Arktos deployment with Mizar CNI

Prepared On-Premises lab machine with below Configuration

- Processor: x86_64
- Cores: 8
- Memory: 16 GB RAM
- Hard Disk: 128 GB HDD
- Network: One network adapter with active Internet connection
- Operating System: Ubuntu 18.04 LTS 64-bit

Step-1 Check the kernel version & update the kernel

uname -a
wget https://raw.githubusercontent.com/CentaurusInfra/mizar/dev-next/kernelupdate.sh
sudo bash kernelupdate.sh

Output:

```
demo@demo:~$ uname -a
Linux demo 4.15.0-55-generic #60-Ubuntu SMP Tue Jul 2 18:22:20 UTC 2019 x86_64 x86_64 x86_64 GNU/Linux
demo@demo:~$
```

```
demo@demo:~$ sudo bash kernelupdate.sh
[sudo] password for demo:
--2021-12-08 05:36:56--  https://mizar.s3.amazonaws.com/linux-5.6-rc2/linux-headers-5.6.0-rc2_5.6.0-rc2-1_amd64.deb
Resolving mizar.s3.amazonaws.com (mizar.s3.amazonaws.com)... 54.231.201.97
Connecting to mizar.s3.amazonaws.com (mizar.s3.amazonaws.com)|54.231.201.97|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 7621020 (7.3M) []
Saving to: '../linux-5.6-rc2/linux-headers-5.6.0-rc2_5.6.0-rc2-1_amd64.deb'

linux-headers-5.6.0-rc2_5.6.0-rc2-1_amd6 100%[=====================================================================================>]   7.27M  3.07MB/s    in 2.4s

2021-12-08 05:36:59 (3.07 MB/s) - '../linux-5.6-rc2/linux-headers-5.6.0-rc2_5.6.0-rc2-1_amd64.deb' saved [7621020/7621020]

--2021-12-08 05:36:59--  https://mizar.s3.amazonaws.com/linux-5.6-rc2/linux-image-5.6.0-rc2-dbg_5.6.0-rc2-1_amd64.deb
Resolving mizar.s3.amazonaws.com (mizar.s3.amazonaws.com)... 52.217.223.41
Connecting to mizar.s3.amazonaws.com (mizar.s3.amazonaws.com)|52.217.223.41|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 857827912 (818M) [application/x-www-form-urlencoded]
Saving to: '../linux-5.6-rc2/linux-image-5.6.0-rc2-dbg_5.6.0-rc2-1_amd64.deb'

linux-image-5.6.0-rc2-dbg_5.6.0-rc2-1_am 100%[=====================================================================================>] 818.09M  5.65MB/s    in 2m 32s

2021-12-08 05:39:32 (5.39 MB/s) - '../linux-5.6-rc2/linux-image-5.6.0-rc2-dbg_5.6.0-rc2-1_amd64.deb' saved [857827912/857827912]

--2021-12-08 05:39:32--  https://mizar.s3.amazonaws.com/linux-5.6-rc2/linux-image-5.6.0-rc2_5.6.0-rc2-1_amd64.deb
Resolving mizar.s3.amazonaws.com (mizar.s3.amazonaws.com)... 52.217.70.228
Connecting to mizar.s3.amazonaws.com (mizar.s3.amazonaws.com)|52.217.70.228|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 56427036 (54M) [application/x-www-form-urlencoded]
Saving to: '../linux-5.6-rc2/linux-image-5.6.0-rc2_5.6.0-rc2-1_amd64.deb'

linux-image-5.6.0-rc2_5.6.0-rc2-1_amd64. 100%[=====================================================================================>]  53.81M  5.55MB/s    in 11s

2021-12-08 05:39:44 (4.84 MB/s) - '../linux-5.6-rc2/linux-image-5.6.0-rc2_5.6.0-rc2-1_amd64.deb' saved [56427036/56427036]

--2021-12-08 05:39:44--  https://mizar.s3.amazonaws.com/linux-5.6-rc2/linux-libc-dev_5.6.0-rc2-1_amd64.deb
Resolving mizar.s3.amazonaws.com (mizar.s3.amazonaws.com)... 52.217.99.100
Connecting to mizar.s3.amazonaws.com (mizar.s3.amazonaws.com)|52.217.99.100|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 1082248 (1.0M) []
