.0.0-20190214190532-511143e8da2
go: extracting github.com/google/cadvisor v0.37.5
go: downloading github.com/aws/aws-sdk-go v1.28.2
go: downloading github.com/opencontainers/runc v1.0.0-rc91.0.20200707015106-819fcc687efb
go: extracting github.com/aron/circbuf v0.0.0-20190214190532-511143e8da2
go: extracting github.com/docker/docker v1.4.2-0.20200309214505-a6a9891b09c
go: extracting github.com/golang/grouper v0.0.0-20191227052852-215e87163ea7
go: extracting github.com/containernetworking/cni v0.8.0
go: downloading cloud.google.com/go v0.51.0
go: downloading github.com/docker/distribution v2.7.1-incompatible
go: downloading github.com/opencontainers/go-digest v1.0.0-rc1
go: extracting github.com/opencontainers/go-digest v1.0.0-rc1
go: downloading google.golang.org/genproto v0.0.0-20200526211855-cb27e3aa2013
go: downloading github.com/munnerz/goautoneg v0.0.0-20191010083416-a7dc0b61c22
go: downloading github.com/stretchr/testify v1.4.0
go: downloading k8s.io/kube-openapi v0.0.0-20200805222855-6aecd4b50c6
go: downloading go.etcd.io/etcd v0.0.0-alpha.5.0.20200810165624-17cfe6e3e9d5
go: extracting github.com/docker/distribution v2.7.1-incompatible
go: downloading k8s.io/kube-scheduler v0.19.10
go: extracting cloud.google.com/go v0.51.0
go: extracting github.com/stretchr/testify v1.4.0
go: extracting github.com/opencontainers/runc v1.0.0-rc91.0.20200707015106-819fcc687efb
```

#### 4. config cloudcore

```
cp /etc/kubernetes/admin.conf /root/.kube/config
```

```
mkdir -p /etc/kubeedge/config
```

```
chmod -R 777 /etc/kubeedge
```

```
_output/local/bin/cloudcore --minconfig > /etc/kubeedge/config/cloudcore.yaml
```

Output:

```
root@node-a:~/fornax# cp /etc/kubernetes/admin.conf /root/.kube/config
root@node-a:~/fornax# mkdir -p /etc/kubeedge/config
root@node-a:~/fornax# chmod -R 777 /etc/kubeedge
root@node-a:~/fornax# _output/local/bin/cloudcore --minconfig > /etc/kubeedge/config/cloudcore.yaml
root@node-a:~/fornax# mkdir -p /etc/kubeedge/ca
```

#### 5. Generate security data

```
mkdir -p /etc/kubeedge/ca
```

```
build/tools/certgen.sh genCA IP_A IP_B IP_C IP_D
```

```
build/tools/certgen.sh genCertAndKey server IP_A IP_B IP_C IP_D
```

Output:

```

root@node-a:~/fornax# mkdir -p /etc/kubeedge/ca
root@node-a:~/fornax# ls -l /etc/kubeedge/ca
total 0
root@node-a:~/fornax# ls -l /etc/kubeedge/
total 8
drwxr-xr-x 2 root root 4096 Oct 14 09:44 ca
drwxrwxrwx 2 root root 4096 Oct 14 09:44 config
root@node-a:~/fornax# build/tools/certgen.sh genCA 192.168.4.51 192.168.4.52 192.168.4.53 192.168.4.54
Generating RSA private key, 4096 bit long modulus (2 primes)
.....++++
e is 65537 (0x010001)
Can't load /root/.rnd into RNG
13976580899776:error:2406F079:random number generator:RAND_load_file:Cannot open file:../crypto/rand/randfile.c:88:Filename=/root/.rnd
root@node-a:~/fornax# build/tools/certgen.sh genCertAndKey server 192.168.4.51 192.168.4.52 192.168.4.53 192.168.4.54
Generating RSA private key, 2048 bit long modulus (2 primes)
.....++++
e is 65537 (0x010001)
Can't load /root/.rnd into RNG
139775158559168:error:2406F079:random number generator:RAND_load_file:Cannot open file:../crypto/rand/randfile.c:88:Filename=/root/.rnd
Signature ok
subject=C = CN, ST = Zhejiang, L = Hangzhou, O = KubeEdge, CN = kubeedge.io
Getting CA Private Key
root@node-a:~/fornax# ls -l /etc/kubeedge/ca
total 12
-rw-r--r-- 1 root root 2057 Oct 14 09:47 rootCA.crt
-rw----- 1 root root 3311 Oct 14 09:47 rootCA.key
-rw-r--r-- 1 root root 41 Oct 14 09:47 rootCA.srl
root@node-a:~/fornax# ls -l /etc/kubeedge/certs/
total 12
-rw-r--r-- 1 root root 1602 Oct 14 09:47 server.crt
-rw-r--r-- 1 root root 989 Oct 14 09:47 server.csr
-rw----- 1 root root 1675 Oct 14 09:47 server.key
root@node-a:~/fornax#

```

6. Copy the files of folder /etc/kubeedge/ca and /etc/kubeedge/certs in machine A to the folder of /etc/kubeedge/ca and /etc/kubeedge/certs in machine B, C and D.

Copy ca and certs to machineB:

```

scp -r /etc/kubeedge/ca/ root@node-b-ip:/etc/kubeedge
scp -r /etc/kubeedge/certs/ root@node-b-ip:/etc/kubeedge

```

Output:

```

root@node-a:~/fornax# scp -r /etc/kubeedge/ca/ root@192.168.4.52:/etc/kubeedge
The authenticity of host '192.168.4.52 (192.168.4.52)' can't be established.
ECDSA key fingerprint is SHA256:CB1dE2wZ3LcNKUGR0DD08xosH3XBK+M4YQM2tc34RI.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '192.168.4.52' (ECDSA) to the list of known hosts.
root@192.168.4.52's password:
rootCA.crt 100% 2057 3.2MB/s 00:00
rootCA.key 100% 3311 4.7MB/s 00:00
rootCA.srl 100% 41 75.8KB/s 00:00
root@node-a:~/fornax# scp -r /etc/kubeedge/certs/ root@192.168.4.52:/etc/kubeedge
root@192.168.4.52's password:
server.crt 100% 1602 3.4MB/s 00:00
server.csr 100% 989 2.7MB/s 00:00
server.key 100% 1675 5.0MB/s 00:00
root@node-a:~/fornax#

```

Copy ca and certs to machineC:

```

scp -r /etc/kubeedge/ca/ root@node-c-ip:/etc/kubeedge
scp -r /etc/kubeedge/certs/ root@node-c-ip:/etc/kubeedge

```

Output:

```

root@node-a:~/fornax# scp -r /etc/kubeedge/ca/ root@192.168.4.53:/etc/kubeedge
The authenticity of host '192.168.4.53 (192.168.4.53)' can't be established.
ECDSA key fingerprint is SHA256:CB1dE2wZ3LcNKUGR0DD08xosH3XBK+M4YQM2tc34RI.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '192.168.4.53' (ECDSA) to the list of known hosts.
root@192.168.4.53's password:
rootCA.crt 100% 2057 3.0MB/s 00:00
rootCA.key 100% 3311 5.9MB/s 00:00
rootCA.srl 100% 41 77.6KB/s 00:00
root@node-a:~/fornax# scp -r /etc/kubeedge/certs/ root@192.168.4.53:/etc/kubeedge
root@192.168.4.53's password:
server.crt 100% 1602 3.0MB/s 00:00
server.csr 100% 989 2.5MB/s 00:00
server.key 100% 1675 3.1MB/s 00:00
root@node-a:~/fornax#

```

Copy ca and certs to machineD:

```
scp -r /etc/kubeedge/ca/ root@node-d-ip:/etc/kubeedge
scp -r /etc/kubeedge/certs/ root@node-d-ip:/etc/kubeedge
```

Output:

```
root@node-a:~/fornax# scp -r /etc/kubeedge/ca/ root@192.168.4.54:/etc/kubeedge
The authenticity of host '192.168.4.54 (192.168.4.54)' can't be established.
ECDSA key fingerprint is SHA256:CB1dE2wMZ3LcNKU8R0D008x08H3X8K+MAYQM2CC34R1.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '192.168.4.54' (ECDSA) to the list of known hosts.
root@192.168.4.54's password:
rootCA.crt 100% 2057 3.0MB/s 00:00
rootCA.key 100% 3311 6.0MB/s 00:00
rootCA.srl 100% 41 107.3KB/s 00:00
root@node-a:~/fornax# scp -r /etc/kubeedge/certs/ root@192.168.4.54:/etc/kubeedge
root@192.168.4.54's password:
server.crt 100% 1602 2.2MB/s 00:00
server.csr 100% 989 1.9MB/s 00:00
server.key 100% 1675 3.4MB/s 00:00
root@node-a:~/fornax#
```

7. Copy Kubeconfig file of cluster A(machine A) to Cluster B(machine B)

