Kubernetes K8

Apr 2021

Overview

Containers contain functions for software components, a container can be a web server, a data processor or an data I/O device, anything really that you used to be able to run on a bare metal server or a VM. Containers can run on multiple servers in multiple locations.

Kubernetes provides an open-source API that controls how and where those containers will run, and manages continer failure and restarts.

Kubernetes Commands

There are many Kubernets commands, here we will explore some that will be useful when dealing with MediaKind HeadEnd solutions (IPHE).

---

get ns

```
  kubectl -n mediakind get nodes
```

PODs run in a particular namespace, there can be more than one namespace in a system. To be able to use any commands you have to know which namespace you wish to use, and specify that namespace in your command line.

Use the following command to show available namespace.

```
kubectl get ns

NAME          STATUS   AGE
default       Active   78d
kube-public   Active   78d
kube-system   Active   78d
mediakind     Active   78d
```

---

get nodes

```
  kubectl -n mediakind get nodes
```

In the above example, kubectl is the command, mediakind is the namespace we are dealing with and get nodes is the parameters for the command.

```
NAME           STATUS   ROLES         AGE   VERSION
172.25.27.17   Ready    master,node   20d   v1.13.12
172.25.27.20   Ready    master,node   20d   v1.13.12
172.25.27.21   Ready    master,node   20d   v1.13.12
172.25.27.26   Ready    node          20d   v1.13.12
```

kubectl -n mediakind get nodes returns the number of 'servers' in the deployment, these nodes can be bare metal or Virtual Machines.