Saving to: '../linux-5.6-rc2/linux-libc-dev_5.6.0-rc2-1_amd64.deb'

linux-libc-dev_5.6.0-rc2-1_amd64.deb     100%[=====================================================================================>]   1.03M   814KB/s    in 1.3s

2021-12-08 05:39:47 (814 KB/s) - '../linux-5.6-rc2/linux-libc-dev_5.6.0-rc2-1_amd64.deb' saved [1082248/1082248]

Continue kernel update (y/n)?y
```

```
-2021-12-08 05:39:44--  https://mizar.s3.amazonaws.com/linux-5.6-rc2/linux-libc-dev_5.6.0-rc2-1_amd64.deb
esolving mizar.s3.amazonaws.com (mizar.s3.amazonaws.com)... 52.217.99.100
onnecting to mizar.s3.amazonaws.com (mizar.s3.amazonaws.com)|52.217.99.100|:443... connected.
TTP request sent, awaiting response... 200 OK
ength: 1082248 (1.0M) []
aving to: '../linux-5.6-rc2/linux-libc-dev_5.6.0-rc2-1_amd64.deb'

inux-libc-dev_5.6.0-rc2-1_amd64.deb     100%[=======================================================================================>]   1.03M   814KB/s    in 1.3s

021-12-08 05:39:47 (814 KB/s) - '../linux-5.6-rc2/linux-libc-dev_5.6.0-rc2-1_amd64.deb' saved [1082248/1082248]

ontinue kernel update (y/n)?y
pdating kernel
electing previously unselected package linux-headers-5.6.0-rc2.
Reading database ... 66992 files and directories currently installed.)
reparing to unpack .../linux-headers-5.6.0-rc2_5.6.0-rc2-1_amd64.deb ...
npacking linux-headers-5.6.0-rc2 (5.6.0-rc2-1) ...
electing previously unselected package linux-image-5.6.0-rc2.
reparing to unpack .../linux-image-5.6.0-rc2_5.6.0-rc2-1_amd64.deb ...
npacking linux-image-5.6.0-rc2 (5.6.0-rc2-1) ...
electing previously unselected package linux-image-5.6.0-rc2-dbg.
reparing to unpack .../linux-image-5.6.0-rc2-dbg_5.6.0-rc2-1_amd64.deb ...
npacking linux-image-5.6.0-rc2-dbg (5.6.0-rc2-1) ...
electing previously unselected package linux-libc-dev:amd64.
reparing to unpack .../linux-libc-dev_5.6.0-rc2-1_amd64.deb ...
npacking linux-libc-dev:amd64 (5.6.0-rc2-1) ...
etting up linux-headers-5.6.0-rc2 (5.6.0-rc2-1) ...
etting up linux-image-5.6.0-rc2 (5.6.0-rc2-1) ...
pdate-initramfs: Generating /boot/initrd.img-5.6.0-rc2
: The initramfs will attempt to resume from /dev/sda3
: (UUID=ba4eff26-1d2c-4263-b6eb-c9ff5d0e07c9)
: Set the RESUME variable to override this.
earching for GRUB installation directory ... found: /boot/grub
earching for default file ... found: /boot/grub/default
esting for an existing GRUB menu.lst file ... found: /boot/grub/menu.lst
earching for splash image ... none found, skipping ...
ound kernel: /vmlinuz-4.15.0-55-generic
eplacing config file /run/grub/menu.lst with new version
ound kernel: /vmlinuz-5.6.0-rc2
ound kernel: /vmlinuz-4.15.0-55-generic
eplacing config file /run/grub/menu.lst with new version
pdating /boot/grub/menu.lst ... done

ourcing file `/etc/default/grub'
enerating grub configuration file ...
ound linux image: /boot/vmlinuz-5.6.0-rc2
ound initrd image: /boot/initrd.img-5.6.0-rc2
ound linux image: /boot/vmlinuz-4.15.0-55-generic
ound initrd image: /boot/initrd.img-4.15.0-55-generic
one
etting up linux-image-5.6.0-rc2-dbg (5.6.0-rc2-1) ...
etting up linux-libc-dev:amd64 (5.6.0-rc2-1) ...
eboot host (y/n)?
```

