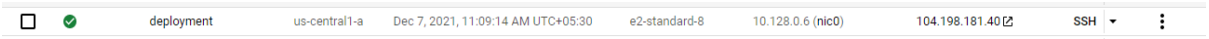
Test report - Deployment of Arktos Cluster with Mizar CNI on GCE

This document captures the steps to deploy an Arktos cluster lab with mizar cni. The machine in
this lab used are GCE e2-standard-8 (8 vCPUs, 32 GB memory) and the storage size is 128GB),
Ubuntu 18.04 LTS.

Created instance on GCE



SSH instance with credentials.

Step-1: Update kernel (If required)
To check kernel, run following command
uname -a

Output

```
ubuntu@deployment:/root$ uname -a
Linux deployment 5.4.0-1058-gcp #62~18.04.1-Ubuntu SMP Mon Nov 15 07:49:04 UTC 2021 x86_64 x86_64 x86_64 GNU/Linux
```

Here kernel version is 5.4.0-1051-gcp which is less than the required kernel version, so to update the kernel version to 5.6.0-rc2, we used the following

steps:

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

sudo bash kernelupdate.s

Output

```
ubuntu@deployment:/root$ sudo wget https://raw.githubusercontent.com/CentaurusInfra/mizar/dev-next/kernelupdate.sh
--2021-12-07 05:55:51--  https://raw.githubusercontent.com/CentaurusInfra/mizar/dev-next/kernelupdate.sh
Resolving raw.githubusercontent.com (raw.githubusercontent.com)... 185.199.111.133, 185.199.110.133, 185.199.109.133, ...
Connecting to raw.githubusercontent.com (raw.githubusercontent.com)|185.199.111.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 791 [text/plain]
Saving to: 'kernelupdate.sh'

kernelupdate.sh                         100%[===================================================================================>]     791  --.-KB/s    in 0s

2021-12-07 05:55:51 (46.5 MB/s) - 'kernelupdate.sh' saved [791/791]

ubuntu@deployment:/root$ sudo bash kernelupdate.sh
--2021-12-07 05:57:07--  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)... 52.216.28.4
Connecting to mizar.s3.amazonaws.com (mizar.s3.amazonaws.com)|52.216.28.4|: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  24.6MB/s    in 0.3s

2021-12-07 05:57:08 (24.6 MB/s) - '../linux-5.6-rc2/linux-headers-5.6.0-rc2_5.6.0-rc2-1_amd64.deb' saved [7621020/7621020]

--2021-12-07 05:57:08--  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)... 52.216.28.4
Connecting to mizar.s3.amazonaws.com (mizar.s3.amazonaws.com)|52.216.28.4|: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  56.0MB/s    in 16s

2021-12-07 05:57:23 (52.7 MB/s) - '../linux-5.6-rc2/linux-image-5.6.0-rc2-dbg_5.6.0-rc2-1_amd64.deb' saved [857827912/857827912]

--2021-12-07 05:57:23--  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)... 52.216.161.43
Connecting to mizar.s3.amazonaws.com (mizar.s3.amazonaws.com)|52.216.161.43|: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  60.0MB/s    in 0.9s

2021-12-07 05:57:25 (60.0 MB/s) - '../linux-5.6-rc2/linux-image-5.6.0-rc2_5.6.0-rc2-1_amd64.deb' saved [56427036/56427036]

--2021-12-07 05:57:25--  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)... 52.216.161.43
Connecting to mizar.s3.amazonaws.com (mizar.s3.amazonaws.com)|52.216.161.43|: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  5.73MB/s    in 0.2s

2021-12-07 05:57:25 (5.73 MB/s) - '../linux-5.6-rc2/linux-libc-dev_5.6.0-rc2-1_amd64.deb' saved [1082248/1082248]

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

Output

```
ubuntu@deployment:/root$ sudo bash kernelupdate.sh
bash: kernelupdate.sh: No such file or directory
ubuntu@deployment:/root$ sudo wget https://raw.githubusercontent.com/CentaurusInfra/mizar/dev-next/kernelupdate.sh
--2021-12-07 05:55:51--  https://raw.githubusercontent.com/CentaurusInfra/mizar/dev-next/kernelupdate.sh
Resolving raw.githubusercontent.com (raw.githubusercontent.com)... 185.199.111.133, 185.199.110.133, 185.199.109.133, ...
Connecting to raw.githubusercontent.com (raw.githubusercontent.com)|185.199.111.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 791 [text/plain]
Saving to: 'kernelupdate.sh'

kernelupdate.sh                         100%[===================================================================================>]     791  --.-KB/s    in 0s

2021-12-07 05:55:51 (46.5 MB/s) - 'kernelupdate.sh' saved [791/791]
```

Output

```
--2021-12-07 05:57:25--  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)... 52.216.161.43
Connecting to mizar.s3.amazonaws.com (mizar.s3.amazonaws.com)|52.216.161.43|: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  5.73MB/s    in 0.2s