```
scp /etc/kubernetes/admin.conf root@node-b-ip:/root/fornax
```

Output:

```
root@node-a:~/fornax# scp /etc/kubernetes/admin.conf root@192.168.4.52:/root/fornax
root@192.168.4.52's password:
admin.conf 100% 5592 7.5MB/s 00:00
root@node-a:~/fornax#
```

8. Install CRDs

```
export KUBECONFIG=/etc/kubernetes/admin.conf
kubectl apply -f build/crds/devices/devices_v1alpha2_device.yaml
kubectl apply -f build/crds/devices/devices_v1alpha2_devicemodel.yaml
```

```
kubectl apply -f build/crds/reliablesyncs/cluster_objectsync_v1alpha1.yaml
kubectl apply -f build/crds/reliablesyncs/objectsyntax_v1alpha1.yaml
```

```
kubectl apply -f build/crds/router/router_v1_rule.yaml
kubectl apply -f build/crds/router/router_v1_ruleEndpoint.yaml
```

```
kubectl apply -f build/crds/edgecluster/mission_v1.yaml
kubectl apply -f build/crds/edgecluster/edgecluster_v1.yaml
```

Output:



```

root@node-a:~/fornax# export KUBECONFIG=/etc/kubernetes/admin.conf
root@node-a:~/fornax# kubectl apply -f build/crds/devices/devices_vialpha2_device.yaml

kubectl apply -f build/crds/reliablesyncs/cluster_objectsync_vialpha1.yaml
kubectl apply -f build/crds/reliablesyncs/objectsync_vialpha1.yaml

kubectl apply -f build/crds/router/router_v1_rule.yaml
kubectl apply -f build/crds/router/router_v1_ruleendpoint.yaml

kubectl apply -f build/crds/edgecluster/mission_v1.yaml
kubectl apply -f build/crds/edgecluster/edgecluster_v1.yaml
Warning: apiextensions.k8s.io/v1beta1 CustomResourceDefinition is deprecated in v1.16+, unavailable in v1.22+; use apiextensions.k8s.io/v1 CustomResourceDefinition
customresourcedefinition.apiextensions.k8s.io/devices.devices.kubeedge.io created
root@node-a:~/fornax# kubectl apply -f build/crds/devices/devices_vialpha2_devicemodel.yaml
Warning: apiextensions.k8s.io/v1beta1 CustomResourceDefinition is deprecated in v1.16+, unavailable in v1.22+; use apiextensions.k8s.io/v1 CustomResourceDefinition
customresourcedefinition.apiextensions.k8s.io/devicemodels.devices.kubeedge.io created
root@node-a:~/fornax#
root@node-a:~/fornax# kubectl apply -f build/crds/reliablesyncs/cluster_objectsync_vialpha1.yaml
Warning: apiextensions.k8s.io/v1beta1 CustomResourceDefinition is deprecated in v1.16+, unavailable in v1.22+; use apiextensions.k8s.io/v1 CustomResourceDefinition
customresourcedefinition.apiextensions.k8s.io/clusterobjectsyncs.reliablesyncs.kubeedge.io created
root@node-a:~/fornax# kubectl apply -f build/crds/reliablesyncs/objectsync_vialpha1.yaml
Warning: apiextensions.k8s.io/v1beta1 CustomResourceDefinition is deprecated in v1.16+, unavailable in v1.22+; use apiextensions.k8s.io/v1 CustomResourceDefinition
customresourcedefinition.apiextensions.k8s.io/objectsyncs.reliablesyncs.kubeedge.io created
root@node-a:~/fornax#
root@node-a:~/fornax# kubectl apply -f build/crds/router/router_v1_rule.yaml
customresourcedefinition.apiextensions.k8s.io/rules.rules.kubeedge.io created
root@node-a:~/fornax# kubectl apply -f build/crds/router/router_v1_ruleendpoint.yaml
customresourcedefinition.apiextensions.k8s.io/ruleendpoints.rules.kubeedge.io created
root@node-a:~/fornax#
root@node-a:~/fornax# kubectl apply -f build/crds/edgecluster/mission_v1.yaml
Warning: apiextensions.k8s.io/v1beta1 CustomResourceDefinition is deprecated in v1.16+, unavailable in v1.22+; use apiextensions.k8s.io/v1 CustomResourceDefinition
customresourcedefinition.apiextensions.k8s.io/missions.edgeclusters.kubeedge.io created
root@node-a:~/fornax# kubectl apply -f build/crds/edgecluster/edgecluster_v1.yaml
Warning: apiextensions.k8s.io/v1beta1 CustomResourceDefinition is deprecated in v1.16+, unavailable in v1.22+; use apiextensions.k8s.io/v1 CustomResourceDefinition
customresourcedefinition.apiextensions.k8s.io/edgeclusters.edgeclusters.kubeedge.io created

```

- start kubeedge cloudcore in the root operator machine, using command:

`_output/local/bin/cloudcore`

Output:

```

root@node-a:~/fornax# _output/local/bin/cloudcore
I1014 10:31:05.028553 32319 server.go:74] Version: v0.2-1+47966d49c404d0
I1014 10:31:06.068678 32319 config.go:43] Succeed in loading CA certificate from local directory
I1014 10:31:06.068749 32319 config.go:50] Succeed in loading CA key from local directory
I1014 10:31:06.068798 32319 config.go:64] Succeed in loading certificate from local directory
I1014 10:31:06.068844 32319 config.go:70] Succeed in loading private key from local directory
I1014 10:31:06.068906 32319 module.go:34] Module cloudbus registered successfully
I1014 10:31:06.187671 32319 module.go:34] Module edgecontroller registered successfully
I1014 10:31:06.187788 32319 module.go:34] Module devicecontroller registered successfully
I1014 10:31:06.187858 32319 module.go:34] Module synccontroller registered successfully
W1014 10:31:06.188108 32319 module.go:37] Module cloudStream is disabled, do not register
W1014 10:31:06.188130 32319 module.go:37] Module router is disabled, do not register
W1014 10:31:06.188159 32319 module.go:37] Module dynamiccontroller is disabled, do not register
I1014 10:31:06.188203 32319 module.go:34] Module missionstatepruner registered successfully
I1014 10:31:06.188295 32319 core.go:24] Starting module edgecontroller
I1014 10:31:06.188450 32319 core.go:24] Starting module devicecontroller
I1014 10:31:06.188437 32319 upstream.go:123] start upstream controller
I1014 10:31:06.188516 32319 downstream.go:873] Start downstream devicecontroller
I1014 10:31:06.188577 32319 core.go:24] Starting module synccontroller
I1014 10:31:06.188635 32319 downstream.go:446] start downstream controller
I1014 10:31:06.188659 32319 core.go:24] Starting module missionstatepruner
I1014 10:31:06.188725 32319 core.go:24] Starting module cloudbus
I1014 10:31:06.563783 32319 signcerts.go:100] Succeed to creating token
I1014 10:31:06.563861 32319 server.go:44] start unix domain socket server
I1014 10:31:06.564127 32319 uds.go:71] listening on: //var/lib/kubeedge/kubeedge.sock
I1014 10:31:06.564503 32319 server.go:64] Starting cloudbus websocket server
I1014 10:31:08.188956 32319 upstream.go:63] Start upstream devicecontroller

```

Leave the terminal as it is after cloudcore started in Machine A.

## Setup Fornax: Machine B

- Make sure Kubernetes cluster is ready:

`Kubectl get nodes`

Output:

```
root@node-b:~# kubectl get nodes
NAME        STATUS    ROLES                  AGE     VERSION
node-b      Ready     control-plane,master   56m     v1.21.1
```

2. Clone a repo of <https://github.com/CentaurusInfra/fornax>, sync to the branch/commit to test.

