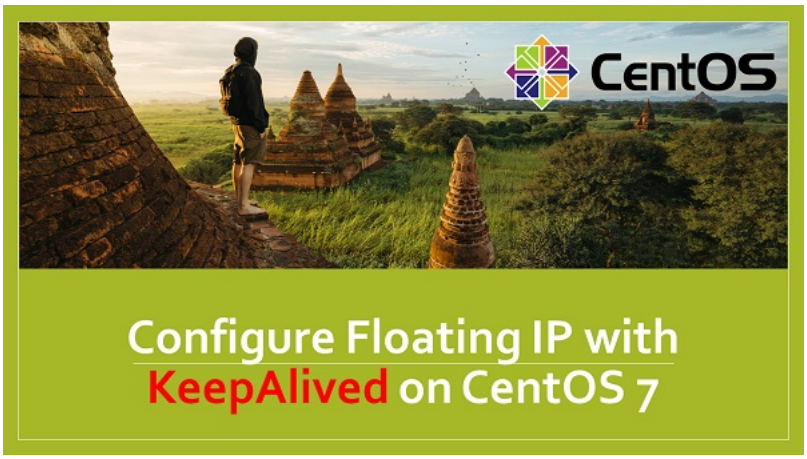
keepalived: Configure Floating IP in CentOS 7 Servers

Ahmer M August 19, 2018 CentOS, High Availability (HA), KeepAlived



In this article, we will configure a Floating IP address for the cluster of two web servers by using KeepAlived.

Table of Contents:

What is Floating IP Address? :

Floating IP address is used to support failover in a high-availability cluster. The cluster is configured such that only the active member of the cluster "owns" or responds to that IP address at any given time. Should the active member fail, then "ownership" of the floating IP address would be transferred to a standby member to promote it as the new active member. Specifically, the member to be promoted issues a gratuitous ARP, announcing the new MAC address–to–IP address association.

What is KeepAlived? :

Keepalived is a routing software written in C. The main goal of this project is to provide simple and robust facilities for loadbalancing and high-availability to Linux system and Linux based infrastructures. Loadbalancing framework relies on well-known and widely used Linux Virtual Server (IPVS) kernel module providing Layer4 loadbalancing. Keepalived implements a set of checkers to dynamically and adaptively maintain and manage loadbalanced server pool according their health. On the other hand high-availability is achieved by VRRP protocol. VRRP is a fundamental brick for router failover. In addition, Keepalived implements a set of hooks to the VRRP finite state machine providing low-level and high-speed protocol interactions. Keepalived frameworks can be used independently or all together to provide resilient infrastructures.

KeepAlived performs well with **haproxy** load balancers. Have a look at our article on how to install and configure haproxy load balancer on CentOS 7.

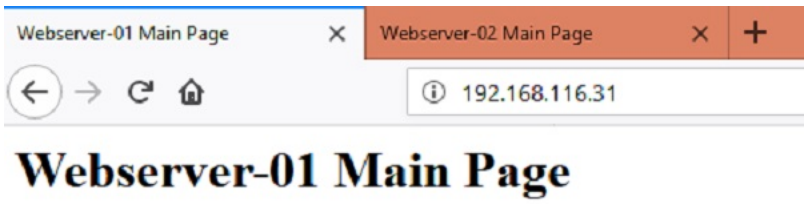
System Specification:

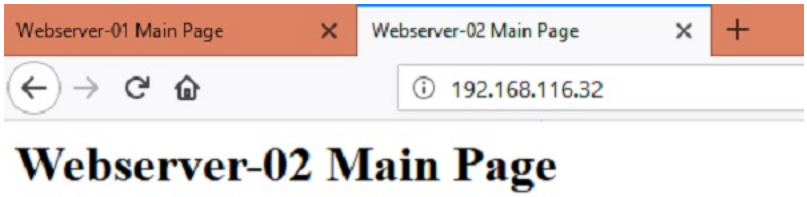
We have two webservers **webserver-01.centlinux.com** and **webserver-02.centlinux.com**.

Hostname	webserver-01.centlinux.com	webserver-02.centlinux.com
IP Address	192.168.116.31/24	192.168.116.32/24
Operating System	CentOS 7	CentOS 7
Web Server	Nginx	Nginx

Floating IP Address: 192.168.116.50/24

To ensure that our webservers are properly configured and browsable, open their URLs in a Browser.