2021-12-07 05:57:25 (5.73 MB/s) - '../linux-5.6-rc2/linux-libc-dev_5.6.0-rc2-1_amd64.deb' saved [1082248/1082248]

Continue kernel update (y/n)?y
Updating kernel
Selecting previously unselected package linux-headers-5.6.0-rc2.
(Reading database ... 65653 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-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) ...
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-libc-dev:amd64.
Preparing to unpack .../linux-libc-dev_5.6.0-rc2-1_amd64.deb ...
Unpacking linux-libc-dev:amd64 (5.6.0-rc2-1) ...
Setting up linux-headers-5.6.0-rc2 (5.6.0-rc2-1) ...
Setting up linux-image-5.6.0-rc2-dbg (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
Sourcing file `/etc/default/grub'
Sourcing file `/etc/default/grub.d/50-cloudimg-settings.cfg'
Generating grub configuration file ...
Found linux image: /boot/vmlinuz-5.6.0-rc2
Found initrd image: /boot/initrd.img-5.6.0-rc2
Found linux image: /boot/vmlinuz-5.4.0-1058-gcp
Found initrd image: /boot/initrd.img-5.4.0-1058-gcp
Adding boot menu entry for EFI firmware configuration
done
Setting up linux-libc-dev:amd64 (5.6.0-rc2-1) ...
Reboot host (y/n)?y
Rebooting
```

Step-2: Install 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

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

Output

```
Done.
Please run and add 'export PATH=$PATH:/usr/local/go/bin' into your shell profile.
You can proceed to run arktos-up.sh if you want to launch a single-node cluster.
ubuntu@deployment:/root$ echo export PATH=$PATH:/usr/local/go/bin\ >> ~/.profile
ubuntu@deployment:/root$ echo cd \$HOME/go/src/k8s.io/arktos >> ~/.profile
ubuntu@deployment:/root$ source ~/.profile
ubuntu@deployment:~/go/src/k8s.io/arktos$
```

Step-3: Start Arktos cluster
Login to instance and run following steps to deploy arktos cluster with Mizar as CNI:
CNIPLUGIN=mizar ./hack/arktos-up.sh
Finally we got following output, which indicates that arktos cluster created successfully with Mizar as CNI

Output:

```
Arktos Setup done.
****************************************
Setup Kata Containers components ...
* Install Kata components
kata-containers 2.3.0 from Kata Containers (katacontainers✓) installed
* Checking Kata compatibility
No newer release available time="2021-12-07T06:45:54Z" level=error msg="CPU property not found" arch=amd64 description="Virtualization support" name=vmx pid=12952
source=runtime type=flag time="2021-12-07T06:45:54Z" level=error msg="Module is not loaded and it can not be inserted. Please consider running with sudo or as root
" arch=amd64 module=kvm name=kata-runtime pid=12952 source=runtime time="2021-12-07T06:45:54Z" level=error msg="kernel property kvm not found" arch=amd64 descripti
on="Kernel-based Virtual Machine" name=kvm pid=12952 source=runtime type=module time="2021-12-07T06:45:54Z" level=error msg="Module is not loaded and it can not be
 inserted. Please consider running with sudo or as root" arch=amd64 module=vhost name=kata-runtime pid=12952 source=runtime time="2021-12-07T06:45:54Z" level=error
 msg="kernel property vhost not found" arch=amd64 description="Host kernel accelerator for virtio" name=vhost pid=12952 source=runtime type=module time="2021-12-07
T06:45:54Z" level=error msg="Module is not loaded and it can not be inserted. Please consider running with sudo or as root" arch=amd64 module=vhost_net name=kata-r
untime pid=12952 source=runtime time="2021-12-07T06:45:54Z" level=error msg="kernel property vhost_net not found" arch=amd64 description="Host kernel accelerator f
or virtio network" name=vhost_net pid=12952 source=runtime type=module time="2021-12-07T06:45:54Z" level=error msg="Module is not loaded and it can not be inserted
. Please consider running with sudo or as root" arch=amd64 module=vhost_vsock name=kata-runtime pid=12952 source=runtime time="2021-12-07T06:45:54Z" level=error ms
g="kernel property vhost_vsock not found" arch=amd64 description="Host Support for Linux VM Sockets" name=vhost_vsock pid=12952 source=runtime type=module time="20
21-12-07T06:45:54Z" level=error msg="Module is not loaded and it can not be inserted. Please consider running with sudo or as root" arch=amd64 module=kvm_intel nam
e=kata-runtime pid=12952 source=runtime time="2021-12-07T06:45:54Z" level=error msg="kernel property kvm_intel not found" arch=amd64 description="Intel KVM" name=k
vm_intel pid=12952 source=runtime type=module time="2021-12-07T06:45:54Z" level=error msg="ERROR: System is not capable of running Kata Containers" arch=amd64 name
=kata-runtime pid=12952 source=runtime ERROR: System is not capable of running Kata Containers
Aborted. Current system does not support Kata Containers.
Kata Setup done.
****************************************
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://deployment: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
```

Leave this terminal here as it is (do not close the terminal) and open new terminal of same instance

Step-4 Check Cluster health
Open new terminal for same instance and run following commands:

GO to below path

cd /home/ubuntu/go/src/k8s.io/arktos

Output

