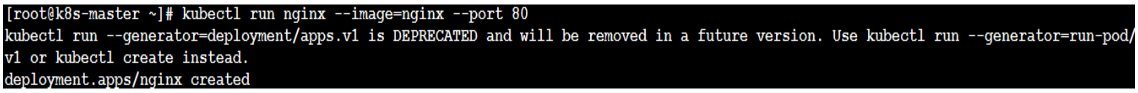
1.1 Kubernetes 网络

1.1.1 Node 与 Pod 间通信

步骤 1 创建一个 pod

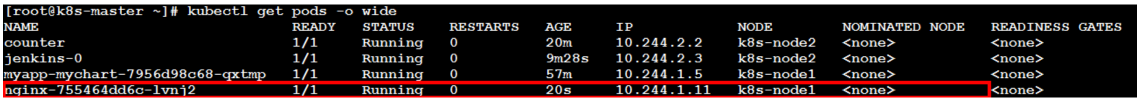
```
[root@k8s-master ~]# kubectl run nginx --image=nginx --port 80
```



```
[root@k8s-master ~]# kubectl run nginx --image=nginx --port 80
kubectl run --generator=deployment/apps.v1 is DEPRECATED and will be removed in a future version. Use kubectl run --generator=run-pod/
v1 or kubectl create instead.
deployment.apps/nginx created
```

步骤 2 查看该 pod 的 ip 地址及所处节点

```
[root@k8s-master ~]# kubectl get pods -o wide
```

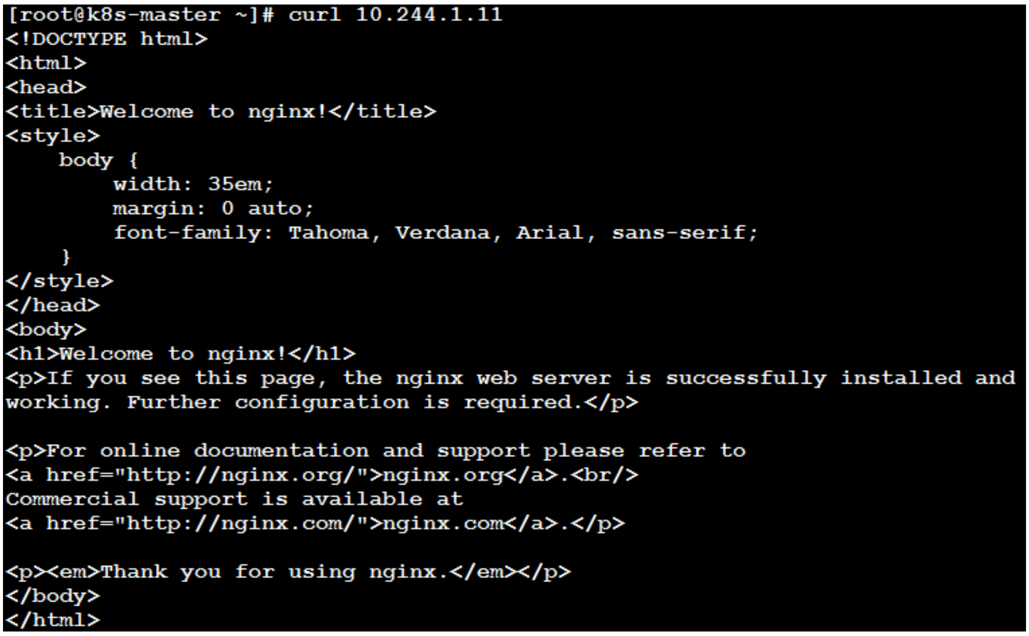


```
[root@k8s-master ~]# kubectl get pods -o wide
NAME                               READY   STATUS    RESTARTS   AGE     IP            NODE        NOMINATED NODE   READINESS GATES
counter                            1/1     Running   0          20m     10.244.2.2    k8s-node2   <none>           <none>
jenkins-0                          1/1     Running   0          9m28s   10.244.2.3    k8s-node2   <none>           <none>
myapp-mychart-7956d98c68-qxtmp     1/1     Running   0          57m     10.244.1.5    k8s-node1   <none>           <none>
nginx-755464dd6c-lvnj2             1/1     Running   0          20s     10.244.1.11   k8s-node1   <none>           <none>
```