I have set different index pages on both servers, to differentiate between servers, when we are accessing them via the Floating IP address.

Configure KeepAlived on webserver-01:

Connect to **webserver-01.centlinux.com** and install **keepalived** by using **yum** command.

```
[root@webserver-01 ~]# yum install -y keepalived
Loaded plugins: langpacks, product-id, subscription-manager
This system is not registered to Red Hat Subscription Management. You can use subsc
localyum                                                 | 4.1 kB     00:00
Resolving Dependencies
--> Running transaction check
---> Package keepalived.x86_64 0:1.2.10-2.el7 will be installed
--> Processing Dependency: libnetsnmp.so.31()(64bit) for package: keepalived-1.2.10
--> Processing Dependency: libnetsnmpagent.so.31()(64bit) for package: keepalived-1
--> Processing Dependency: libnetsnmpmibs.so.31()(64bit) for package: keepalived-1.
--> Running transaction check
---> Package net-snmp-agent-libs.x86_64 1:5.7.2-18.el7 will be installed
---> Package net-snmp-libs.x86_64 1:5.7.2-18.el7 will be installed
--> Finished Dependency Resolution

Dependencies Resolved

================================================================================
 Package                 Arch        Version               Repository     Size
================================================================================
Installing:
 keepalived              x86_64      1.2.10-2.el7          localyum      218 k
Installing for dependencies:
 net-snmp-agent-libs     x86_64      1:5.7.2-18.el7        localyum      698 k
 net-snmp-libs           x86_64      1:5.7.2-18.el7        localyum      745 k

Transaction Summary
================================================================================
Install  1 Package (+2 Dependent packages)

Total download size: 1.6 M
Installed size: 5.6 M
Downloading packages:
--------------------------------------------------------------------------------
```

```
Total                                               2.6 MB/s | 1.6 MB  00:00
Running transaction check
Running transaction test
Transaction test succeeded
Running transaction
  Installing : 1:net-snmp-libs-5.7.2-18.el7.x86_64                         1/3
  Installing : 1:net-snmp-agent-libs-5.7.2-18.el7.x86_64                   2/3
  Installing : keepalived-1.2.10-2.el7.x86_64                              3/3
  Verifying  : 1:net-snmp-libs-5.7.2-18.el7.x86_64                         1/3
  Verifying  : 1:net-snmp-agent-libs-5.7.2-18.el7.x86_64                   2/3
  Verifying  : keepalived-1.2.10-2.el7.x86_64                              3/3

Installed:
  keepalived.x86_64 0:1.2.10-2.el7

Dependency Installed:
  net-snmp-agent-libs.x86_64 1:5.7.2-18.el7 net-snmp-libs.x86_64 1:5.7.2-18.el7

Complete!
```

Set Linux Kernel parameters as follows to support Floating IP.

```
[root@webserver-01 ~]# echo "net.ipv4.ip_nonlocal_bind = 1" >> /etc/sysctl.conf
[root@webserver-01 ~]# sysctl -p
net.ipv4.ip_nonlocal_bind = 1
[root@webserver-01 ~]#
```

Now configure **keepalived** settings.

```
[root@webserver-01 ~]# cd /etc/keepalived/
[root@webserver-01 keepalived]# mv keepalived.conf keepalived.conf.org
[root@webserver-01 keepalived]# vi keepalived.conf
```

Add following directives and save.

```
! Configuration File for keepalived

global_defs {
   notification_email {
  root@webserver-01.centlinux.com
   }
   notification_email_from root@webserver-01.centlinux.com
   smtp_server 127.0.0.1
   smtp_connect_timeout 30
   router_id LVS_DEVEL
}

vrrp_instance VI_1 {
    state MASTER
    interface eno16777728
    virtual_router_id 51
    priority 101 #used in election, 101 for master & 100 for backup
    advert_int 1
    authentication {
        auth_type PASS
        auth_pass 1111
    }
```

```
    virtual_ipaddress {
        192.168.116.50/24
    }
}
```

Start and enable **keepalived** service.

```
[root@webserver-01 keepalived]# systemctl start keepalived ; systemctl enable keepa
ln -s '/usr/lib/systemd/system/keepalived.service' '/etc/systemd/system/multi-user.
```

Check IP Address of the server.

```
[root@webserver-01 keepalived]# ip addr | grep "inet" | grep "eno16777728"
    inet 192.168.116.31/24 brd 192.168.116.255 scope global eno16777728
    inet 192.168.116.50/24 scope global secondary eno16777728
[root@webserver-01 keepalived]#
```

You might observe that the Floating IP: **192.168.116.50** has been assigned to the network interface.