```
buntu@deployment:/root$ cd /home/ubuntu/go/src/k8s.io/arktos
buntu@deployment:~/go/src/k8s.io/arktos$ sudo ./cluster/kubectl.sh get nodes -Ao wide
AME         STATUS   ROLES    AGE   VERSION   INTERNAL-IP   EXTERNAL-IP   OS-IMAGE             KERNEL-VERSION   CONTAINER-RUNTIME
eployment   Ready    <none>   16m   v0.9.0    10.128.0.6    <none>        Ubuntu 18.04.6 LTS   5.6.0-rc2        containerd://1.4.0-beta.1-29-g70b0d3cf
buntu@deployment:~/go/src/k8s.io/arktos$ cd /home/ubuntu/go/src/k8s.io/arktos^C
```

1) Check node status
./cluster/kubectl.sh get nodes -Ao wide

Output

```
ubuntu@deployment:~/go/src/k8s.io/arktos$ sudo ./cluster/kubectl.sh get nodes -Ao wide
NAME         STATUS   ROLES    AGE   VERSION   INTERNAL-IP   EXTERNAL-IP   OS-IMAGE             KERNEL-VERSION   CONTAINER-RUNTIME
deployment   Ready    <none>   16m   v0.9.0    10.128.0.6    <none>        Ubuntu 18.04.6 LTS   5.6.0-rc2        containerd://1.4.0-beta.1-29-g70b0d3cf
ubuntu@deployment:~/go/src/k8s.io/arktos$ cd /home/ubuntu/go/src/k8s.io/arktos
```

2) Check pods status
./cluster/kubectl.sh get pods -Ao wide

Output

```
ubuntu@deployment:~/go/src/k8s.io/arktos$ ./cluster/kubectl.sh get pods -Ao wide
NAMESPACE     NAME                              HASHKEY             READY   STATUS             RESTARTS   AGE   IP           NODE         NOMINATED NODE   READI
NESS GATES
default       mizar-daemon-fz7nt                6227399048249985085   1/1     Running            0          21m   10.128.0.6   deployment   <none>           <none
>
default       mizar-operator-6b78d7ffc4-n8dsr   1365579182048140550   1/1     Running            0          21m   10.128.0.6   deployment   <none>           <none
>
kube-system   coredns-default-7999fb47fb-l6qln   2779149631578886749   0/1     CrashLoopBackOff   7          21m   20.0.0.2     deployment   <none>           <none
>
kube-system   kube-dns-554c5866fc-86wnm          7587638410360437250   1/3     CrashLoopBackOff   21         21m   20.0.0.6     deployment   <none>           <none
>
kube-system   virtlet-r9tf6                     4243249231154683095   3/3     Running            0          21m   10.128.0.6   deployment   <none>           <none
>
ubuntu@deployment:~/go/src/k8s.io/arktos$
```

3) Check vpc status
./cluster/kubectl.sh get vpc -Ao wide

Output

```
ubuntu@deployment:~/go/src/k8s.io/arktos$ ./cluster/kubectl.sh get vpc -Ao wide
NAMESPACE   NAME   IP          PREFIX   VNI   DIVIDERS   STATUS        CREATETIME                    PROVISIONDELAY
default     vpc0   20.0.0.0    8        1     1          Provisioned   2021-12-07T06:50:36.620527   61.291832
ubuntu@deployment:~/go/src/k8s.io/arktos$
```

4) Check subnets
./cluster/kubectl.sh get subnets -Ao wide

Output

```
ubuntu@deployment:~/go/src/k8s.io/arktos$ ./cluster/kubectl.sh get subnets -Ao wide
NAMESPACE   NAME   IP         PREFIX   VNI   VPC    STATUS        BOUNCERS   CREATETIME                   PROVISIONDELAY
default     net0   20.0.0.0   8        1     vpc0   Provisioned   1          2021-12-07T06:50:36.717522   81.360562
ubuntu@deployment:~/go/src/k8s.io/arktos$
```

5) Check net

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

Output

```
ubuntu@deployment:~/go/src/k8s.io/arktos$ ./cluster/kubectl.sh get net -Ao wide
NAME      TYPE     VPC                        PHASE   DNS
default   mizar    system-default-network     Ready   10.0.0.170
```

6) Check dividers

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

Output