---

describe node

```
  kubectl -n mediakind describe node ipaddress
```

Above the command is describing a particular node in the system, the node IP address was derived by using the get node command.

```
kubectl -n mediakind describe node 172.25.27.26

Name:               172.25.27.26
Roles:              node
Labels:             beta.kubernetes.io/arch=amd64
                    beta.kubernetes.io/os=linux
                    encoding-hd-services=enabled
                    encoding-ott-services=enabled
                    encoding-sd-services=enabled
                    kubernetes.io/hostname=172.25.27.26
                    mux-bckp=enabled
                    node-role.kubernetes.io/node=
Annotations:        flannel.alpha.coreos.com/backend-data: {"VtepMAC":"5a:a7:35:25:88:d4"}
                    flannel.alpha.coreos.com/backend-type: vxlan
                    flannel.alpha.coreos.com/kube-subnet-manager: true
                    flannel.alpha.coreos.com/public-ip: 172.25.27.26
                    node.alpha.kubernetes.io/ttl: 0
                    volumes.kubernetes.io/controller-managed-attach-detach: true
CreationTimestamp:  Tue, 02 Mar 2021 17:47:31 +0000
Taints:             <none>
Unschedulable:      false
Conditions:
  Type             Status  LastHeartbeatTime                 LastTransitionTime                Reason
Message
  ----             ------  -----------------                 ------------------                ------
-------
  MemoryPressure   False   Tue, 23 Mar 2021 14:38:55 +0000   Tue, 02 Mar 2021 17:47:56 +0000
KubeletHasSufficientMemory   kubelet has sufficient memory available
  DiskPressure     False   Tue, 23 Mar 2021 14:38:55 +0000   Tue, 02 Mar 2021 17:47:56 +0000
KubeletHasNoDiskPressure     kubelet has no disk pressure
  PIDPressure      False   Tue, 23 Mar 2021 14:38:55 +0000   Tue, 02 Mar 2021 17:47:56 +0000
KubeletHasSufficientPID      kubelet has sufficient PID available
  Ready            True    Tue, 23 Mar 2021 14:38:55 +0000   Tue, 02 Mar 2021 17:49:07 +0000
KubeletReady                 kubelet is posting ready status
Addresses:
  InternalIP:  172.25.27.26
  Hostname:    172.25.27.26
Capacity:
 cpu:                96
 ephemeral-storage:  114356412Ki
 hugepages-1Gi:      0
 hugepages-2Mi:      0
 memory:             196496644Ki
 pods:               110
Allocatable:
 cpu:                95900m
 ephemeral-storage:  105390869125
 hugepages-1Gi:      0
 hugepages-2Mi:      0
 memory:             196144244Ki
 pods:               110
System Info:
 Machine ID:                 2637027352b94bdfbaf1bb6d06401946
 System UUID:                800B863A-10CB-EA11-906E-0017A4403562
 Boot ID:                    799bbe1a-8015-4250-beb1-c39958381d58
 Kernel Version:             3.10.0-957.el7.x86_64
 OS Image:                   CentOS Linux 7 (Core)
 Operating System:           linux
 Architecture:               amd64
 Container Runtime Version:  docker://18.9.9
 Kubelet Version:            v1.13.12
 Kube-Proxy Version:         v1.13.12
PodCIDR:                     10.234.1.0/24
```

```
Non-terminated Pods:         (17 in total)
  Namespace                  Name                                                          CPU
Requests  CPU Limits  Memory Requests  Memory Limits  AGE