Configure KeepAlived on webserver-02:

Connect to **webserver-02.centlinux.com** and install **keepalived** by using **yum** command.

```
[root@webserver-02 ~]# yum install -y keepalived
Loaded plugins: langpacks, product-id, subscription-manager
This system is not registered to Red Hat Subscription Management. You can use subsc
localyum                                                 | 4.1 kB     00:00
nginx                                                    | 2.9 kB     00:01
rpmforge                                                 | 1.9 kB     00:00
Resolving Dependencies
--> Running transaction check
---> Package keepalived.x86_64 0:1.2.10-2.el7 will be installed
--> Processing Dependency: libnetsnmp.so.31()(64bit) for package: keepalived-1.2.10
--> Processing Dependency: libnetsnmpagent.so.31()(64bit) for package: keepalived-1
--> Processing Dependency: libnetsnmpmibs.so.31()(64bit) for package: keepalived-1.
--> Running transaction check
---> Package net-snmp-agent-libs.x86_64 1:5.7.2-18.el7 will be installed
---> Package net-snmp-libs.x86_64 1:5.7.2-18.el7 will be installed
--> Finished Dependency Resolution

Dependencies Resolved

================================================================================
 Package                 Arch        Version               Repository     Size
================================================================================
Installing:
 keepalived              x86_64      1.2.10-2.el7          localyum      218 k
Installing for dependencies:
 net-snmp-agent-libs     x86_64      1:5.7.2-18.el7        localyum      698 k
 net-snmp-libs           x86_64      1:5.7.2-18.el7        localyum      745 k

Transaction Summary
================================================================================
Install  1 Package (+2 Dependent packages)
```

```
Total download size: 1.6 M
Installed size: 5.6 M
Downloading packages:
--------------------------------------------------------------------------------
Total                                           11 MB/s | 1.6 MB  00:00
Running transaction check
Running transaction test
Transaction test succeeded
Running transaction
  Installing : 1:net-snmp-libs-5.7.2-18.el7.x86_64                         1/3
  Installing : 1:net-snmp-agent-libs-5.7.2-18.el7.x86_64                   2/3
  Installing : keepalived-1.2.10-2.el7.x86_64                              3/3
  Verifying  : 1:net-snmp-libs-5.7.2-18.el7.x86_64                         1/3
  Verifying  : 1:net-snmp-agent-libs-5.7.2-18.el7.x86_64                   2/3
  Verifying  : keepalived-1.2.10-2.el7.x86_64                              3/3

Installed:
  keepalived.x86_64 0:1.2.10-2.el7

Dependency Installed:
  net-snmp-agent-libs.x86_64 1:5.7.2-18.el7 net-snmp-libs.x86_64 1:5.7.2-18.el7

Complete!
```

Set Linux Kernel parameters as follows to support Floating IP.

```
[root@webserver-02 ~]# echo "net.ipv4.ip_nonlocal_bind = 1" >> /etc/sysctl.conf
[root@webserver-02 ~]# sysctl -p
net.ipv4.ip_nonlocal_bind = 1
```

Now configure **keepalived** settings.

```
[root@webserver-02 ~]# cd /etc/keepalived/
[root@webserver-02 keepalived]# mv keepalived.conf keepalived.conf.org
[root@webserver-02 keepalived]# vi keepalived.conf
```

Add following directives and save.

```
! Configuration File for keepalived

global_defs {
   notification_email {
  root@webserver-02.centlinux.com
   }
   notification_email_from root@webserver-02.centlinux.com
   smtp_server 127.0.0.1
   smtp_connect_timeout 30
   router_id LVS_DEVEL
}

vrrp_instance VI_1 {
    state BACKUP
    interface eno16777728
    virtual_router_id 51
    priority 100 #used in election, 101 for master & 100 for backup
    advert_int 1
```

```
    authentication {
        auth_type PASS
        auth_pass 1111
    }
    virtual_ipaddress {
        192.168.116.50/24
    }
}
```