```
ubuntu@deployment:~/go/src/k8s.io/arktos$ ./cluster/kubectl.sh get dividers -Ao wide
NAMESPACE   NAME                                   VPC    IP    MAC   DROPLET      STATUS        CREATETIME                   PROVISIONDELAY
default     vpc0-d-27858a1c-80e2-47ee-83f0-cc3bd28aa2d4   vpc0             deployment   Provisioned   2021-12-07T06:51:37.902721   0.245232
ubuntu@deployment:~/go/src/k8s.io/arktos$
```

7) Check bouncers

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

Output

```
ubuntu@deployment:~/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-77f6ce8c-f75c-4763-8f6d-41aa2ff8b5f6   vpc0   net0             deployment   Provisioned   2021-12-07T06:51:58.064355   1.156814
ubuntu@deployment:~/go/src/k8s.io/arktos$
```

8) Pod deployment:

Output

```
default     net0-b-77f6ce8c-f75c-4763-8f6d-41aa2ff8b5f6   vpc0   net0             deployment   Provisioned   2021-12-07T06:51:58.064355   1.156814
ubuntu@deployment:~/go/src/k8s.io/arktos$ ./cluster/kubectl.sh get pods -Ao wide
NAMESPACE     NAME                                HASHKEY              READY   STATUS             RESTARTS   AGE   IP           NODE         NOMINATED NODE   READI
NESS GATES
default       mizar-daemon-fz7nt                  6227399048249985085  1/1     Running            0          29m   10.128.0.6   deployment   <none>           <none
>
default       mizar-operator-6b78d7ffc4-n8dsr     1365579182048140550  1/1     Running            0          29m   10.128.0.6   deployment   <none>           <none
>
kube-system   coredns-default-7999fb47fb-l6qln    2779149631578886749  0/1     CrashLoopBackOff   9          29m   20.0.0.2     deployment   <none>           <none
>
kube-system   kube-dns-554c5866fc-86wnm           7587638410360437250  0/3     CrashLoopBackOff   25         29m   20.0.0.6     deployment   <none>           <none
>
kube-system   virtlet-r9tf6                       4243249231154683095  3/3     Running            0          29m   10.128.0.6   deployment   <none>           <none
>
```

Pod getting stuck in crash off state.

Output

```
ubuntu@deployment:~/go/src/k8s.io/arktos$ ./cluster/kubectl.sh get pods -Ao wide
NAMESPACE     NAME                                HASHKEY              READY   STATUS             RESTARTS   AGE   IP           NODE         NOMINATED NODE   READI
NESS GATES
default       mizar-daemon-fz7nt                  6227399048249985085  1/1     Running            0          49m   10.128.0.6   deployment   <none>           <none
>
default       mizar-operator-6b78d7ffc4-n8dsr     1365579182048140550  1/1     Running            0          49m   10.128.0.6   deployment   <none>           <none
>
default       netpod1                             4115053383722671416  1/1     Running            0          18s   20.0.0.38    deployment   <none>           <none
>
default       netpod2                             4248382394945406721  1/1     Running            0          18s   20.0.0.14    deployment   <none>           <none
>
```

9) ping pods

Command:

./cluster/kubectl.sh exec netpod1 ping 20.0.0.14

./cluster/kubectl.sh exec netpod2 ping 20.0.0.38

Output

./cluster/kubectl.sh exec netpod1 ping 20.0.0.14

```
^C
ubuntu@deployment:~/go/src/k8s.io/arktos$ ./cluster/kubectl.sh get pods -Ao wide^C
ubuntu@deployment:~/go/src/k8s.io/arktos$ ./cluster/kubectl.sh exec netpod1 ping 20.0.0.14
PING 20.0.0.14 (20.0.0.14) 56(84) bytes of data.
From 20.0.0.38 icmp_seq=1 Destination Host Unreachable
From 20.0.0.38 icmp_seq=2 Destination Host Unreachable
From 20.0.0.38 icmp_seq=3 Destination Host Unreachable
From 20.0.0.38 icmp_seq=4 Destination Host Unreachable
^C
```

./cluster/kubectl.sh exec netpod2 ping 20.0.0.38

```
^C
ubuntu@deployment:~/go/src/k8s.io/arktos$ ./cluster/kubectl.sh exec netpod2 ping 20.0.0.38
PING 20.0.0.38 (20.0.0.38) 56(84) bytes of data.
From 20.0.0.14 icmp_seq=1 Destination Host Unreachable
From 20.0.0.14 icmp_seq=2 Destination Host Unreachable
From 20.0.0.14 icmp_seq=5 Destination Host Unreachable
From 20.0.0.14 icmp_seq=6 Destination Host Unreachable
^C
```