创建高可用etcd集群

kuberntes系统使用 etcd 存储所有数据，这里介绍部署一个三节点高可用etcd集群的步骤，这三个节点复用
kubernetes master 机器，分别命令为 vlnx251101.zyg.com,vlnx251102.zyg.com,vlnx251103.zyg.com

- vlnx251101.zyg.com   192.168.251.101
- vlnx251102.zyg.com   192.168.251.102
- vlnx251103.zyg.com   192.168.251.103

TLS认证文件

需要为etcd 集群创建加密通信的TLS证书，这里复用以前创建的 kubernetes证书
[root@vlnx251101 ssl]# scp ca.pem kubernetes-key.pem kubernetes.pem /etc/kubernetes/ssl/
kubernetes 证书的hosts字段列表中包含上面三台机器的 IP，否则后续证书校验会失败；

下载二进制文件

到 https://github.com/coreos/etcd/releases 页面下载最新版本的二进制文件 （三个节点都要部署）
[root@vlnx251101 ~]# wget https://github.com/coreos/etcd/releases/download/v3.3.9/etcd-
v3.3.9-linux-amd64.tar.gz

[root@vlnx251101 ~]# tar xf etcd-v3.3.9-linux-amd64.tar.gz
[root@vlnx251101 ~]# mv etcd-v3.3.9-linux-amd64/etcd* /usr/local/bin/

创建etcd 的systemd unit 文件
注意替换IP地址为你自己的etcd集群的主机IP。

```
[root@vlnx251101 ~]# mkdir -p /var/lib/etcd  /etc/etcd/
[root@vlnx251101 ~]# vim /etc/systemd/system/etcd.service
[Unit]
Description=Etcd Server
After=network.target
After=network-online.target
Wants=network-online.target
Documentation=https://github.com/coreos
[Service]
Type=notify
WorkingDirectory=/var/lib/etcd/
EnvironmentFile=-/etc/etcd/etcd.conf
ExecStart=/usr/local/bin/etcd \
  --name vlnx251101.zyg.com \
  --cert-file=/etc/kubernetes/ssl/kubernetes.pem \
  --key-file=/etc/kubernetes/ssl/kubernetes-key.pem \
  --peer-cert-file=/etc/kubernetes/ssl/kubernetes.pem \
  --peer-key-file=/etc/kubernetes/ssl/kubernetes-key.pem \
  --trusted-ca-file=/etc/kubernetes/ssl/ca.pem \
```

```
    --peer-trusted-ca-file=/etc/kubernetes/ssl/ca.pem \
    --initial-advertise-peer-urls https://192.168.251.101:2380 \
    --listen-peer-urls https://192.168.251.101:2380 \
    --listen-client-urls https://192.168.251.101:2379,https://127.0.0.1:2379 \
    --advertise-client-urls https://192.168.251.101:2379 \
    --initial-cluster-token "etcd-cluster-1" \
    --initial-cluster
vlnx251101.zyg.com=https://192.168.251.101:2380,vlnx251102.zyg.com=https://192.168.251.10
 \
    --initial-cluster-state new \
    --data-dir=/var/lib/etcd
Restart=on-failure
RestartSec=5
LimitNOFILE=65536

[Install]
WantedBy=multi-user.target
```

- 指定`etcd` 的工作目录为`/var/lib/etcd`,数据目录为 `/var/lib/etcd`,需在启动服务前创建这两个目录;
- 为了保证通信安全,需要指定`etcd`的公私钥 (`cert-file`和 `key-file`) 、`Peers` 通信的公私钥和CA证书 (`peer-cert-file`、 `peer-key-file`、 `peer-trusted-ca-file`) 、客户端的CA证书(`trusted-ca-file`);
- 创建`kubernetes.pem`证书时使用的 `kubernetes-csr.json`文件的 `hosts` 字段**包含所有etcd节点的 `_IP`**,否者证书校验会出错;
- `--initial-cluster-state` 值为`new`时, `--name`的参数值必须位于 `--initial-cluster`列表中;

这是192.168.251.101节点的配置,其他两个etcd节点只要将上面的IP地址改成相应节点的IP地址即可。ETCD_NAME换成对应节点的vlnx251101.zyg.com,vlnx251102.zyg.com,vlnx251103.zyg.com。

启动etcd服务

```
[root@vlnx251101 ~]# systemctl daemon-reload ; systemctl enable etcd ; systemctl start etcd ; systemctl status etcd
```
在所有的`kubernetes master` 节点重复上面的步骤,直到所有机器的`etcd`服务都已启动

验证服务

在任一`kubernetes master`机器上执行如下命令:

```
[root@vlnx251101 ~]# etcdctl --ca-file=/etc/kubernetes/ssl/ca.pem --cert-file=/etc/kubernetes/ssl/kubernetes.pem --key-file=/etc/kubernetes/ssl/kubernetes-key.pem --endpoints=https://127.0.0.1:2379 cluster-health

member 73a72c21b3c0c4a6 is healthy: got healthy result from https://192.168.251.103:2379
```

member 8059573fbe80832e is healthy: got healthy result from https://192.168.251.101:2379
member b21d9a40c358ffbb is healthy: got healthy result from https://192.168.251.102:2379
cluster is healthy

结果最后一行为cluster is healthy 时表示集群服务正常。