  ---------                  ----                                                          -----------
-  ----------  ---------------  -------------  ---
  kube-system                kube-flannel-6ntgc                                            150m (0%)
300m (0%)   64M (0%)         500M (0%)      20d
  kube-system                kube-proxy-172.25.27.26                                       150m (0%)
500m (0%)   64M (0%)         2G (0%)        20d
  kube-system                nginx-proxy-172.25.27.26                                      25m (0%)
300m (0%)   32M (0%)         512M (0%)      20d
  mediakind                  fluentbit-fluent-bit-8n7vp                                    0 (0%)
0 (0%)      0 (0%)           0 (0%)         20d
  mediakind                  logrotate-8d4j7                                               0 (0%)
0 (0%)      0 (0%)           0 (0%)         20d
  mediakind                  metrics-prometheus-node-exporter-q7qqs                        0 (0%)
0 (0%)      30Mi (0%)        150Mi (0%)     20d
  mediakind                  mux-bckp-1-stream-processor-mux-65c46756b5-sgprz              0 (0%)
0 (0%)      0 (0%)           0 (0%)         20d
  mediakind                  service-01-enc-hd-encoding-live-worker-6f6c448599-rnx9q        9 (9%)
12 (12%)    1536Mi (0%)      5Gi (2%)       19d
  mediakind                  service-02-iptv-hd-encoding-live-worker-564fd48c7c-lnpk5       9 (9%)
12 (12%)    1536Mi (0%)      5Gi (2%)       6d2h
  mediakind                  service-02-ott-encoding-live-worker-7d74dddc79-d7mn7           4 (4%)
0 (0%)      1G (0%)          0 (0%)         6d17h
  mediakind                  service-03-enc-sd-encoding-live-worker-5d56c8b844-6hsl6        2 (2%)
3 (3%)      500Mi (0%)       2Gi (1%)       19d
  mediakind                  service-05-enc-hd-encoding-live-worker-7bff86bff-nmx4g         9 (9%)
12 (12%)    1536Mi (0%)      5Gi (2%)       19d
  mediakind                  service-08-enc-hd-encoding-live-worker-6cdf78b9c9-r5fbv        9 (9%)
12 (12%)    1536Mi (0%)      5Gi (2%)       8d
  mediakind                  service-dtt01-2-enc-hd-encoding-live-worker-5bdfc9dc9-rfbcc    9 (9%)
12 (12%)    1536Mi (0%)      5Gi (2%)       7d17h
  mediakind                  service-dtt02-3-enc-hd-encoding-live-worker-65d5fb7455-5slpw   9 (9%)
12 (12%)    1536Mi (0%)      5Gi (2%)       7d4h
  mediakind                  service-dtt02-6-enc-sd-encoding-live-worker-7844d9b7d4-2cnz8   2 (2%)
3 (3%)      500Mi (0%)       2Gi (1%)       7d3h
  mediakind                  stream-processor-statmux-bckp-75dc49984-lfl7v                 0 (0%)
0 (0%)      0 (0%)           0 (0%)         20d
Allocated resources:
  (Total limits may be over 100 percent, i.e., overcommitted.)
  Resource           Requests          Limits
  --------           --------          ------
  cpu                62325m (64%)      79100m (82%)
  memory             11903709696 (5%)  39676508416 (19%)
  ephemeral-storage  0 (0%)            0 (0%)
Events:              <none>
```

---

get pods

PODs are groups of containers, each POD can have a single or many containers. Each time a POD is created (from a profile in MDT) the profile details are used to create the POD.