```
git clone https://github.com/CentaurusInfra/fornax.git
cd fornax
```

Output:

```
root@node-b:~# git clone https://github.com/CentaurusInfra/fornax.git
Cloning into 'fornax'...
remote: Enumerating objects: 50967, done.
remote: Counting objects: 100% (781/781), done.
remote: Compressing objects: 100% (385/385), done.
remote: Total 50967 (delta 429), reused 664 (delta 362), pack-reused 50186
Receiving objects: 100% (50967/50967), 114.10 MiB | 7.22 MiB/s, done.
Resolving deltas: 100% (28074/28074), done.
Checking out files: 100% (8784/8784), done.
root@node-b:~# cd fornax/
root@node-b:~/fornax# make WHAT=cloudcore
```

3. Build the binaries of edgecore and cloudcore using the commands:

```
make WHAT=cloudcore
```

Output:

```
root@node-b:~/fornax# make WHAT=cloudcore
hack/verify-golang.sh
go version: go version go1.13.9 linux/amd64
go version: 1.13.9
KUBEEDGE_OUTPUT_SUBPATH= output/local hack/make-rules/build.sh cloudcore
building github.com/kubeedge/kubeedge/cloud/cmd/cloudcore
+ go build -o /root/.foray/output/local/bin/cloudcore -gcflags=-ldflags '-s -w -buildid=-X github.com/kubeedge/kubeedge/pkg/version.buildDate=2021-10-14T09:27:25Z -X github.com/kubeedge/kubeedge/pkg/version.gitCommit=47966d49c404d0607b5430c0db092fe1f590ab -X github.com/kubeedge/kubeedge/pkg/version.gitTreeState=clean -X github.com/kubeedge/kubeedge/pkg/version.gitVersion=v0.2.1-47966d49c404d0 -X github.com/kubeedge/kubeedge/pkg/version.gitMajor=0 -X github.com/kubeedge/kubeedge/pkg/version.gitMinor=2' github.com/kubeedge/kubeedge/cloud/cmd/cloudcore
go: downloading k8s.io/component-base v0.19.10
go: downloading k8s.io/api v0.19.10
go: downloading k8s.io/client-go v0.19.10
go: extracting k8s.io/component-base v0.19.10
go: extracting k8s.io/api v0.19.10
go: extracting k8s.io/client-go v0.19.10
go: downloading github.com/gorilla/websocket v1.4.0
go: downloading github.com/emicklei/go-restful v2.9.6+incompatible
go: extracting k8s.io/apiextensions-apiserver v0.19.10
go: downloading golang.org/x/net v0.0.0-20201110031124-69a78807bb2b
go: downloading k8s.io/autoscaler/vertical-pod-autoscaler v0.0.0-20200729134348-d5654de09c73
go: extracting k8s.io/autoscaler/vertical-pod-autoscaler v0.0.0-20200729134348-d5654de09c73
go: downloading github.com/google/gofuzz v1.1.0
go: downloading github.com/moby/term v0.0.0-20200312100748-672ec06f55cd
go: downloading k8s.io/klog v1.0.0
go: extracting k8s.io/klog v1.0.0
go: downloading github.com/gorilla/websocket v1.4.0
go: extracting k8s.io/klog v1.0.0
go: downloading k8s.io/autoscaler/vertical-pod-autoscaler v0.0.0-20200729134348-d5654de09c73
go: extracting k8s.io/autoscaler/vertical-pod-autoscaler v0.0.0-20200729134348-d5654de09c73
go: downloading go.uber.org/zap v1.10.0
go: downloading github.com/satori/go.uuid v1.2.0
go: downloading github.com/indaryl/mergo v0.3.7
go: downloading github.com/spf13/pflag v1.0.5
go: extracting k8s.io/metrics v0.0.0-20200312100748-672ec06f55cd
go: extracting k8s.io/metrics v0.0.0-20200312100748-672ec06f55cd
go: extracting k8s.io/metrics v0.0.0-20200312100748-672ec06f55cd
go: downloading golang.org/x/time v0.0.0-20191024005414-555d28b269f0
go: extracting golang.org/x/time v0.0.0-20191024005414-555d28b269f0
go: extracting golang.org/x/time v0.0.0-20191024005414-555d28b269f0
go: extracting github.com/satori/go.uuid v1.2.0
go: extracting github.com/satori/go.uuid v1.2.0
go: downloading github.com/google/uuid v1.1.1
go: downloading github.com/matttn/go-rdt v1.1.1
go: downloading k8s.io/autoscaler/vertical-pod-autoscaler v0.0.0-20200729134348-d5654de09c73
go: extracting k8s.io/autoscaler/vertical-pod-autoscaler v0.0.0-20200729134348-d5654de09c73
```

```
make WHAT=edgecore
```

Output:

```

root@node-b:~/fornax# make WHAT=edgcore
hack/verify-golang.sh
go detail version: go version go1.13.9 linux/amd64
go version: 1.13.9
KUBEEDGE_OUTPUT_SUBPATH=_output/local/bin/edgcore
building github.com/kubeedge/kubeedge/cmd/edgcore
+ go build -o /root/fornax/_output/local/bin/edgcore -gcflags=-ldflags -s -w -buildid= -X github.com/kubeedge/kubeedge/pkg/version.buildDate=2021-10-14T09:38:19Z -X github.com/kubeedge/kubeedge/pkg/version.gitCommit=47966d49c404d0 -X github.com/kubeedge/kubeedge/pkg/version.gitTreeState=clean -X github.com/kubeedge/kubeedge/pkg/version.gitVersion=v0.2.1-47966d49c404d0 -X github.com/kubeedge/kubeedge/pkg/version.kubernetesVersion=v1.19.0 -X github.com/kubeedge/kubeedge/pkg/version.dockerVersion=v1.4.2-0.20200309214505-aa6a9891b09c -X github.com/kubeedge/kubeedge/pkg/version.golangVersion=v1.13.9 -X github.com/kubeedge/kubeedge/pkg/version.golangArch=amd64 -X github.com/kubeedge/kubeedge/pkg/version.golangOS=linux -X github.com/kubeedge/kubeedge/pkg/version.golangVendor=fornax
go: downloading github.com/mitchellh/go-ps v0.0.0-20190716172923-621e5597135b
go: extracting k8s.io/kubernetes v1.19.10
go: extracting github.com/mitchellh/go-ps v0.0.0-20190716172923-621e5597135b
go: extracting k8s.io/kubernetes v1.19.10
go: downloading github.com/google/cadvisor v0.37.5
go: downloading github.com/docker/go-units v0.4.0
go: downloading github.com/opencontainers/runc v1.0.0-rc91.0.20200707015106-819fcc687efb
go: downloading github.com/container-storage-interface/spec v1.2.0
go: downloading google.golang.org/grpc v1.27.0
go: downloading github.com/fsnotify/fsnotify v1.4.0
go: extracting github.com/docker/go-units v0.4.0
go: downloading k8s.io/csi-translation-lib v0.19.10
go: extracting github.com/fsnotify/fsnotify v1.4.0
go: extracting github.com/google/cadvisor v0.37.5
go: extracting github.com/container-storage-interface/spec v1.2.0
go: downloading github.com/docker/docker v1.4.2-0.20200309214505-aa6a9891b09c
go: downloading github.com/go-openapi/spec v0.19.3
go: extracting github.com/opencontainers/runc v1.0.0-rc91.0.20200707015106-819fcc687efb
go: extracting google.golang.org/grpc v1.27.0
go: downloading github.com/docker/distribution v2.7.1+incompatible
go: downloading github.com/docker/go-connections v0.4.0
go: downloading github.com/cyphar/filepath-securejoin v0.2.2
go: downloading k8s.io/kube-openapi v0.0.0-20200805222855-6aecd4b50c6
go: downloading github.com/opencontainers/go-digest v1.0.0-rc1
go: extracting k8s.io/csi-translation-lib v0.19.10
go: downloading go.etcd.io/etcd v0.5.0-alpha.5.0.20200819165624-17cfee3e9d5
go: extracting github.com/go-openapi/spec v0.19.3
go: downloading k8s.io/cloud-provider v0.19.10
go: extracting github.com/docker/docker v1.4.2-0.20200309214505-aa6a9891b09c
go: extracting github.com/cyphar/filepath-securejoin v0.2.2
go: extracting github.com/docker/distribution v2.7.1+incompatible
go: extracting github.com/opencontainers/go-digest v1.0.0-rc1
go: extracting github.com/cyphar/filepath-securejoin v0.2.2
go: downloading github.com/blang/semver v3.5.1+incompatible
go: downloading k8s.io/kubelet v0.19.10
go: extracting k8s.io/cloud-provider v0.19.10
go: extracting github.com/blang/semver v3.5.1+incompatible
go: extracting github.com/docker/docker v1.4.2-0.20200309214505-aa6a9891b09c
go: downloading github.com/prometheus/client_model v0.2.0
go: extracting k8s.io/kubelet v0.19.10
go: extracting github.com/prometheus/procfs v0.1.3
go: extracting github.com/docker/docker v1.4.2-0.20200309214505-aa6a9891b09c
go: downloading github.com/aws/aws-sdk-go v1.28.2
go: extracting k8s.io/kube-openapi v0.0.0-20200805222855-6aecd4b50c6
go: extracting go.etcd.io/etcd v0.5.0-alpha.5.0.20200819165624-17cfee3e9d5
go: downloading k8s.io/csi-api v0.19.10
go: downloading github.com/go-openapi/jsonpointer v0.19.3
go: downloading k8s.io/gopher-network-proxy v0.0.20
go: downloading cloud.google.com/go v0.51.0

```

#### 4. config cloudcore

```
cp /etc/kubernetes/admin.conf /root/.kube/config
```

```
mkdir -p /etc/kubeedge/config
```

```
chmod -R 777 /etc/kubeedge
```

```
_output/local/bin/cloudcore --minconfig > /etc/kubeedge/config/cloudcore.yaml
```

Output:

```

root@node-b:~/fornax# cp /etc/kubernetes/admin.conf /root/.kube/config
root@node-b:~/fornax# mkdir -p /etc/kubeedge/config
root@node-b:~/fornax# chmod -R 777 /etc/kubeedge
root@node-b:~/fornax# _output/local/bin/cloudcore --minconfig > /etc/kubeedge/config/cloudcore.yaml
root@node-b:~/fornax# █

```

#### 5. Copy Kubeconfig file of clusterB(machineB) to ClusterC(machineC)

```
scp /etc/kubernetes/admin.conf root@node-c-ip:/root/fornax
```

Output:

```

root@node-b:~/fornax# scp /etc/kubernetes/admin.conf root@192.168.4.53:/root/fornax
The authenticity of host '192.168.4.53 (192.168.4.53)' can't be established.
ECDSA key fingerprint is SHA256:CB1dE2wZSLcMU6Q0003oxh3JdkH4Vq2cc3Jn1.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '192.168.4.53' (ECDSA) to the list of known hosts.
root@192.168.4.53's password:
admin.conf
root@node-b:~/fornax# █

```



## 6. config edgecore:

```
cp /etc/kubernetes/admin.conf /root/edgecluster.kubeconfig
_output/local/bin/edgecore --edgeclusterconfig > /etc/kubeedge/config/edgecore.yaml
chmod 777 tests/edgecluster/hack/update_edgecore_config.sh
tests/edgecluster/hack/update_edgecore_config.sh admin.conf
```

Output:

```
root@node-b:~/fornax# cp /etc/kubernetes/admin.conf /root/edgecluster.kubeconfig
root@node-b:~/fornax# _output/local/bin/edgecore --edgeclusterconfig > /etc/kubeedge/config/edgecore.yaml
root@node-b:~/fornax# chmod 777 tests/edgecluster/hack/update_edgecore_config.sh
root@node-b:~/fornax# tests/edgecluster/hack/update_edgecore_config.sh admin.conf
root@node-b:~/fornax#
```

## 7. Install CRDs

```
export KUBECONFIG=/etc/kubernetes/admin.conf
```

```
kubectl apply -f build/crds/devices/devices_v1alpha2_device.yaml
```

```
kubectl apply -f build/crds/devices/devices_v1alpha2_devicemodel.yaml
```

```
kubectl apply -f build/crds/reliablesyncs/cluster_objectsync_v1alpha1.yaml
```

```
kubectl apply -f build/crds/reliablesyncs/objectsync_v1alpha1.yaml
```

```
kubectl apply -f build/crds/router/router_v1_rule.yaml
```

```
kubectl apply -f build/crds/router/router_v1_ruleEndpoint.yaml
```

```
kubectl apply -f build/crds/edgecluster/mission_v1.yaml
```

```
kubectl apply -f build/crds/edgecluster/edgecluster_v1.yaml
```

```
root@node-b:~/fornax# export KUBECONFIG=/etc/kubernetes/admin.conf
root@node-b:~/fornax# kubectl apply -f build/crds/devices/devices_v1alpha2_device.yaml
kubectl apply -f build/crds/devices/devices_v1alpha2_devicemodel.yaml
root@node-b:~/fornax# kubectl apply -f build/crds/reliablesyncs/cluster_objectsync_v1alpha1.yaml
kubectl apply -f build/crds/reliablesyncs/objectsync_v1alpha1.yaml
root@node-b:~/fornax# kubectl apply -f build/crds/router/router_v1_rule.yaml
kubectl apply -f build/crds/router/router_v1_ruleEndpoint.yaml
root@node-b:~/fornax# kubectl apply -f build/crds/edgecluster/mission_v1.yaml
kubectl apply -f build/crds/edgecluster/edgecluster_v1.yaml

Warning: apiextensions.k8s.io/v1beta1 CustomResourceDefinition is deprecated in v1.16+, unavailable in v1.22+; use apiextensions.k8s.io/v1 CustomResourceDefinition
customresourcedefinition.apiextensions.k8s.io/devices.devices.kubeedge.io created
root@node-b:~/fornax# kubectl apply -f build/crds/devices/devices_v1alpha2_devicemodel.yaml
Warning: apiextensions.k8s.io/v1beta1 CustomResourceDefinition is deprecated in v1.16+, unavailable in v1.22+; use apiextensions.k8s.io/v1 CustomResourceDefinition
customresourcedefinition.apiextensions.k8s.io/devicemodels.devices.kubeedge.io created
root@node-b:~/fornax# kubectl apply -f build/crds/reliablesyncs/cluster_objectsync_v1alpha1.yaml
Warning: apiextensions.k8s.io/v1beta1 CustomResourceDefinition is deprecated in v1.16+, unavailable in v1.22+; use apiextensions.k8s.io/v1 CustomResourceDefinition
customresourcedefinition.apiextensions.k8s.io/clusterobjectsyncs.reliablesyncs.kubeedge.io created
root@node-b:~/fornax# kubectl apply -f build/crds/reliablesyncs/objectsync_v1alpha1.yaml
Warning: apiextensions.k8s.io/v1beta1 CustomResourceDefinition is deprecated in v1.16+, unavailable in v1.22+; use apiextensions.k8s.io/v1 CustomResourceDefinition
customresourcedefinition.apiextensions.k8s.io/objectsyncs.reliablesyncs.kubeedge.io created
root@node-b:~/fornax# kubectl apply -f build/crds/router/router_v1_rule.yaml
Warning: apiextensions.k8s.io/v1beta1 CustomResourceDefinition is deprecated in v1.16+, unavailable in v1.22+; use apiextensions.k8s.io/v1 CustomResourceDefinition
customresourcedefinition.apiextensions.k8s.io/rules.rules.kubeedge.io created
root@node-b:~/fornax# kubectl apply -f build/crds/router/router_v1_ruleEndpoint.yaml
Warning: apiextensions.k8s.io/v1beta1 CustomResourceDefinition is deprecated in v1.16+, unavailable in v1.22+; use apiextensions.k8s.io/v1 CustomResourceDefinition
customresourcedefinition.apiextensions.k8s.io/ruleendpoints.rules.kubeedge.io created
root@node-b:~/fornax# kubectl apply -f build/crds/edgecluster/mission_v1.yaml
Warning: apiextensions.k8s.io/v1beta1 CustomResourceDefinition is deprecated in v1.16+, unavailable in v1.22+; use apiextensions.k8s.io/v1 CustomResourceDefinition
customresourcedefinition.apiextensions.k8s.io/missions.edgeclusters.kubeedge.io created
root@node-b:~/fornax# kubectl apply -f build/crds/edgecluster/edgecluster_v1.yaml
Warning: apiextensions.k8s.io/v1beta1 CustomResourceDefinition is deprecated in v1.16+, unavailable in v1.22+; use apiextensions.k8s.io/v1 CustomResourceDefinition
customresourcedefinition.apiextensions.k8s.io/edgeclusters.edgeclusters.kubeedge.io created
root@node-b:~/fornax#
```

8. Start the edgecore in edge-cluster mode, with command:

```
output/local/bin/edgecore --edgecluster
```

Output:

```
root@node-b:~/fornax# output/local/bin/edgecore --edgecluster
I1014 11:23:38.750524 12035 server.go:73] Version: v0.2-1+47966d49c404d0
I1014 11:23:38.752134 12035 module.go:34] Module websocket registered successfully
I1014 11:23:38.758926 12035 metamanager.go:46] Begin to register metaManager db model
I1014 11:23:38.759424 12035 module.go:34] Module metaManager registered successfully
I1014 11:23:38.760253 12035 module.go:34] Module clusterd registered successfully
W1014 11:23:38.760553 12035 module.go:37] Module edgestream is disabled, do not register
I1014 11:23:38.760712 12035 edgecluster_state_reporter.go:209] Starting edgecluster state reporter.
I1014 11:23:38.760873 12035 edgecluster_state_reporter.go:213] Shutting down edgecluster state reporter
W1014 11:23:38.760842 12035 module.go:37] Module testManager is disabled, do not register
I1014 11:23:38.760508 12035 mission_state_reporter.go:77] Starting mission state reporter.
table 'meta' already exists, skip
table 'meta_v2' already exists, skip
I1014 11:23:38.789053 12035 core.go:24] Starting module websocket
I1014 11:23:38.815601 12035 core.go:24] Starting module metaManager
I1014 11:23:38.815894 12035 core.go:24] Starting module clusterd
I1014 11:23:38.826137 12035 clusterd.go:85] Starting clusterd...
I1014 11:23:38.826227 12035 clusterd.go:87] starting sync with cloud
I1014 11:23:38.968431 12035 certmanager.go:159] Certificate rotation is enabled.
I1014 11:23:38.968603 12035 websocket.go:51] Websocket start to connect Access
I1014 11:23:39.030974 12035 ws.go:46] dial wss://192.168.1.104:10000/e632aba927ea4ac2b575ec1603d56f10/node-b/events successfully
I1014 11:23:39.031171 12035 websocket.go:93] Websocket connect to cloud access successful
W1014 11:23:39.031234 12035 context_channel.go:335] Failed to get type channel, type:bus
W1014 11:23:39.031266 12035 context_channel.go:184] Get bad module type:bus when sendToGroup message, do nothing
W1014 11:23:39.031313 12035 context_channel.go:335] Failed to get type channel, type:twinn
W1014 11:23:39.031339 12035 context_channel.go:184] Get bad module type:twinn when sendToGroup message, do nothing
I1014 11:23:39.031462 12035 process.go:411] node connection event occur: cloud_connected
I1014 11:23:39.031602 12035 process.go:411] node connection event occur: cloud_connected
I1014 11:23:42.322620 12035 edgecluster_state_reporter.go:120] Attempting to register edgeCluster (node-b), default/edgeclusterstate/node-b
I1014 11:23:42.337898 12035 edgecluster_state_reporter.go:138] Successfully registered edgeCluster node-b
```

9. start cloudcore:

```
output/local/bin/cloudcore
```

Output:

```
root@node-b:~/fornax# output/local/bin/cloudcore
I1014 10:51:49.034133 25709 server.go:74] Version: v0.2-1+47966d49c404d0
I1014 10:51:50.075053 25709 config.go:43] Succeed in loading CA certificate from local directory
I1014 10:51:50.075135 25709 config.go:50] Succeed in loading CA key from local directory
I1014 10:51:50.075190 25709 config.go:64] Succeed in loading certificate from local directory
I1014 10:51:50.075234 25709 config.go:70] Succeed in loading private key from local directory
I1014 10:51:50.075325 25709 module.go:34] Module cloudhub registered successfully
I1014 10:51:50.226697 25709 module.go:34] Module edgecontroller registered successfully
I1014 10:51:50.226790 25709 module.go:34] Module devicecontroller registered successfully
I1014 10:51:50.226836 25709 module.go:34] Module synccontroller registered successfully
W1014 10:51:50.226973 25709 module.go:37] Module cloudStream is disabled, do not register
W1014 10:51:50.226994 25709 module.go:37] Module router is disabled, do not register
W1014 10:51:50.227005 25709 module.go:37] Module dynamiccontroller is disabled, do not register
I1014 10:51:50.227022 25709 module.go:34] Module missionstatepruner registered successfully
I1014 10:51:50.227095 25709 core.go:24] Starting module synccontroller
I1014 10:51:50.227147 25709 core.go:24] Starting module missionstatepruner
I1014 10:51:50.227196 25709 core.go:24] Starting module cloudhub
I1014 10:51:50.227242 25709 core.go:24] Starting module edgecontroller
I1014 10:51:50.227319 25709 core.go:24] Starting module devicecontroller
I1014 10:51:50.227366 25709 upstream.go:123] start upstream controller
I1014 10:51:50.227473 25709 downstream.go:446] start downstream controller
I1014 10:51:50.227749 25709 downstream.go:873] Start downstream devicecontroller
I1014 10:51:50.537673 25709 signcerts.go:100] Succeed to creating token
I1014 10:51:50.537774 25709 server.go:44] start unix domain socket server
I1014 10:51:50.538052 25709 uds.go:71] listening on: //var/lib/kubeedge/kubeedge.sock
I1014 10:51:50.538466 25709 server.go:64] Starting cloudhub websocket server
I1014 10:51:52.228310 25709 upstream.go:63] Start upstream devicecontroller
```

## Setup Fornax: Machine C

1. Make sure Kubernetes cluster is ready:

`kubectl get nodes`

Output:

```
root@node-c:~# kubectl get nodes
```

NAME	STATUS	ROLES	AGE	VERSION
node-c	Ready	control-plane,master	48m	v1.21.1

2. Clone a repo of <https://github.com/CentaurusInfra/fornax>, sync to the branch/commit to test.

`git clone https://github.com/CentaurusInfra/fornax.git`

`cd fornax`

Output:

```
root@node-c:~# git clone https://github.com/CentaurusInfra/fornax.git
Cloning into 'fornax'...
remote: Enumerating objects: 50967, done.
remote: Counting objects: 100% (781/781), done.
remote: Compressing objects: 100% (385/385), done.
remote: Total 50967 (delta 429), reused 664 (delta 362), pack-reused 50186
Receiving objects: 100% (50967/50967), 114.10 MiB | 7.10 MiB/s, done.
Resolving deltas: 100% (28074/28074), done.
Checking out files: 100% (8784/8784), done.
root@node-c:~# cd fornax/
root@node-c:~/fornax# make WHAT=cloudcore
```

3. Build the binaries of edgecore and cloudcore using the commands:

`make WHAT=cloudcore`

Output:



```

root@node-c1:~/fornax# make WHAT=cloudcore
hack/verify-golang.sh
go detail version: go version go1.13.9 linux/amd64
go version: 1.13.9
KUBEEDGE_OUTPUT_SUBPATH= output/local hack/make-rules/build.sh cloudcore
building github.com/kubeedge/kubeedge/cloud/cmd/cloudcore
* go build -o /root/fornax/output/local/bin/cloudcore -gcflags=-ldflags '-s -w -buildid=-X github.com/kubeedge/kubeedge/pkg/version.builddate=2021-10-14T09:27:33Z -X github.com/kubeedge/kubeedge/pkg/version.gitCommit=47966d49c404d067b843e0cddb0b2f1f590ab -X github.com/kubeedge/kubeedge/pkg/version.gitTreeState=clean -X github.com/kubeedge/kubeedge/pkg/version.gitTreeState=clean -X github.com/kubeedge/kubeedge/pkg/version.gitMinor=2' github.com/kubeedge/kubeedge/cloud/cmd/cloudcore
go: downloading k8s.io/component-base v0.19.10
go: downloading k8s.io/apimachinery v0.19.10
go: downloading k8s.io/client-go v0.19.10
go: downloading k8s.io/klog v1.0.0
go: downloading k8s.io/klog/v2 v2.2.0
go: extracting k8s.io/apimachinery v0.19.10
go: extracting k8s.io/client-go v0.19.10
go: extracting k8s.io/component-base v0.19.10
go: downloading github.com/spf13/pflag v1.0.5
go: downloading github.com/moby/term v0.0.0-20200312100748-672ec06f55cd
go: downloading github.com/gorilla/websocket v1.4.0
go: downloading k8s.io/apiserver v0.19.10
go: downloading github.com/google/uuid v1.1.1
go: extracting k8s.io/klog/v2 v2.2.0
go: downloading k8s.io/api v0.19.10
go: downloading github.com/dgrijalva/jwt-go v3.2.0+incompatible
go: downloading sigs.k8s.io/yaml v1.2.0
go: downloading github.com/gorilla/websocket v1.4.0
go: downloading k8s.io/utils v0.0.0-20200729134348-d5654de09c73
go: extracting github.com/spf13/pflag v1.0.5
go: extracting github.com/google/uuid v1.1.1
go: extracting sigs.k8s.io/yaml v1.2.0
go: extracting github.com/dgrijalva/jwt-go v3.2.0+incompatible
go: extracting github.com/gorilla/websocket v1.4.0
go: extracting github.com/moby/term v0.0.0-20200312100748-672ec06f55cd
go: extracting github.com/gorilla/websocket v1.4.0
go: downloading github.com/google/gofuzz v1.1.0
go: downloading github.com/indario/mergo v0.3.7
go: downloading github.com/emicklei/go-restful v2.9.6+incompatible
go: downloading go.uber.org/zap v1.18.0
go: extracting k8s.io/utils v0.0.0-20200729134348-d5654de09c73
go: extracting k8s.io/apiserver v0.19.10
go: extracting k8s.io/api v0.19.10
go: downloading go/pkg.in/yaml.v2 v2.2.8
go: downloading github.com/google/go-cmp v0.4.0
go: downloading github.com/cobra/cobra v1.0.0
go: downloading github.com/docker/spdystream v0.0.0-20181023171402-6480d4ef844c
go: downloading github.com/astaxie/beego v1.12.0
go: downloading github.com/davecgh/go-spew v1.1.1
go: extracting go.uber.org/zap v1.18.0
go: extracting github.com/indario/mergo v0.3.7
go: extracting github.com/google/gofuzz v1.1.0
go: downloading github.com/gogo/protobuf v1.3.2
go: downloading go/pkg.in/inf.v0 v0.0.1
go: extracting github.com/emicklei/go-restful v2.9.6+incompatible

```

make WHAT=edgecore

Output:

```

root@node-c1:~/fornax# make WHAT=edgecore
hack/verify-golang.sh
go detail version: go version go1.13.9 linux/amd64
go version: 1.13.9
KUBEEDGE_OUTPUT_SUBPATH= output/local hack/make-rules/build.sh edgecore
building github.com/kubeedge/kubeedge/edge/cmd/edgecore
* go build -o /root/fornax/output/local/bin/edgecore -gcflags=-ldflags '-s -w -buildid=-X github.com/kubeedge/kubeedge/pkg/version.builddate=2021-10-14T09:39:22Z -X github.com/kubeedge/kubeedge/pkg/version.gitCommit=47966d49c404d067b843e0cddb0b2f1f590ab -X github.com/kubeedge/kubeedge/pkg/version.gitTreeState=clean -X github.com/kubeedge/kubeedge/pkg/version.gitTreeState=clean -X github.com/kubeedge/kubeedge/pkg/version.gitMinor=2' github.com/kubeedge/kubeedge/edge/cmd/edgecore
go: downloading k8s.io/kubernetes v1.19.10
go: downloading sigs.k8s.io/apiserver-network-proxy v0.0.20
go: extracting sigs.k8s.io/apiserver-network-proxy v0.0.20
go: extracting github.com/eclipse/paho.mqtt.golang v1.2.0
go: downloading sigs.k8s.io/apiserver-network-proxy/konnectivity-client v0.0.20
go: extracting k8s.io/kubernetes v1.19.10
go: downloading k8s.io/kubelet v0.19.10
go: downloading k8s.io/kube-openapi v0.0.0-20200805222855-6aecc4b506c
go: downloading google.golang.org/grpc v1.27.0
go: downloading github.com/google/cadvisor v0.37.5
go: downloading k8s.io/cloud-provider v0.19.10
go: downloading github.com/go-openapi/spec v0.19.3
go: extracting k8s.io/kubelet v0.19.10
go: extracting k8s.io/kubelet v0.19.10
go: extracting github.com/google/cadvisor v0.37.5
go: downloading github.com/coreos/go-systemd v0.0.0-20190620071333-e64a0ec8b42a
go: downloading k8s.io/kube-scheduler v0.19.10
go: downloading github.com/opencontainers/runc v1.0.0-rc91.0.20200707015106-819fcc87efb
go: downloading k8s.io/cri-api v0.19.10
go: extracting github.com/go-openapi/spec v0.19.3
go: extracting google.golang.org/grpc v1.27.0
go: extracting k8s.io/kube-openapi v0.0.0-20200805222855-6aecc4b506c
go: downloading github.com/docker/go-units v0.4.0
go: downloading github.com/evanphx/json-patch v4.9.0+incompatible
go: downloading k8s.io/apiextensions-apiserver v0.19.10
go: downloading k8s.io/csi-translation-lib v0.19.10
go: extracting github.com/coreos/go-systemd v0.0.0-20190620071333-e64a0ec8b42a
go: downloading go.etcd.io/etcd v0.5.0-alpha.5.0.20200819165624-17cfe6a3e9d5
go: extracting github.com/evanphx/json-patch v4.9.0+incompatible
go: extracting k8s.io/cri-api v0.19.10
go: extracting k8s.io/kube-scheduler v0.19.10
go: extracting github.com/docker/go-units v0.4.0
go: extracting github.com/opencontainers/runc v1.0.0-rc91.0.20200707015106-819fcc87efb
go: extracting k8s.io/csi-translation-lib v0.19.10
go: extracting k8s.io/apiextensions-apiserver v0.19.10
go: downloading github.com/blang/semver v2.5.1+incompatible
go: downloading google.golang.org/genproto v0.0.0-20200526211855-cb27e3aa2013
go: downloading github.com/docker/docker v1.4.2-0.20200309214505-aa6a9891b09c
go: downloading github.com/prometheus/client_model v0.2.0
go: downloading github.com/container-storage-interface/spec v1.2.0
go: downloading github.com/prometheus/client_golang v1.7.1
go: downloading github.com/go-openapi/jsonpointer v0.19.3
go: downloading github.com/cyphar/filepath-securejoin v0.2.2
go: downloading github.com/godbus/dbus/v5 v5.0.3
go: extracting github.com/blang/semver v2.5.1+incompatible
go: downloading github.com/256dp/gomqtt v0.10.4

```

#### 4. config cloudcore

mkdir -p /etc/kubeedge/config

chmod -R 777 /etc/kubeedge

output/local/bin/cloudcore --minconfig > /etc/kubeedge/config/cloudcore.yaml



Output:

```
root@node-c:~/fornax# cp /etc/kubernetes/admin.conf /root/.kube/config
root@node-c:~/fornax#
root@node-c:~/fornax# mkdir -p /etc/kubeedge/config
root@node-c:~/fornax# chmod -R 777 /etc/kubeedge
root@node-c:~/fornax# _output/local/bin/cloudcore --minconfig > /etc/kubeedge/config/cloudcore.yaml
root@node-c:~/fornax#
```

5. Copy Kubeconfig file of clusterC(machineC) to ClusterD(machineD)

```
scp /etc/kubernetes/admin.conf root@node-d-ip:/root/go/src/k8s.io/arktos/fornax
```

Output:

```
root@node-c:~/fornax# scp /etc/kubernetes/admin.conf root@192.168.4.54:/root/go/src/k8s.io/arktos/fornax
The authenticity of host '192.168.4.54 (192.168.4.54)' can't be established.
ECDSA key fingerprint is SHA256:CB1dE2wZ3LcNKU6R0D0D8xosH3X8K+M4YQM2tC34RI.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '192.168.4.54' (ECDSA) to the list of known hosts.
root@192.168.4.54's password:
admin.conf
root@node-c:~/fornax#
```

6. config edgecore:

```
cp /etc/kubernetes/admin.conf /root/edgecluster.kubeconfig
_output/local/bin/edgecore --edgeclusterconfig > /etc/kubeedge/config/edgecore.yaml
chmod 777 tests/edgecluster/hack/update_edgecore_config.sh
tests/edgecluster/hack/update_edgecore_config.sh admin.conf
```

Output:

```
root@node-c:~/fornax# cp /etc/kubernetes/admin.conf /root/edgecluster.kubeconfig
root@node-c:~/fornax# _output/local/bin/edgecore --edgeclusterconfig > /etc/kubeedge/config/edgecore.yaml
root@node-c:~/fornax#
root@node-c:~/fornax# chmod 777 tests/edgecluster/hack/update_edgecore_config.sh
root@node-c:~/fornax# tests/edgecluster/hack/update_edgecore_config.sh admin.conf
root@node-c:~/fornax#
```

7. Install CRDs

```
export KUBECONFIG=/etc/kubernetes/admin.conf
```

```
kubectl apply -f build/crds/devices/devices_v1alpha2_device.yaml
kubectl apply -f build/crds/devices/devices_v1alpha2_devicemodel.yaml
```

```
kubectl apply -f build/crds/reliablesyncs/cluster_objectsync_v1alpha1.yaml
kubectl apply -f build/crds/reliablesyncs/objectsync_v1alpha1.yaml
```

```
kubectl apply -f build/crds/router/router_v1_rule.yaml
kubectl apply -f build/crds/router/router_v1_ruleEndpoint.yaml
```

```
kubectl apply -f build/crds/edgecluster/mission_v1.yaml
```

```
kubectl apply -f build/crds/edgecluster/edgecluster_v1.yaml
```

Output:

```
root@node-c:~/fornax# export KUBECONFIG=/etc/kubernetes/admin.conf
root@node-c:~/fornax# kubectl apply -f build/crds/devices/devices_v1alpha2_device.yaml
Warning: apiextensions.k8s.io/v1beta1 CustomResourceDefinition is deprecated in v1.16+, unavailable in v1.22+; use apiextensions.k8s.io/v1 CustomResourceDefinition
customresourcedefinition.apiextensions.k8s.io/devices.devices.kubeedge.io created
root@node-c:~/fornax# kubectl apply -f build/crds/devices/devices_v1alpha2_devicemodel.yaml
Warning: apiextensions.k8s.io/v1beta1 CustomResourceDefinition is deprecated in v1.16+, unavailable in v1.22+; use apiextensions.k8s.io/v1 CustomResourceDefinition
customresourcedefinition.apiextensions.k8s.io/devicemodels.devices.kubeedge.io created
root@node-c:~/fornax#
root@node-c:~/fornax# kubectl apply -f build/crds/reliablesyncs/cluster_objectsync_v1alpha1.yaml
Warning: apiextensions.k8s.io/v1beta1 CustomResourceDefinition is deprecated in v1.16+, unavailable in v1.22+; use apiextensions.k8s.io/v1 CustomResourceDefinition
customresourcedefinition.apiextensions.k8s.io/clusterobjectsyncs.reliablesyncs.kubeedge.io created
root@node-c:~/fornax# kubectl apply -f build/crds/reliablesyncs/objectsync_v1alpha1.yaml
Warning: apiextensions.k8s.io/v1beta1 CustomResourceDefinition is deprecated in v1.16+, unavailable in v1.22+; use apiextensions.k8s.io/v1 CustomResourceDefinition
customresourcedefinition.apiextensions.k8s.io/objectsyncs.reliablesyncs.kubeedge.io created
root@node-c:~/fornax#
root@node-c:~/fornax# kubectl apply -f build/crds/router/router_v1_rule.yaml
customresourcedefinition.apiextensions.k8s.io/rules.rules.kubeedge.io created
root@node-c:~/fornax# kubectl apply -f build/crds/router/router_v1_ruleEndpoint.yaml
customresourcedefinition.apiextensions.k8s.io/ruleendpoints.rules.kubeedge.io created
root@node-c:~/fornax#
root@node-c:~/fornax# kubectl apply -f build/crds/edgecluster/mission_v1.yaml
Warning: apiextensions.k8s.io/v1beta1 CustomResourceDefinition is deprecated in v1.16+, unavailable in v1.22+; use apiextensions.k8s.io/v1 CustomResourceDefinition
customresourcedefinition.apiextensions.k8s.io/missions.edgeclusters.kubeedge.io created
root@node-c:~/fornax# kubectl apply -f build/crds/edgecluster/edgecluster_v1.yaml
Warning: apiextensions.k8s.io/v1beta1 CustomResourceDefinition is deprecated in v1.16+, unavailable in v1.22+; use apiextensions.k8s.io/v1 CustomResourceDefinition
customresourcedefinition.apiextensions.k8s.io/edgeclusters.edgeclusters.kubeedge.io created
root@node-c:~/fornax#
```

8. Start the edgecore in edge-cluster mode, with command:

```
_output/local/bin/edgecore --edgecluster
```

Output:

```
root@node-c:~/fornax# _output/local/bin/edgecore --edgecluster
I1014 11:26:08.584799 12644 server.go:73] Version: v0.2-1+47966d49c404d0
I1014 11:26:08.586254 12644 module.go:34] Module websocket registered successfully
I1014 11:26:08.604292 12644 metamanager.go:46] Begin to register metaManager db model
I1014 11:26:08.604998 12644 module.go:34] Module metaManager registered successfully
I1014 11:26:08.606103 12644 module.go:34] Module clusterd registered successfully
I1014 11:26:08.606370 12644 mission_state_reporter.go:77] Starting mission state reporter.
I1014 11:26:08.606360 12644 edgecluster_state_reporter.go:209] Starting edgecluster state reporter.
I1014 11:26:08.606731 12644 edgecluster_state_reporter.go:213] Shutting down edgecluster state reporter
I1014 11:26:08.606525 12644 module.go:37] Module edgestream is disabled, do not register
I1014 11:26:08.607177 12644 module.go:37] Module testManager is disabled, do not register
table 'meta' already exists, skip
table 'meta_v2' already exists, skip
I1014 11:26:08.822910 12644 core.go:24] Starting module websocket
I1014 11:26:08.823040 12644 core.go:24] Starting module metaManager
I1014 11:26:08.840451 12644 core.go:24] Starting module clusterd
I1014 11:26:08.841330 12644 clusterd.go:85] Starting clusterd...
I1014 11:26:08.841394 12644 clusterd.go:87] starting sync with cloud
I1014 11:26:08.902698 12644 certmanager.go:159] Certificate rotation is enabled.
I1014 11:26:08.902847 12644 websocket.go:51] Websocket start to connect Access
I1014 11:26:08.947184 12644 ws.go:46] dial wss://192.168.1.102:10000/e632aba927ea4ac2b575ec1603d56f10/node-c/events successfully
I1014 11:26:08.947387 12644 websocket.go:93] Websocket connect to cloud access successful
I1014 11:26:08.947487 12644 context_channel.go:335] Failed to get type channel, type:twinn
I1014 11:26:08.947519 12644 context_channel.go:184] Get bad module type:twinn when sendToGroup message, do nothing
I1014 11:26:08.947563 12644 context_channel.go:335] Failed to get type channel, type:bus
I1014 11:26:08.947587 12644 context_channel.go:184] Get bad module type:bus when sendToGroup message, do nothing
I1014 11:26:08.947699 12644 process.go:411] node connection event occur: cloud_connected
I1014 11:26:08.947933 12644 process.go:411] node connection event occur: cloud_connected
I1014 11:26:12.714743 12644 edgecluster_state_reporter.go:120] Attempting to register edgeCluster (node-c), default/edgeclusterstate/node-c
I1014 11:26:12.737210 12644 edgecluster_state_reporter.go:138] Successfully registered edgeCluster node-c
```

9. start cloudcore

```
_output/local/bin/cloudcore
```

Output:

```

root@node-c:~/fornax# _output/local/bin/cloudcore
I1014 11:03:28.078781 32314 server.go:74] Version: v0.2-1+47966d49c404d0
I1014 11:03:29.351015 32314 config.go:43] Succeed in loading CA certificate from local directory
I1014 11:03:29.351093 32314 config.go:50] Succeed in loading CA key from local directory
I1014 11:03:29.351139 32314 config.go:64] Succeed in loading certificate from local directory
I1014 11:03:29.351176 32314 config.go:70] Succeed in loading private key from local directory
I1014 11:03:29.351209 32314 module.go:34] Module cloudhub registered successfully
I1014 11:03:29.375123 32314 module.go:34] Module edgecontroller registered successfully
I1014 11:03:29.375218 32314 module.go:34] Module devicecontroller registered successfully
I1014 11:03:29.375286 32314 module.go:34] Module synccontroller registered successfully
W1014 11:03:29.375407 32314 module.go:37] Module cloudStream is disabled, do not register
W1014 11:03:29.375425 32314 module.go:37] Module router is disabled, do not register
W1014 11:03:29.375441 32314 module.go:37] Module dynamiccontroller is disabled, do not register
I1014 11:03:29.375456 32314 module.go:34] Module missionstatepruner registered successfully
I1014 11:03:29.375518 32314 core.go:24] Starting module cloudhub
I1014 11:03:29.375559 32314 core.go:24] Starting module edgecontroller
I1014 11:03:29.375598 32314 core.go:24] Starting module devicecontroller
I1014 11:03:29.375645 32314 core.go:24] Starting module synccontroller
I1014 11:03:29.375691 32314 upstream.go:123] start upstream controller
I1014 11:03:29.375707 32314 core.go:24] Starting module missionstatepruner
I1014 11:03:29.375722 32314 downstream.go:873] Start downstream devicecontroller
I1014 11:03:29.376190 32314 downstream.go:446] start downstream controller
I1014 11:03:30.050029 32314 signcerts.go:100] Succeed to creating token
I1014 11:03:30.050107 32314 server.go:44] start unix domain socket server
I1014 11:03:30.050341 32314 uds.go:71] listening on: //var/lib/kubeedge/kubeedge.sock
I1014 11:03:30.050693 32314 server.go:64] Starting cloudhub websocket server
I1014 11:03:31.376186 32314 upstream.go:63] Start upstream devicecontroller

```

Leave terminal as it is.

## Setup Fornax: Machine D

1. Make sure Arktos cluster is ready:

```
./cluster/kubectl.sh get nodes
```

Output:

```

root@node-d:~/go/src/k8s.io/arktos# ./cluster/kubectl.sh get nodes
NAME      STATUS    ROLES    AGE   VERSION
node-d    Ready     <none>   29m   v0.9.0
root@node-d:~/go/src/k8s.io/arktos#

```

2. Clone a repo of <https://github.com/CentaurusInfra/fornax>, sync to the branch/commit to test.
3. 