步骤 3 从 k8s-master 节点访问该 pod

```
[root@k8s-master ~]# curl 10.244.1.11
```

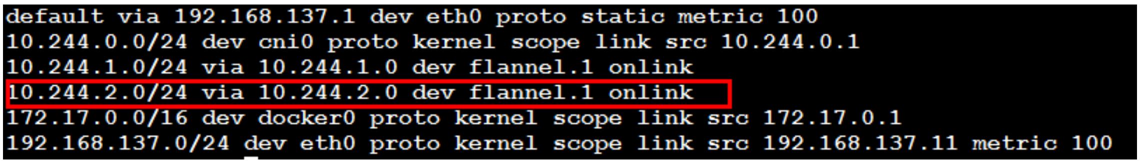
# 实际 IP 以实际输出为准



```
[root@k8s-master ~]# curl 10.244.1.11
<!DOCTYPE html>
<html>
<head>
<title>Welcome to nginx!</title>
<style>
    body {
        width: 35em;
        margin: 0 auto;
        font-family: Tahoma, Verdana, Arial, sans-serif;
    }
</style>
</head>
<body>
<h1>Welcome to nginx!</h1>
<p>If you see this page, the nginx web server is successfully installed and
working. Further configuration is required.</p>

<p>For online documentation and support please refer to
<a href="http://nginx.org/">nginx.org</a>.<br/>
Commercial support is available at
<a href="http://nginx.com/">nginx.com</a>.</p>

<p><em>Thank you for using nginx.</em></p>
</body>
</html>
```

步骤 4 查看主机上的路由可知，主机通过 Flannel 网络与 pod 通信

```
[root@k8s-master ~]# ip route
```



```
default via 192.168.137.1 dev eth0 proto static metric 100
10.244.0.0/24 dev cni0 proto kernel scope link src 10.244.0.1
10.244.1.0/24 via 10.244.1.0 dev flannel.1 onlink
10.244.2.0/24 via 10.244.2.0 dev flannel.1 onlink
172.17.0.0/16 dev docker0 proto kernel scope link src 172.17.0.1
192.168.137.0/24 dev eth0 proto kernel scope link src 192.168.137.11 metric 100
```

flannel.1 是 flannel 插件生成的逻辑接口

1.1.2 Pod 和 Pod 间通信

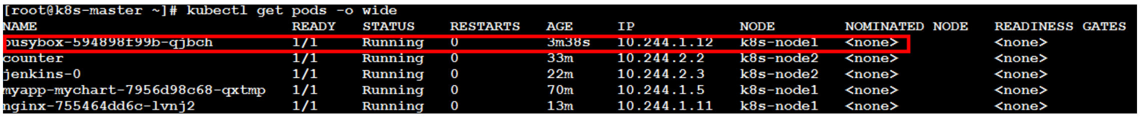
步骤 1 紧接上一个实验，创建一个 client pod，并进入该 pod 的 tty

```
[root@k8s-master ~]# kubectl run -i -t busybox --image=busybox
```

#该命令执行后将自动进入容器环境

#另起一个终端，查看 pods 运行所在节点

```
[root@k8s-master ~]# kubectl get pods -o wide
```

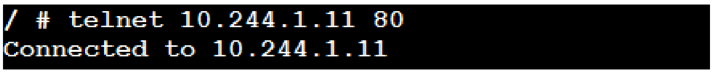


```
[root@k8s-master ~]# kubectl get pods -o wide
NAME                            READY   STATUS    RESTARTS   AGE     IP            NODE        NOMINATED NODE   READINESS GATES
busybox-594898f99b-qjbch        1/1     Running   0          3m38s   10.244.1.12   k8s-node1   <none>           <none>
counter                         1/1     Running   0          33m     10.244.2.2    k8s-node2   <none>           <none>
jenkins-0                       1/1     Running   0          22m     10.244.2.3    k8s-node2   <none>           <none>
myapp-mychart-7956d98c68-qxtmp  1/1     Running   0          70m     10.244.1.5    k8s-node1   <none>           <none>
nginx-755464dd6c-lvnj2          1/1     Running   0          13m     10.244.1.11   k8s-node1   <none>           <none>
```