To see what PODs have been deployed, we can use a 'get pods' command.

```
kubectl -n mediakind get pods

NAME                                                READY   STATUS    RESTARTS   AGE
alarm-7c69d9f46c-tcz8d                              3/3     Running   29         78d
alarm-proxy-6f59cbfd6b-ghmdn                        1/1     Running   9          78d
alertmanager-metrics-prometheus-operato-alertmanager-0   2/2     Running   18         78d
alertmanager-metrics-prometheus-operato-alertmanager-1   2/2     Running   18         78d
alertmanager-metrics-prometheus-operato-alertmanager-2   2/2     Running   18         78d
automation-config-cf95fd5c7-k6gjm                   1/1     Running   29         78d
command-84886544c9-m4gkw                            1/1     Running   9          78d
elasticsearch-exporter-5dbf97948c-swlgm             1/1     Running   9          78d
```

```
elasticsearch-master-0                                    1/1     Running   4          34d
elasticsearch-master-1                                    1/1     Running   4          34d
elasticsearch-master-2                                    1/1     Running   4          34d
encoding-live-config-65547d7979-t4w7j                     1/1     Running   28         78d
encoding-live-ui-connector-74f4458478-bgtvp               1/1     Running   9          78d
esam-proxy-67ffff6d77-8hgxl                               1/1     Running   9          78d
etcd-0                                                    1/1     Running   14         78d
etcd-1                                                    1/1     Running   15         78d
etcd-2                                                    1/1     Running   14         78d
failover-api-5d77b57d75-b79xv                             3/3     Running   42         78d
fluen-282-kls5n-fluent-bit-2dzvw                          1/1     Running   10         78d
fluen-282-kls5n-fluent-bit-2tqzw                          1/1     Running   10         78d
fluen-282-kls5n-fluent-bit-4wfv8                          1/1     Running   10         78d
fluen-282-kls5n-fluent-bit-6tvrm                          1/1     Running   9          78d
fluen-282-kls5n-fluent-bit-fst5t                          1/1     Running   9          78d
fluen-282-kls5n-fluent-bit-hxhcv                          1/1     Running   9          78d
fluen-282-kls5n-fluent-bit-x5ztw                          1/1     Running   10         78d
interface-discovery-cf446c54-6xcmt                        1/1     Running   9          78d
kibana-kibana-9bccd7fb8-xmw58                             1/1     Running   9          78d
launch-control-749c675669-fkvqm                           1/1     Running   9          78d
license-manager-7555998744-qljbm                          3/3     Running   23         73d
live-sources-config-665dff566c-9pztm                      1/1     Running   28         78d
logrotate-656ts                                           1/1     Running   9          78d
logrotate-6cgjr                                           1/1     Running   10         78d
logrotate-fjkpx                                           1/1     Running   9          78d
logrotate-k47ng                                           1/1     Running   10         78d
logrotate-kx7dp                                           1/1     Running   10         78d
logrotate-t6pqg                                           1/1     Running   9          78d
logrotate-wctw7                                           1/1     Running   10         78d
metrics-grafana-5df9cd76bd-pxbhp                          2/2     Running   18         78d
metrics-kube-state-metrics-556bbc4fbf-vn86v                1/1     Running   9          78d
metrics-prometheus-node-exporter-6zqwd                    1/1     Running   10         78d
metrics-prometheus-node-exporter-dm9cf                    1/1     Running   10         78d
metrics-prometheus-node-exporter-g8b58                    1/1     Running   10         78d
metrics-prometheus-node-exporter-kcnqb                    1/1     Running   9          78d
metrics-prometheus-node-exporter-t2pbl                    1/1     Running   9          78d
metrics-prometheus-node-exporter-v46j6                    1/1     Running   9          78d
metrics-prometheus-node-exporter-vtsqw                    1/1     Running   10         78d
metrics-prometheus-operato-operator-5fb8bc499f-8sfsw      2/2     Running   18         78d
mkel-sd1-encoding-live-worker-84596675d7-jbgcp            4/4     Running   0          25m
mkel-sd2-encoding-live-worker-668846bbdd-xtlnn            4/4     Running   0          25m
mongodb-replicaset-0                                      2/2     Running   18         78d
mongodb-replicaset-1                                      2/2     Running   18         78d
mongodb-replicaset-2                                      2/2     Running   18         78d
muconv-config-77f85cf5b9-lm74k                            1/1     Running   28         78d
muconv-ui-connector-68dbd6c756-rmxpd                      1/1     Running   13         78d
mux-bckp-1-stream-processor-mux-b6c545c89-srpvv           5/5     Running   0          2m19s
mux-main-1-stream-processor-mux-844644dd44-tqqlr          5/5     Running   0          2m50s
nielsen-rtvod-log-archiver-857c6788b5-5swgj               1/1     Running   28         78d
packaging-config-5bd6778cf4-tsjlj                         1/1     Running   9          78d
packaging-dvr-auto-577d4b487c-5kw9g                       1/1     Running   9          78d
packaging-dynamic-ui-connector-7b65cc476f-jfv8d           1/1     Running   9          78d
packaging-recorder-ui-connector-6496d758c9-ntdjp          1/1     Running   9          78d
placement-api-75dfd78f77-nb74z                            1/1     Running   9          78d
prometheus-metrics-prometheus-operato-prometheus-0        3/3     Running   28         78d
prometheus-metrics-prometheus-operato-prometheus-1        3/3     Running   28         78d
prometheus-metrics-prometheus-operato-prometheus-2        3/3     Running   28         78d
rabbitmq-ha-0                                             1/1     Running   0          27m
rabbitmq-ha-1                                             1/1     Running   0          26m
rabbitmq-ha-2                                             1/1     Running   0          26m
redis-5885955657-9rzhf                                    1/1     Running   9          78d
redis-exporter-prometheus-redis-exporter-b75844d5f-mscxs  1/1     Running   9          78d
server-api-7dbc67f674-qzr76                               1/1     Running   10         78d
server-monitor-7fc9bbcd9f-hjz6z                           1/1     Running   9          78d
service-api-56d7cfdf7c-qd4tv                              2/2     Running   26         78d
snmp-notification-6ddc75cf85-pdlzq                        1/1     Running   13         78d
statistic-7cdccbcfcf-qkbb2                                1/1     Running   9          78d
stream-processor-config-7578c5bb7b-bgc87                  1/1     Running   9          78d
stream-processor-statmux-bckp-6584c7849d-mmzzk            3/3     Running   0          2m50s
stream-processor-statmux-main-9954b49db-9f7s5             3/3     Running   0          3m21s
```

```
stream-processor-ui-connector-6bd8c4c9b5-lsdjd            1/1     Running   9          78d
template-api-65c56cfc95-sd49f                             1/1     Running   15         78d
unified-ui-cbf7767bd-mqv7t                                5/5     Running   51         78d
```