```
git clone https://github.com/CentaurusInfra/fornax.git
cd forna
```



Output:

```
root@node-d:~/go/src/k8s.io/arktos# git clone https://github.com/CentaurusInfra/fornax.git
Cloning into 'fornax'...
remote: Enumerating objects: 50967, done.
remote: Counting objects: 100% (781/781), done.
remote: Compressing objects: 100% (385/385), done.
remote: Total 50967 (delta 429), reused 664 (delta 362), pack-reused 50186
Receiving objects: 100% (50967/50967), 114.10 MiB | 9.31 MiB/s, done.
Resolving deltas: 100% (28074/28074), done.
Checking out files: 100% (8784/8784), done.
root@node-d:~/go/src/k8s.io/arktos# cd fornax
root@node-d:~/go/src/k8s.io/arktos/fornax#
```

```
mkdir -p /etc/kubeedge
```

```
chmod -R 777 /etc/kubeedge
```

Output:

```
root@node-d:~/go/src/k8s.io/arktos/fornax# mkdir -p /etc/kubeedge
root@node-d:~/go/src/k8s.io/arktos/fornax# chmod -R 777 /etc/kubeedge
root@node-d:~/go/src/k8s.io/arktos/fornax#
```

### 3. Build the binary of edgecore

```
make WHAT=edgecore
```

Output:

```
root@node-d:~/go/src/k8s.io/arktos/fornax# make WHAT=edgecore
hack/verify-golang.sh
go detail version: go version go1.13.9 linux/amd64
go version: 1.12.9
KUBEEDGE_OUTPUT_SUBPATH= output/local hack/make-rules/build.sh edgecore
building github.com/kubeedge/kubeedge/edge/cmd/edgecore
+ go build -o /root/go/src/k8s.io/arktos/output/local/bin/edgecore -gcflags=-ldflags=-s -w -buildid= -X github.com/kubeedge/kubeedge/pkg/version.buildDate=2021-10-14T11:08:53Z -X github.com/kubeedge/kubeedge/pkg/version.gitCommit=47966d49c404d0607b843e0cddb0b02fe1f590ab -X github.com/kubeedge/kubeedge/pkg/version.gitTreeState=dirty -X github.com/kubeedge/kubeedge/pkg/version.gitVersion=v0.2-1+47966d49c404d0-dirty -X github.com/kubeedge/kubeedge/pkg/version.gitMajor=0 -X github.com/kubeedge/kubeedge/pkg/version.gitMinor=2+ github.com/kubeedge/kubeedge/edge/cmd/edgecore
go: downloading k8s.io/component-base v0.19.10
go: downloading github.com/mitchellh/go-ps v0.0.0-20190716172923-621e5597135b
go: downloading k8s.io/apimachinery v0.19.10
go: downloading k8s.io/kubernetes v1.19.10
go: downloading k8s.io/client-go v0.19.10
go: downloading k8s.io/kubelet v0.19.10
go: extracting k8s.io/component-base v0.19.10
go: extracting github.com/mitchellh/go-ps v0.0.0-20190716172923-621e5597135b
go: downloading github.com/docker/docker v1.4.2-0.20200309214505-aa6a9891b09c
go: downloading k8s.io/crt-api v0.19.10
go: extracting k8s.io/client-go v0.19.10
go: extracting k8s.io/apimachinery v0.19.10
go: extracting k8s.io/kubernetes v1.19.10
go: extracting github.com/docker/docker v1.4.2-0.20200309214505-aa6a9891b09c
go: extracting k8s.io/kubelet v0.19.10
go: downloading github.com/spf13/pflag v1.0.5
go: downloading github.com/gogo/protobuf v1.3.2
go: downloading github.com/spf13/cobra v1.0.0
go: downloading github.com/golang/grouper v0.0.0-20191227052852-215e87163ea7
go: downloading k8s.io/api v0.19.10
go: downloading github.com/gorilla/websocket v1.4.0
go: downloading golang.org/x/sys v0.0.0-2020112073958-5c8a982894dd
go: downloading github.com/moby/term v0.0.0-20200312100748-672ec06f55cd
go: downloading github.com/golang/protobuf v1.4.2
go: downloading github.com/golang/grouper v2.5.1+incompatible
go: extracting github.com/spf13/pflag v1.0.5
go: downloading github.com/opencontainers/runc v1.0.0-rc91.0.2020070815106-819fcc687efb
go: extracting github.com/golang/grouper v0.0.0-20191227052852-215e87163ea7
go: extracting github.com/moby/term v0.0.0-20200312100748-672ec06f55cd
go: extracting github.com/gorilla/websocket v1.4.0
go: extracting github.com/golang/protobuf v1.4.2
go: extracting github.com/spf13/cobra v1.0.0
go: downloading k8s.io/utlis v0.0.0-20200729134348-d5654de09c73
go: downloading k8s.io/klog v1.0.0
go: downloading github.com/astaxie/beego v1.12.0
go: downloading k8s.io/apiserver v0.19.10
go: extracting github.com/golang/grouper v2.5.1+incompatible
go: extracting golang.org/x/sys v0.0.0-2020112073958-5c8a982894dd
go: downloading k8s.io/kube-scheduler v0.19.10
go: extracting github.com/gogo/protobuf v1.3.2
go: downloading github.com/google/cadvisor v0.37.5
go: extracting k8s.io/api v0.19.10
go: extracting github.com/opencontainers/runc v1.0.0-rc91.0.2020070815106-819fcc687efb
go: extracting k8s.io/kube-scheduler v0.19.10
go: extracting github.com/astaxie/beego v1.12.0
go: extracting k8s.io/klog v1.0.0
```

### 4. config edgecore



```
cp /var/run/kubernetes/admin.kubeconfig /root/edgecluster.kubeconfig
mkdir -p /etc/kubeedge/config
```

```
chmod -R 777 /etc/kubeedge
```

```
_output/local/bin/edgecore --edgeclusterconfig > /etc/kubeedge/config/edgecore.yaml
```

```
chmod 777 tests/edgecluster/hack/update_edgecore_config.sh
```

```
tests/edgecluster/hack/update_edgecore_config.sh admin.conf
```

```
root@node-d:~/go/src/k8s.io/arktos/fornax# cp /var/run/kubernetes/admin.kubeconfig /root/edgecluster.kubeconfig
root@node-d:~/go/src/k8s.io/arktos/fornax# mkdir -p /etc/kubeedge/config
root@node-d:~/go/src/k8s.io/arktos/fornax# chmod -R 777 /etc/kubeedge
root@node-d:~/go/src/k8s.io/arktos/fornax# _output/local/bin/edgecore --edgeclusterconfig > /etc/kubeedge/config/edgecore.yaml
root@node-d:~/go/src/k8s.io/arktos/fornax# chmod 777 tests/edgecluster/hack/update_edgecore_config.sh
```

Output

### Install 'kubectl' on machine D

update the /etc/kubeedge/config/edgecore.yaml

```
clusterd: ...
```

```
kubeDistro: arktos
```

```
labels:
```

```
"company": "futurewei"
```

## 5. start the edgecore in edge-cluster mode, with command

```
chmod 777 /root/go/src/k8s.io/arktos/fornax/_output/local/bin/kubectl/
```

```
_output/local/bin/edgecore --edgecluster
```

Output:

```

root@node-d:~/go/src/k8s.io/arktos/fornax# _output/local/bin/edgecore --edgecluster
I1014 12:09:40.358894 24085 server.go:73] Version: v0.2-1+47966d49c404d0-dirty
I1014 12:09:40.359219 24085 module.go:34] Module websocket registered successfully
I1014 12:09:40.359282 24085 metamanager.go:46] Begin to register metaManager db model
I1014 12:09:40.359389 24085 module.go:34] Module metaManager registered successfully
I1014 12:09:40.359477 24085 module.go:34] Module clusterd registered successfully
W1014 12:09:40.359513 24085 module.go:37] Module edgestream is disabled, do not register
W1014 12:09:40.359541 24085 module.go:37] Module testManager is disabled, do not register
I1014 12:09:40.359712 24085 edgecluster_state_reporter.go:209] Starting edgecluster state reporter.
I1014 12:09:40.359780 24085 mission_state_reporter.go:77] Starting mission state reporter.
I1014 12:09:40.359738 24085 edgecluster_state_reporter.go:213] Shutting down edgecluster state reporter
create table `meta`
-----
-- Table Structure for `github.com/kubeedge/kubeedge/edge/pkg/metamanager/dao.Meta`
-----
CREATE TABLE IF NOT EXISTS `meta` (
  `key` varchar(256) NOT NULL PRIMARY KEY,
  `type` varchar(32) NOT NULL DEFAULT '',
  `value` text
);

create table `meta_v2`
-----
-- Table Structure for `github.com/kubeedge/kubeedge/edge/pkg/metamanager/dao/v2.MetaV2`
-----
CREATE TABLE IF NOT EXISTS `meta_v2` (
  `key` varchar(256) NOT NULL PRIMARY KEY,
  `groupversionresource` varchar(256) NOT NULL DEFAULT '',
  `namespace` varchar(256) NOT NULL DEFAULT '',
  `name` varchar(256) NOT NULL DEFAULT '',
  `resourceversion` bigint unsigned NOT NULL DEFAULT 0,
  `value` text
);

I1014 12:09:41.431351 24085 core.go:24] Starting module websocket
I1014 12:09:41.431413 24085 core.go:24] Starting module metaManager

```

Leave the terminal as it is..

### Verification:

**Verify the deployment on clusterA:**

**Node-b is the edge of node-a**

**Node-c is the edge of node-b**

**Node-d is the edge of node-c**

```

root@node-a:~/fornax# kubectl get edgecluster
NAME      LASTHEARTBEAT  HEALTHSTATUS  SUBEDGECLUSTERS  RECEIVED_MISSIONS  MATCHED_MISSIONS
node-b    4s             healthy       {"node-c":"healthy", "node-c/node-d":"healthy"}
root@node-a:~/fornax#

```