Kernel updated successfully

Step-2 Clone the Arktos repository and install the required dependencies:

```
git clone https://github.com/Click2Cloud-Centaurus/arktos.git ~/go/src/k8s.io/arktos -b default-cni-mizar

sudo bash $HOME/go/src/k8s.io/arktos/hack/setup-dev-node.sh
```

Output:

```
oot@demo:~# git clone https://github.com/Click2Cloud-Centaurus/arktos.git ~/go/src/k8s.io/arktos -b default-cni-mizar
loning into '/root/go/src/k8s.io/arktos'...
emote: Enumerating objects: 61743, done.
emote: Counting objects: 100% (1147/1147), done.
emote: Compressing objects: 100% (523/523), done.
emote: Total 61743 (delta 716), reused 928 (delta 604), pack-reused 60596
eceiving objects: 100% (61743/61743), 221.59 MiB | 10.46 MiB/s, done.
esolving deltas: 100% (37873/37873), done.
hecking out files: 100% (20767/20767), done.
oot@demo:~# sudo bash $HOME/go/src/k8s.io/arktos/hack/setup-dev-node.sh
he script is to help install prerequisites of Arktos development environment
n a fresh Linux installation.
t's been tested on Ubuntu 16.04 LTS and 18.04 LTS.
pdate apt.
it:1 http://archive.ubuntu.com/ubuntu bionic InRelease
et:2 http://archive.ubuntu.com/ubuntu bionic-updates InRelease [88.7 kB]
et:3 http://archive.ubuntu.com/ubuntu bionic-backports InRelease [74.6 kB]
et:4 http://archive.ubuntu.com/ubuntu bionic-security InRelease [88.7 kB]
et:5 http://archive.ubuntu.com/ubuntu bionic/restricted amd64 Packages [9,184 B]
et:6 http://archive.ubuntu.com/ubuntu bionic/restricted Translation-en [3,584 B]
et:7 http://archive.ubuntu.com/ubuntu bionic/universe amd64 Packages [8,570 kB]
et:8 http://archive.ubuntu.com/ubuntu bionic/universe Translation-en [4,941 kB]
et:9 http://archive.ubuntu.com/ubuntu bionic/multiverse amd64 Packages [151 kB]
et:10 http://archive.ubuntu.com/ubuntu bionic/multiverse Translation-en [108 kB]
et:11 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 Packages [2,329 kB]
et:12 http://archive.ubuntu.com/ubuntu bionic-updates/main Translation-en [448 kB]
et:13 http://archive.ubuntu.com/ubuntu bionic-updates/restricted amd64 Packages [559 kB]
et:14 http://archive.ubuntu.com/ubuntu bionic-updates/restricted Translation-en [76.4 kB]
et:15 http://archive.ubuntu.com/ubuntu bionic-updates/universe amd64 Packages [1,771 kB]
et:16 http://archive.ubuntu.com/ubuntu bionic-updates/universe Translation-en [383 kB]
et:17 http://archive.ubuntu.com/ubuntu bionic-updates/multiverse amd64 Packages [27.3 kB]
et:18 http://archive.ubuntu.com/ubuntu bionic-updates/multiverse Translation-en [6,808 B]
et:19 http://archive.ubuntu.com/ubuntu bionic-backports/main amd64 Packages [10.0 kB]
et:20 http://archive.ubuntu.com/ubuntu bionic-backports/main Translation-en [4,764 B]
et:21 http://archive.ubuntu.com/ubuntu bionic-backports/universe amd64 Packages [10.3 kB]
et:22 http://archive.ubuntu.com/ubuntu bionic-backports/universe Translation-en [4,588 B]
et:23 http://archive.ubuntu.com/ubuntu bionic-security/main amd64 Packages [1,983 kB]
et:24 http://archive.ubuntu.com/ubuntu bionic-security/main Translation-en [355 kB]
et:25 http://archive.ubuntu.com/ubuntu bionic-security/restricted amd64 Packages [535 kB]
```

echo export PATH=$PATH:/usr/local/go/bin\ >> ~/.profile
echo cd \$HOME/go/src/k8s.io/arktos >> ~/.profile
source ~/.profile

```
root@demo:~# echo export PATH=$PATH:/usr/local/go/bin\ >> ~/.profile
root@demo:~# echo cd \$HOME/go/src/k8s.io/arktos >> ~/.profile
root@demo:~# source ~/.profile
root@demo:~/go/src/k8s.io/arktos#
```