步骤 2 连通性测试，从该 busybox pod 访问 nginx pod 服务。

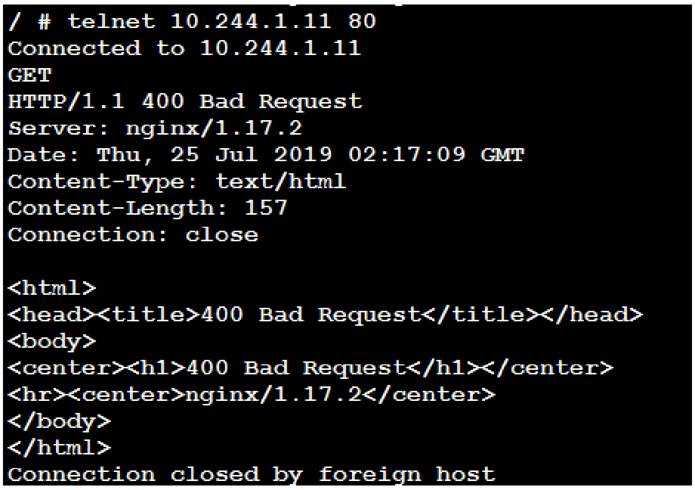
容器中无 curl，用 telnet 命令模拟访问

```
/ # telnet 10.244.1.41 80
```



```
/ # telnet 10.244.1.11 80
Connected to 10.244.1.11
```

GET #使用 GET 方法获取



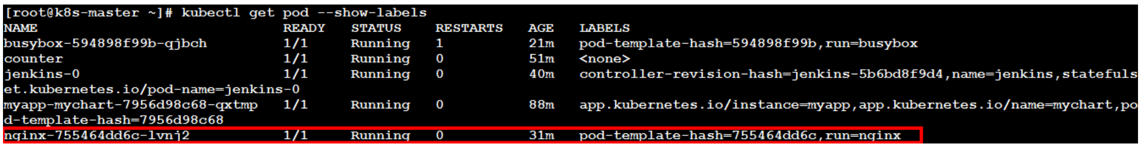
```
/ # telnet 10.244.1.11 80
Connected to 10.244.1.11
GET
HTTP/1.1 400 Bad Request
Server: nginx/1.17.2
Date: Thu, 25 Jul 2019 02:17:09 GMT
Content-Type: text/html
Content-Length: 157
Connection: close

<html>
<head><title>400 Bad Request</title></head>
<body>
<center><h1>400 Bad Request</h1></center>
<hr><center>nginx/1.17.2</center>
</body>
</html>
Connection closed by foreign host
```

exit 退出

1.1.3 集群外访问实验（NodePort 方式）

步骤 1 查看已经运行的 pod 的 label

```
[root@k8s-master ~]# kubectl get pod --show-labels
```



```
[root@k8s-master ~]# kubectl get pod --show-labels
NAME                          READY   STATUS    RESTARTS   AGE   LABELS
busybox-594898f99b-qjbch      1/1     Running   1          21m   pod-template-hash=594898f99b,run=busybox
counter                       1/1     Running   0          51m   <none>
jenkins-0                     1/1     Running   0          40m   controller-revision-hash=jenkins-5b6bd8f9d4,name=jenkins,statefuls
et.kubernetes.io/pod-name=jenkins-0
myapp-mychart-7956d98c68-qxtmp   1/1     Running   0          88m   app.kubernetes.io/instance=myapp,app.kubernetes.io/name=mychart,po
d-template-hash=7956d98c68
nginx-755464dd6c-lvnj2        1/1     Running   0          31m   pod-template-hash=755464dd6c,run=nginx
```