---

delete pods

Once the PODs have been listed, it is then possible to delete a POD or PODs. Use the following (this example assumes you have these PODs available for deletion).

Lets say you wish to delete the following three PODS

```
rabbitmq-ha-0                                             1/1     Running   0          27m
rabbitmq-ha-1                                             1/1     Running   0          26m
rabbitmq-ha-2                                             1/1     Running   0          26m
```

You would use the following command: (assuming you are using the namespace mediakind).

```
kubectl -n mediakind delete pod rabbitmq-ha-0 rabbitmq-ha-1 rabbitmq-ha-2

pod "rabbitmq-ha-0" deleted
pod "rabbitmq-ha-1" deleted
pod "rabbitmq-ha-2" deleted
```

Kubernetes would the start to rebuild these PODs if they are still currently deployed in IPHE.

---

get deploy

'get deploy' is similar to get PODs, but it shows the deployed components of your system rather than all of the system, so you don't see Rabbit, Mongo etc, but you do see what you want in terms of services and their components

```
kubectl -n mediakind get deploy


NAME                                    READY   UP-TO-DATE   AVAILABLE   AGE
alarm                                   1/1     1            1           78d
alarm-proxy                             1/1     1            1           78d
automation-config                       1/1     1            1           78d
command                                 1/1     1            1           78d
elasticsearch-exporter                  1/1     1            1           78d
encoding-live-config                    1/1     1            1           78d
encoding-live-ui-connector              1/1     1            1           78d
esam-proxy                              1/1     1            1           78d
failover-api                            1/1     1            1           78d
flow                                    0/0     0            0           78d
interface-discovery                     1/1     1            1           78d
kibana-kibana                           1/1     1            1           78d
launch-control                          1/1     1            1           78d
license-manager                         1/1     1            1           76d
live-sources-config                     1/1     1            1           78d
metrics-grafana                         1/1     1            1           78d
metrics-kube-state-metrics              1/1     1            1           78d
metrics-prometheus-operato-operator     1/1     1            1           78d
mfvp-probe-light                        0/0     0            0           78d
mkel-sd1-encoding-live-worker           1/1     1            1           46m
mkel-sd2-encoding-live-worker           1/1     1            1           46m
muconv-config                           1/1     1            1           78d
muconv-ui-connector                     1/1     1            1           78d
mux-bckp-1-stream-processor-mux         1/1     1            1           23m
mux-main-1-stream-processor-mux         1/1     1            1           24m
nielsen-rtvod-log-archiver              1/1     1            1           78d
packaging-config                        1/1     1            1           78d
```

```
packaging-dvr-auto                          1/1     1            1           78d
packaging-dynamic-ui-connector              1/1     1            1           78d
packaging-recorder-ui-connector             1/1     1            1           78d
placement-api                               1/1     1            1           78d
redis                                       1/1     1            1           78d
redis-exporter-prometheus-redis-exporter    1/1     1            1           78d
server-api                                  1/1     1            1           78d
server-monitor                              1/1     1            1           78d
service-api                                 1/1     1            1           78d
snmp-notification                           1/1     1            1           78d
statistic                                   1/1     1            1           78d
stream-processor-asi                        0/0     0            0           24m
stream-processor-config                     1/1     1            1           78d
stream-processor-statmux-bckp               1/1     1            1           24m
stream-processor-statmux-main               1/1     1            1           24m
stream-processor-ui-connector               1/1     1            1           78d
template-api                                1/1     1            1           78d
unified-ui                                  1/1     1            1           78d
```

---

get statefulset

Stateful set is for pods that have to maintain state, say even after a reboot, and tries to put PODs back in the same place (server or instance) as before, where as Deployments dont care where they put replicasets/pods.

```
kubectl -n mediakind get statefulset

NAME                                                 READY   AGE
alertmanager-metrics-prometheus-operato-alertmanager   3/3     78d
elasticsearch-master                                 3/3     78d
etcd                                                 3/3     78d
mongodb-replicaset                                   3/3     78d
prometheus-metrics-prometheus-operato-prometheus       3/3     78d
rabbitmq-ha
```