Step-3 Start Arktos cluster
CNIPLUGIN=mizar ./hack/arktos-up.sh

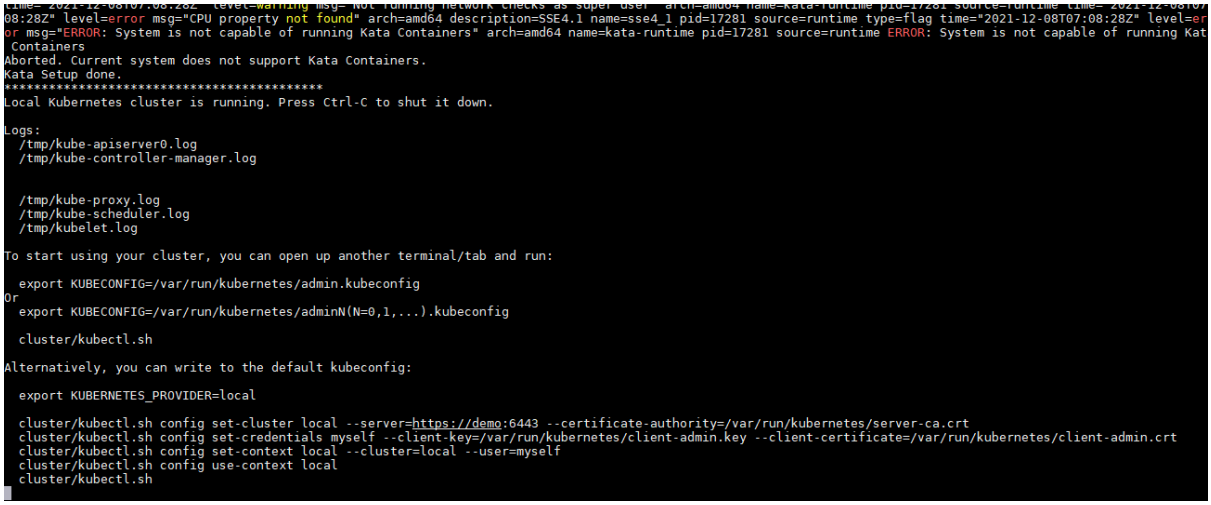
Deployment Successfully done.