步骤 2 在 master 节点创建/labfile/log 目录，用于保存配置文件。后续本章的 yaml 文件保存在此处。

```
[root@k8s-master /]# cd /
[root@k8s-master /]# mkdir labfile
[root@k8s-master /]# cd labfile/
[root@k8s-master labfile]# mkdir network/
```

步骤 3 创建 type 为 nodePort 的 Service 的 yaml 文件

```
[root@k8s-master network]# vim serviceNodeport.yaml
```

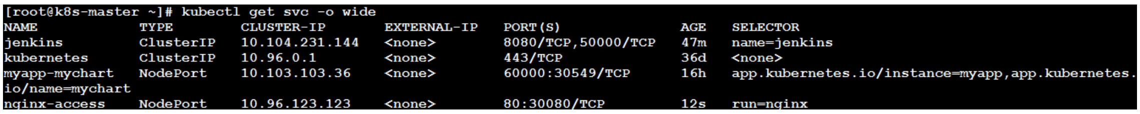
```
apiVersion: v1
kind: Service
metadata:
  name: nginx-access
  namespace: default
spec:
  selector:
    run: nginx
  clusterIP: 10.96.123.123
  type: NodePort
  ports:
  - port: 80   #service 端口
    targetPort: 80 #容器端口
    nodePort: 30080    #node 节点端口
```

步骤 4 创建该 Service

```
[root@k8s-master network]# kubectl apply -f serviceNodeport.yaml
```

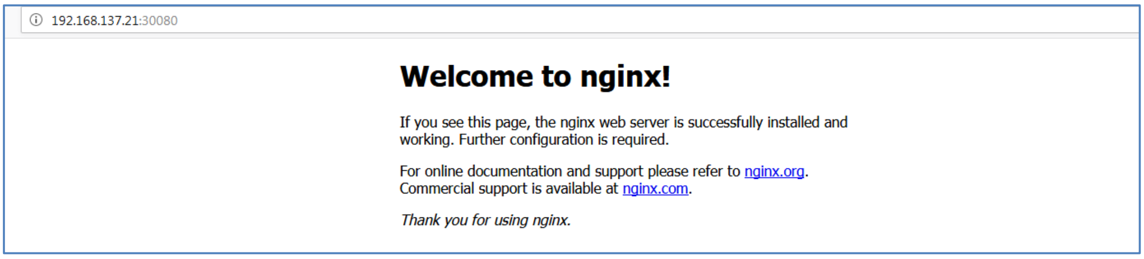
步骤 5 查看该 service 状态

```
[root@k8s-master ~]# kubectl get svc -o wide
```



```
[root@k8s-master ~]# kubectl get svc -o wide
NAME            TYPE        CLUSTER-IP       EXTERNAL-IP   PORT(S)              AGE   SELECTOR
jenkins         ClusterIP   10.104.231.144   <none>        8080/TCP,50000/TCP   47m   name=jenkins
kubernetes      ClusterIP   10.96.0.1        <none>        443/TCP              36d   <none>
myapp-mychart   NodePort    10.103.103.36    <none>        60000:30549/TCP      16h   app.kubernetes.io/instance=myapp,app.kubernetes.
io/name=mychart
nginx-access    NodePort    10.96.123.123    <none>        80:30080/TCP         12s   run=nginx
```

步骤 6 集群外主机可使用 Node 节点地址访问该 Pod 服务（任一 Node 节点地址均可）。



192.168.137.21:30080

Welcome to nginx!

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Commercial support is available at nginx.com.

Thank you for using nginx.

步骤 7 在节点上用 ss 命令查看可知，每个节点上都有一个 kube-proxy 发起的进程监听 30080 端口

```
[root@k8s-master ~]# ss -ntlp | grep 30080
LISTEN   0    128    :::30080    :::*    users:(("kube-proxy",pid=15859,fd=12))
```