Task:-11

Install and Configure HAProxy on CentOS 8

HAProxy is a **free, very fast** and **reliable reverse-proxy** offering high availability, load balancing.

 It is also particularly suited for very high traffic web sites, and power a significant.

we can say HAProxy is used to provide fault tolerance and high availability in case when one Pc/Node is getting too many concurrent requests. It is used by most famous web sites like **GitHub, Stack Overflow** and **Tumbler**.

Today, we have install haproxy and also configuration on CentOS-8,we have used three Virtual Machine.

1. Haproxy_Server IP Address :- **192.168.122.244**

2. Nginx_Node_01 IP Address :- **192.168.122.48**

3. Nginx_Node_02 IP Address :- **192.168.122.83**

STEP:1

First of all, I will search where i install haproxy add the following line in **/etc/hosts** file.

192.168.122.244   haproxy_server

192.168.122.48   Nginx_Node_01

192.168.122.83   Nginx_Node_02

After that update and save then you can ping both nginx nodes.

```
[root@haproxy_Server ~]# ping 192.168.122.244
PING 192.168.122.244 (192.168.122.244) 56(84) bytes of data.
64 bytes from 192.168.122.244: icmp_seq=1 ttl=64 time=0.163 ms
64 bytes from 192.168.122.244: icmp_seq=2 ttl=64 time=0.165 ms
64 bytes from 192.168.122.244: icmp_seq=3 ttl=64 time=0.197 ms
^C
```

Nginx_Node_01 ping on **192.168.122.244**

```
[root@Nginx_Node_01 ~]# ping 192.168.122.83
PING 192.168.122.83 (192.168.122.83) 56(84) bytes of data.
64 bytes from 192.168.122.83: icmp_seq=1 ttl=64 time=1.29 ms
64 bytes from 192.168.122.83: icmp_seq=2 ttl=64 time=0.944 ms
^C
```

Nginx_Node_02 ping on **192.168.122.48**

```
[root@Nginx_Node_02 ~]# ping 192.168.122.244
PING 192.168.122.244 (192.168.122.244) 56(84) bytes of data.
64 bytes from 192.168.122.244: icmp_seq=1 ttl=64 time=0.990 ms
64 bytes from 192.168.122.244: icmp_seq=2 ttl=64 time=0.781 ms
64 bytes from 192.168.122.244: icmp_seq=3 ttl=64 time=0.928 ms
64 bytes from 192.168.122.244: icmp_seq=4 ttl=64 time=0.928 ms
^C
```

STEP:- 2 Install and Configuration Haproxy

First of all, Haproxy package is available in the default package repositories of CentOS 8 , so it can be easily installed with **Yum command**. You can run execute the following command.

[root@haproxy_Server ~]# **yum install haproxy**

```
[root@haproxy_Server ~]# yum install haproxy
Last metadata expiration check: 0:10:15 ago on Wednesday 19 January 2022 09:37:16 PM IST.
Dependencies resolved.
================================================================================
 Package                          Architecture              Version
================================================================================
Installing:
 haproxy          ◄────────────────── x86_64                 1.8.27-2.el8

Transaction Summary
================================================================================
Install  1 Package
```

when haproxy pacakege successfully installed after that i can configuration and file **/etc/haproxy/haproxy.cfg**

[root@haproxy_Server haproxy]#**vim /etc/haproxy/haproxy.cfg**

In configuration file,i will modifiy two sections **frontend** and **backend** . In frontend section IP and its port , stats uri and backend name.In Backend section i define the type of **load balance** algorithm i will use like **round robin** & least connection and also addition backend server's name, IPs and port, as you can see given bellow.