Output

```
root@demo:~/go/src/k8s.io/arktos# CNIPLUGIN=mizar ./hack/arktos-up.sh
DBG: mizar CNI plugin will be installed AFTER cluster is up
DBG: effective feature gates AllAlpha=false,WorkloadInfoDefaulting=true,QPSDoubleGCController=true,QPSDoubleRSController=true,MandatoryArktosNetwork=true
DBG: effective disabling admission plugins
DBG: effective default network template file is /root/go/src/k8s.io/arktos/hack/testdata/default-mizar-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 mizar; arktos will use mizar to provision pod network
Checking arktos containerd...
arktos containerd found...
installing loopback cni binary...
./loopback
2021-12-08 07:03:25 URL:https://objects.githubusercontent.com/github-production-release-asset-2e65be/84575398/53318d00-bf61-11e9-9a8f-40364582e9ed?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAIWNJYAX4CSVEH53A%2F20211208%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20211208T070321Z&X-Amz-Expires=300&X-Amz-Signature=39ad07eeb86d36515bbf62efed237f5772b19b6030d1548cecfc8b94c6fb788d&X-Amz-SignedHeaders=host&actor_id=0&key_id=0&repo_id=84575398&response-content-disposition=attachment%3B%20filename%3Dcni-plugins-linux-amd64-v0.8.2.tgz&response-content-type=application%2Foctet-stream [36662740/36662740] -> "-" [1]
WARNING : The kubelet is configured to not fail even if swap is enabled; production deployments should disable swap.
Getting runtime deployment file  libvirt-qemu
--2021-12-08 07:03:25--  https://raw.githubusercontent.com/futurewei-cloud/arktos-vm-runtime/release-0.6/deploy/apparmor/libvirt-qemu
Resolving raw.githubusercontent.com (raw.githubusercontent.com)... 185.199.111.133, 185.199.108.133, 185.199.110.133, ...
Connecting to raw.githubusercontent.com (raw.githubusercontent.com)|185.199.111.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 6578 (6.4K) [text/plain]
Saving to: ‘/tmp/libvirt-qemu’

/tmp/libvirt-qemu                   100%[=====================================================================================>]   6.42K  --.-KB/s    in 0s

2021-12-08 07:03:25 (14.1 MB/s) - ‘/tmp/libvirt-qemu’ saved [6578/6578]

Getting runtime deployment file  libvirtd
--2021-12-08 07:03:25--  https://raw.githubusercontent.com/futurewei-cloud/arktos-vm-runtime/release-0.6/deploy/apparmor/libvirtd
Resolving raw.githubusercontent.com (raw.githubusercontent.com)... 185.199.111.133, 185.199.108.133, 185.199.110.133, ...
Connecting to raw.githubusercontent.com (raw.githubusercontent.com)|185.199.111.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 1617 (1.6K) [text/plain]
Saving to: ‘/tmp/libvirtd’

/tmp/libvirtd                       100%[=====================================================================================>]   1.58K  --.-KB/s    in 0.001s

2021-12-08 07:03:26 (2.32 MB/s) - ‘/tmp/libvirtd’ saved [1617/1617]

Getting runtime deployment file  virtlet
--2021-12-08 07:03:26--  https://raw.githubusercontent.com/futurewei-cloud/arktos-vm-runtime/release-0.6/deploy/apparmor/virtlet
Resolving raw.githubusercontent.com (raw.githubusercontent.com)... 185.199.111.133, 185.199.108.133, 185.199.110.133, ...
Connecting to raw.githubusercontent.com (raw.githubusercontent.com)|185.199.111.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 2582 (2.5K) [text/plain]
```

Deployment Successfully done.

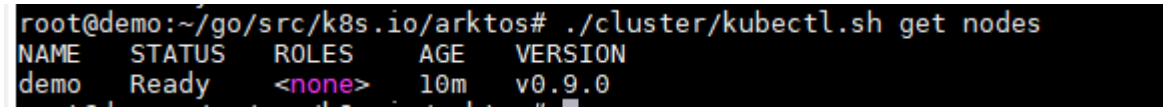
Output:



Step-4 Check Cluster health

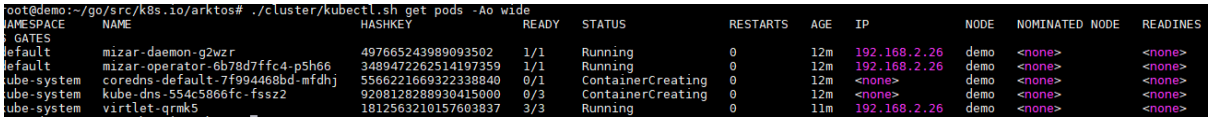
`./cluster/kubectl.sh get nodes`

Output:



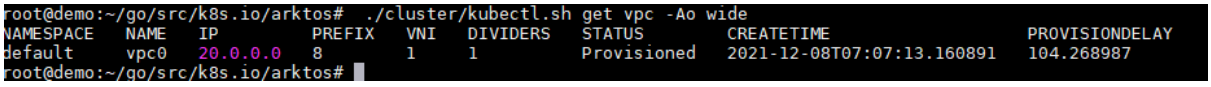
`./cluster/kubectl.sh get pods -Ao wide`

Output:



`./cluster/kubectl.sh get vpc -Ao wide`

Output:



`./cluster/kubectl.sh get subnet -Ao wide`

Output:

```
root@demo:~/go/src/k8s.io/arktos# ./cluster/kubectl.sh get subnet -Ao wide
NAMESPACE   NAME   IP         PREFIX   VNI   VPC    STATUS        BOUNCERS   CREATETIME                    PROVISIONDELAY
default     net0   20.0.0.0   8        1     vpc0   Provisioned   1          2021-12-08T07:07:13.338116   124.411121
root@demo:~/go/src/k8s.io/arktos#
```

