> LVS是实现高可用集群负载均衡非常高效的一种方案，在LVS中，通常有三种模型，NAT、DR、TNU。但在LVS实现中，不能解决Director单点故障的问题，以及面对大的访问量时，前端负载均衡器吞吐的压力。keepalived可以实现Director的高可用，当一个Director故障时，能及时切换到另外一台Director。keepalived通过配置可以生成LVS规则，继而实现LVS集群负载均衡。keepalived还可以对后端服务器进行健康状态检测，故障通知等功能。

说明：基于LVS-DR模型实现；master/backup要保持时间同步，可利用chrony服务进行时间同步；director之间能够基于主机名通信；Director是一主一从模式。

真实服务器配置

```
#!/bin/bash
#
# $1 ---> VIP/NETMASK
# $2 ---> test page nodeN
echo "Installing Apache...."
yum install httpd -y &> /dev/null
if [ $? -eq 0 ] ;then
    echo "Apache Successful installation."
else
    echo "Apache installation failed."
    exit 2
fi
echo "Create a test page..."
echo "<h1>$2</h1>" >> /var/www/html/index.html
if [ -f /var/www/html/index.html ];then
    echo "The test page was created successfully."
else
    echo "Test page creation failed."
    exit 3
fi
echo "KeepAlive off" >> /etc/httpd/conf/httpd.conf
```

```
echo "ServerName `hostname`" >> /etc/httpd/conf/httpd.conf
echo "Starting Apache is starting..."
systemctl start httpd
curl -I http://192.168.1.152 &> /dev/null
if [ $? -eq 0 ];then
    echo "Apache started successfully."
else
    echo "Apache failed to start."
fi
VIP=$1
echo "start LVS of Real Server."
# CentOS 6
# /sbin/ifconfig lo:0 $2 broadcast $VIP netmask 255.255.255.255 up
# CentOS 7
/usr/sbin/ip addr add $1 dev lo:0
echo "1" >/proc/sys/net/ipv4/conf/lo/arp_ignore
echo "2" >/proc/sys/net/ipv4/conf/lo/arp_announce
echo "1" >/proc/sys/net/ipv4/conf/all/arp_ignore
echo "2" >/proc/sys/net/ipv4/conf/all/arp_announce
```

负载均衡器配置

> Director1配置

```
! Configuration File for keepalived
global_defs {
   notification_email {
     acassen@firewall.loc
     failover@firewall.loc
     sysadmin@firewall.loc
   }
   notification_email_from Alexandre.Cassen@firewall.loc
   smtp_server 192.168.200.1
   smtp_connect_timeout 30
   router_id LVS_DEVEL
```

```
}
vrrp_script monitor {
  script "[[ -f /etc/keepalived/down ]] && exit 1 || exit 0"
  interval 1
  weight -2
}
vrrp_instance VI_1 {
    state MASTER
    interface eno16777736
    virtual_router_id 51
    priority 100
    advert_int 1
    authentication {
        auth_type PASS
        auth_pass 1111
    }
    virtual_ipaddress {
        192.168.1.149
    }
   track_script {
        monitor
   }
}
virtual_server 192.168.1.149 80 {
    delay_loop 6
    lb_algo rr
    lb_kind DR
    protocol TCP
    real_server 192.168.1.152 80 {
        weight 1
        HTTP_GET {
            url {
              path /
              status_code 200
            }
            connect_timeout 3
            nb_get_retry 3
```

```
            delay_before_retry 3
        }
    }
    real_server 192.168.1.153 80 {
        weight 1
        HTTP_GET {
            url {
              path /
              status_code 200
            }
            connect_timeout 3
            nb_get_retry 3
            delay_before_retry 3
        }
    }
}
```

> Director2配置

```
! Configuration File for keepalived
global_defs {
   notification_email {
     acassen@firewall.loc
     failover@firewall.loc
     sysadmin@firewall.loc
   }
   notification_email_from
Alexandre.Cassen@firewall.loc
   smtp_server 192.168.200.1
   smtp_connect_timeout 30
   router_id LVS_DEVEL
}
vrrp_script monitor {
  script "[[ -f /etc/keepalived/down ]] && exit 1 ||
exit 0"
  interval 1
  weight -2
}
```

```
vrrp_instance VI_1 {
    state BACKUP
    interface eno16777736
    virtual_router_id 51
    priority 99
    advert_int 1
    authentication {
        auth_type PASS
        auth_pass 1111
    }
    virtual_ipaddress {
        192.168.1.149
    }
   track_script {
        monitor
   }
}
virtual_server 192.168.1.149 80 {
    delay_loop 6
    lb_algo rr
    lb_kind DR
    protocol TCP
    real_server 192.168.1.152 80 {
        weight 1
        HTTP_GET {
            url {
              path /
              status_code 200
            }
            connect_timeout 3
            nb_get_retry 3
            delay_before_retry 3
       }
    }
    real_server 192.168.1.153 80 {
        weight 1
        HTTP_GET {
            url {
```

```
56                path /
57                status_code 200
58            }
59            connect_timeout 3
60            nb_get_retry 3
61            delay_before_retry 3
62        }
63    }
64}
```