 Save and Exit the file.

```
#
frontend http_balancer
    bind 192.168.122.244:80
    option http-server-close
    option forwardfor
    stats uri /haproxy?stats
#   bind *:5000
#   acl url_static       path_beg       -i /static /images /javascript /stylesheets
#   acl url_static       path_end       -i .jpg .gif .png .css .js

#   use_backend static          if url_static
    default_backend            nginx_webservers

#---------------------------------------------------------------
# static backend for serving up images, stylesheets and such
#---------------------------------------------------------------
#backend static

#   balance       roundrobin
#   server        static 127.0.0.1:4331 check


#---------------------------------------------------------------
# round robin balancing between the various backends
#---------------------------------------------------------------
backend nginx_webservers
    balance  roundrobin
    mode     http
    balance  roundrobin
    option httpchk HEAD / HTTP/1.1\r\nHost:\ localhost
    server   Nginx_Node_01 192.168.122.48:80 check
    server   Nginx_Node_02 192.168.122.83:80 check

#   server   app1 127.0.0.1:5001 check
#   server   app2 127.0.0.1:5002 check
#   server   app3 127.0.0.1:5003 check
#   server   app4 127.0.0.1:5004 check
"haproxy.cfg" 101L, 3646C
```

Configure rsyslog so that edit rsyslog config file **"/etc/rsyslog.conf"** and uncomment line 19 and 20,
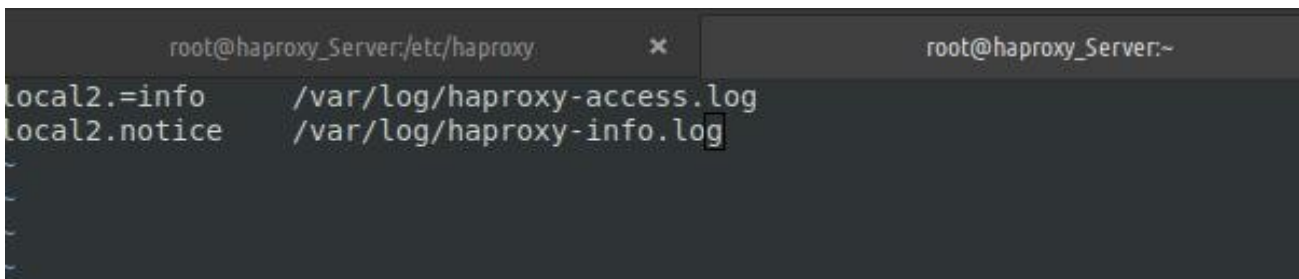
[root@haproxy_Server ~]#**vim /etc/rsyslog.conf**

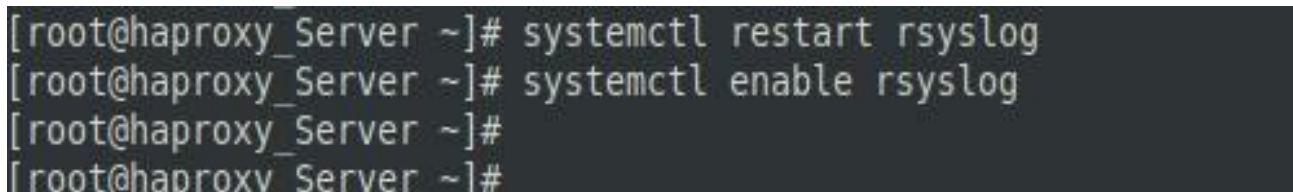**module(load="imudp")**

input(type="imudp" port="514")

Save and Exit the File.

Now i create haproxy .conf file for rsyslog, paste given bellow line in this file.