---

get worker pods

Getting the worker pods provides a list of running services that should match the list of services that you created in Controller.

```
kubectl -n mediakind get pods -o wide |grep "worker"

service-01-enc-hd-encoding-live-worker-6f6c448599-rnx9q        4/4     Running     9          21d
172.25.27.26   172.25.27.26   <none>           <none>
service-01-enc-sd-encoding-live-worker-bc678ff64-7hq2s         4/4     Running     20         21d
172.25.27.20   172.25.27.20   <none>           <none>
service-01-iptv-hd-encoding-live-worker-74f9546cb7-n44xp       4/4     Running     0          8d
172.25.27.20   172.25.27.20   <none>           <none>
service-01-ott-encoding-live-worker-75d78f546f-rk7wd           4/4     Running     0          9d
172.25.27.21   172.25.27.21   <none>           <none>
service-02-enc-hd-encoding-live-worker-7f7ffd7b59-bhxwx        4/4     Running     3          15d
172.25.27.20   172.25.27.20   <none>           <none>
service-02-enc-sd-encoding-live-worker-648d9fccfb-xmr2v        4/4     Running     3          15d
172.25.27.17   172.25.27.17   <none>           <none>
service-02-iptv-hd-encoding-live-worker-564fd48c7c-lnpk5       4/4     Running     0          8d
172.25.27.26   172.25.27.26   <none>           <none>
service-02-ott-encoding-live-worker-7d74dddc79-d7mn7           4/4     Running     0          8d
172.25.27.26   172.25.27.26   <none>           <none>
service-03-enc-hd-encoding-live-worker-d47d78799-fgkjh         4/4     Running     9          21d
172.25.27.20   172.25.27.20   <none>           <none>
service-03-enc-sd-encoding-live-worker-5d56c8b844-6hsl6        4/4     Running     9          21d
172.25.27.26   172.25.27.26   <none>           <none>
service-03-iptv-hd-encoding-live-worker-57789d7567-llh9s       4/4     Running     0          8d
```

```
172.25.27.17   172.25.27.17   <none>           <none>
service-04-enc-hd-encoding-live-worker-67c7bff875-5gnbb        4/4     Running     9          21d
172.25.27.17   172.25.27.17   <none>           <none>
service-04-enc-sd-encoding-live-worker-6cd7f464d8-9kr8v        4/4     Running     9          21d
172.25.27.17   172.25.27.17   <none>           <none>
service-04-iptv-hd-encoding-live-worker-8d7646985-xnzwl        4/4     Running     0          8d
172.25.27.21   172.25.27.21   <none>           <none>
service-05-enc-hd-encoding-live-worker-7bff86bff-nmx4g         4/4     Running     9          21d
172.25.27.26   172.25.27.26   <none>           <none>
service-05-enc-sd-encoding-live-worker-75797fbd44-g2sv8        4/4     Running     9          21d
172.25.27.20   172.25.27.20   <none>           <none>
service-06-enc-hd-encoding-live-worker-5f8f87df9-bwdxr         4/4     Running     9          21d
172.25.27.17   172.25.27.17   <none>           <none>
service-06-enc-sd-encoding-live-worker-6c9b7f7fd4-g66q5        4/4     Running     10         21d
172.25.27.20   172.25.27.20   <none>           <none>
service-07-enc-hd-encoding-live-worker-57bfd9bff9-25sgv        4/4     Running     0          10d
172.25.27.21   172.25.27.21   <none>           <none>
service-08-enc-hd-encoding-live-worker-6cdf78b9c9-r5fbv        4/4     Running     1          10d
172.25.27.26   172.25.27.26   <none>           <none>
service-09-enc-hd-encoding-live-worker-84f7db7dd7-pfbxg        4/4     Running     1          10d
172.25.27.21   172.25.27.21   <none>           <none>
service-dtt01-1-enc-hd-encoding-live-worker-5958cddc97-gbczc   4/4     Running     0          9d
172.25.27.21   172.25.27.21   <none>           <none>
service-dtt01-2-enc-hd-encoding-live-worker-5bdfc9dc9-rfbcc    4/4     Running     0          9d
172.25.27.26   172.25.27.26   <none>           <none>
service-dtt01-3-enc-hd-encoding-live-worker-8696d7955c-gqwxk   4/4     Running     0          9d
172.25.27.21   172.25.27.21   <none>           <none>
service-dtt01-4-enc-hd-encoding-live-worker-85f95cd6c9-vswhx   4/4     Running     0          9d
172.25.27.17   172.25.27.17   <none>           <none>
service-dtt01-5-enc-hd-encoding-live-worker-65447cbdc7-swxt2   4/4     Running     0          9d
172.25.27.20   172.25.27.20   <none>           <none>
service-dtt02-1-enc-hd-encoding-live-worker-d8bdd8c4c-knwr8    4/4     Running     0          9d
172.25.27.21   172.25.27.21   <none>           <none>
service-dtt02-2-enc-hd-encoding-live-worker-5dd4f4d445-mdtkh   4/4     Running     0          9d
172.25.27.20   172.25.27.20   <none>           <none>
service-dtt02-3-enc-hd-encoding-live-worker-65d5fb7455-5slpw   4/4     Running     0          9d
172.25.27.26   172.25.27.26   <none>           <none>
service-dtt02-4-enc-hd-encoding-live-worker-549dbbcf8f-5dxlz   4/4     Running     0          9d
172.25.27.17   172.25.27.17   <none>           <none>
service-dtt02-5-enc-hd-encoding-live-worker-d678b88ff-pq66k    4/4     Running     0          9d
172.25.27.20   172.25.27.20   <none>           <none>
service-dtt02-6-enc-sd-encoding-live-worker-7844d9b7d4-2cnz8   4/4     Running     14         9d
172.25.27.26   172.25.27.26   <none>           <none>
```