Start and enable **keepalived** service.

```
[root@webserver-02 keepalived]# systemctl start keepalived ; systemctl enable keepa
ln -s '/usr/lib/systemd/system/keepalived.service' '/etc/systemd/system/multi-user.
```

Check IP Address of the server.

```
[root@webserver-02 keepalived]# ip addr | grep "inet" | grep "eno16777728"
    inet 192.168.116.32/24 brd 192.168.116.255 scope global eno16777728
    inet 192.168.116.50/24 scope global secondary eno16777728
[root@webserver-02 keepalived]#
```

You might observe that the Floating IP: **192.168.116.50** has been assigned to the network interface.

Testing KeepAlived Configuration:

Open the Floating IP Address **http://192.168.116.50** in a browser.

Refresh webpage multiple times, and you will always get the result from same server i.e. **webserver-01.centlinux.com**.

Now, make **webserver-01.centlinux.com** unavailable by disconnecting its network connection.

```
[root@webserver-01 ~]# nmcli c down eno16777728
```

Again Refresh your webpage.

You can see that, due to unavailability of **webserver-01.centlinux.com** the Floating IP is now moved to **webserver-02.centlinux.com**.

Conclusion:

We have successfully configured Floating IP by using KeepAlived in CentOS 7. This aricle is written completely in commandline environment, therefore if you feel any difficulty, then you should buy and read The Linux Command Line, 2nd Edition: A Complete Introduction by **William Shotts**.

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13 COMMENTS:

Anonymous

19 June 2019 at 13:18

very useful thanks alot

Reply

Anonymous

27 July 2019 at 12:52

Great explanation sir. Thankyou

Reply

Replies

Ahmer M

27 July 2019 at 19:51

My pleasure.

Reply

Anonymous

27 July 2019 at 12:55

small doubt after you moving the keepalived conf file from that path after that how you can open the .conf file from same path.

[root@webserver-02 ~]# cd /etc/keepalived/
[root@webserver-02 keepalived]# mv keepalived.conf keepalived.conf.org
[root@webserver-02 keepalived]# vi keepalived.conf (how can you open it from hear after .conf file is moved to keepa;ived.conf.org)

Reply

Replies

Ahmer M

27 July 2019 at 19:53

Hi,
The vi command creates an empty file and then we are adding configurations in it.
Hope it clarifies your doubt.

Reply

iZak

7 January 2020 at 17:41

Hello,

First of all, thank you for this valuable post.

I think you should change the parameter "state MASTER" in webserver-02 server to "state BACKUP"

Reply

Replies

Ahmer M

8 January 2020 at 19:02

Thanks for the correction.
The same has been updated above.

Reply

Bikash

27 October 2020 at 22:37

Hello, I am facing a problem with MASTER and BACKUP configuration. My MASTER interface in the "keealived.conf" is different than my BACKUP interface. Like your both MASTER and BACKUP interface name are same "interface eno16777728". So my setup is not working and browser not able to open page using Virtual IP. Any suggestion would be greatly appreciated.

Reply

Replies

Ahmer M

27 October 2020 at 22:47

By using nmcli, Rename your interfaces on the BACKUP system same as of MASTER.

Reply

Bikash

27 October 2020 at 22:50

Could you please provide me the complete command as I am not expert on this. Thanks a lot!!

Reply

Replies

Ahmer M

27 October 2020 at 23:35

Execute following two commands.

nmcli c del ens160
nmcli c add conn-name ens192 ifname ens160 type ethernet autoconnect yes

Please discuss it with me on Facebook, if the problem stand still.

Reply

Bikash

27 October 2020 at 22:59

I ran the command into MASTER: nmcli dev status
DEVICE TYPE STATE CONNECTION
ens192 ethernet connected ens192

I ran the command into BACKUP: nmcli dev status
DEVICE TYPE STATE CONNECTION
ens160 ethernet connected ens160

Reply

Unknown

14 September 2021 at 23:40

Thanks!! I was missing "echo "net.ipv4.ip_nonlocal_bind = 1" >> /etc/sysctl.conf" step. Now it's working and I understand how it works better.

Reply

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