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

Output:

```
root@demo:~/go/src/k8s.io/arktos# ./cluster/kubectl.sh get dividers -Ao wide
NAMESPACE   NAME                                   VPC    IP   MAC   DROPLET   STATUS        CREATETIME                    PROVISIONDELAY
default     vpc0-d-22dd008c-b257-47e2-b6d4-3d6699281fdd   vpc0              demo      Provisioned   2021-12-08T07:08:57.340327   0.358722
root@demo:~/go/src/k8s.io/arktos#
```

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

Output:

```
root@demo:~/go/src/k8s.io/arktos# ./cluster/kubectl.sh get bouncers -Ao wide
NAMESPACE   NAME                                  VPC    NET    IP   MAC   DROPLET   STATUS        CREATETIME                    PROVISIONDELAY
default     net0-b-ef601677-8f9d-4f43-bb0f-e6875ee1bf67   vpc0   net0              demo      Provisioned   2021-12-08T07:09:17.735220   4.109248
```

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

Output:

```
root@demo:~/go/src/k8s.io/arktos# ./cluster/kubectl.sh get net -Ao wide
NAME      TYPE     VPC                       PHASE   DNS
default   mizar    system-default-network    Ready   10.0.0.151
```

Pod deployment:

Output

```
root@demo:~/go/src/k8s.io/arktos# ./cluster/kubectl.sh get pods -Ao wide
NAMESPACE     NAME                              HASHKEY              READY   STATUS              RESTARTS   AGE     IP              NODE   NOMINATED NODE   READIN
ESS GATES
default       mizar-daemon-g2wzr                497665243989093502   1/1     Running             0          99m     192.168.2.26    demo   <none>           <none>
default       mizar-operator-6b78d7ffc4-p5h66   3489472262514197359  1/1     Running             0          99m     192.168.2.26    demo   <none>           <none>
default       netpod1                           1453073738910852153  1/1     Running             0          4m44s   20.0.0.17       demo   <none>           <none>
default       netpod2                           6341521578412978439  1/1     Running             0          4m44s   20.0.0.13       demo   <none>           <none>
kube-system   coredns-default-7f994468bd-mfdhj  5566221669322338840  0/1     ContainerCreating   0          99m     <none>          demo   <none>           <none>
kube-system   kube-dns-554c5866fc-fssz2         9208128288930415000  0/3     ContainerCreating   0          99m     <none>          demo   <none>           <none>
kube-system   virtlet-qrmk5                     1812563210157603837  3/3     Running             0          98m     192.168.2.26    demo   <none>           <none>
```

9) ping pods

Command:

./cluster/kubectl.sh exec netpod1 ping 20.0.0.13

Output:

```
root@demo:~/go/src/k8s.io/arktos# ./cluster/kubectl.sh exec netpod1 ping 20.0.0.13
PING 20.0.0.13 (20.0.0.13) 56(84) bytes of data.
From 20.0.0.17 icmp_seq=1 Destination Host Unreachable
From 20.0.0.17 icmp_seq=2 Destination Host Unreachable
From 20.0.0.17 icmp_seq=3 Destination Host Unreachable
From 20.0.0.17 icmp_seq=4 Destination Host Unreachable
From 20.0.0.17 icmp_seq=5 Destination Host Unreachable
From 20.0.0.17 icmp_seq=6 Destination Host Unreachable
^X^C
```

Output:

./cluster/kubectl.sh exec netpod2 ping 20.0.0.17

```
root@demo:~/go/src/k8s.io/arktos# ./cluster/kubectl.sh exec netpod2 ping 20.0.0.17
PING 20.0.0.17 (20.0.0.17) 56(84) bytes of data.
From 20.0.0.13 icmp_seq=1 Destination Host Unreachable
From 20.0.0.13 icmp_seq=2 Destination Host Unreachable
From 20.0.0.13 icmp_seq=3 Destination Host Unreachable
From 20.0.0.13 icmp_seq=4 Destination Host Unreachable
From 20.0.0.13 icmp_seq=5 Destination Host Unreachable
From 20.0.0.13 icmp_seq=6 Destination Host Unreachable
^C
```