[root@haproxy_Server ~]# **vim /etc/rsyslog.conf**

```
        root@haproxy_Server:/etc/haproxy          ✕          root@haproxy_Server:~

local2.=info      /var/log/haproxy-access.log
local2.notice     /var/log/haproxy-info.log
```
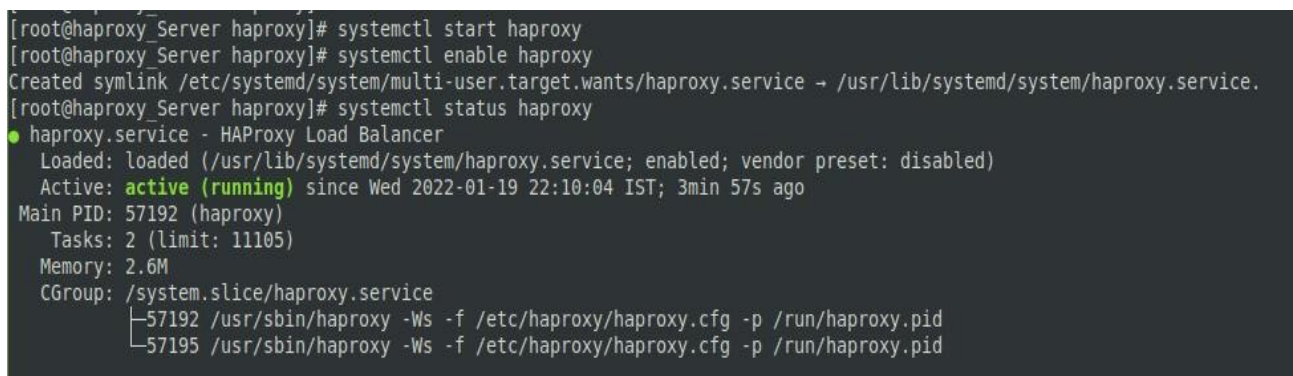
After update above two line then you can save and Exit file.You can complete all then you can Restart and enable rsyslog service as you can see given bellow.

```
[root@haproxy_Server ~]# systemctl restart rsyslog
[root@haproxy_Server ~]# systemctl enable rsyslog
[root@haproxy_Server ~]#
[root@haproxy_Server ~]#
```

Now finally start haproxy but before starting haproxy service, set the following selinux rule,

[root@haproxy_Server ~]# **setsebool -P haproxy_connect_any 1**

After that you can start and enable haproxy using systemctl using following command .

```
[root@haproxy_Server haproxy]# systemctl start haproxy
[root@haproxy_Server haproxy]# systemctl enable haproxy
Created symlink /etc/systemd/system/multi-user.target.wants/haproxy.service → /usr/lib/systemd/system/haproxy.service.
[root@haproxy_Server haproxy]# systemctl status haproxy
● haproxy.service - HAProxy Load Balancer
   Loaded: loaded (/usr/lib/systemd/system/haproxy.service; enabled; vendor preset: disabled)
   Active: active (running) since Wed 2022-01-19 22:10:04 IST; 3min 57s ago
 Main PID: 57192 (haproxy)
    Tasks: 2 (limit: 11105)
   Memory: 2.6M
   CGroup: /system.slice/haproxy.service
           ├─57192 /usr/sbin/haproxy -Ws -f /etc/haproxy/haproxy.cfg -p /run/haproxy.pid
           └─57195 /usr/sbin/haproxy -Ws -f /etc/haproxy/haproxy.cfg -p /run/haproxy.pid
```

Allow the haproxy port (Port 80) in OS firewall, execute the beneath firewall-cmd command.

```
[root@haproxy_Server haproxy]# firewall-cmd --permanent --add-port=80/tcp
success
[root@haproxy_Server haproxy]# firewall-cmd --reload  ←
success
[root@haproxy_Server haproxy]#
```

All setting and configuration for haproxy-server are completed successfully.After that i can

configuration Client for nginx both nodes.

STEP:-4

In the section i will install nginx both virtual machine i am already define above, so first i install
nginx in first Node .

```
[root@Nginx_Node_01 ~]# yum install nginx -y
Last metadata expiration check: 10:42:31 ago on Wednesday 19 January 2022 11:32:38 AM IST.
Package nginx-1:1.14.1-9.module_el8.0.0+184+e34fea82.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
```

After that you can start and enable nginx service systemctl using following command .

```
[root@Nginx_Node_01 ~]# systemctl start nginx
[root@Nginx_Node_01 ~]# systemctl enable nginx
[root@Nginx_Node_01 ~]# systemctl status nginx
● nginx.service - The nginx HTTP and reverse proxy server
   Loaded: loaded (/usr/lib/systemd/system/nginx.service; enabled; vendor preset: disabled)
   Active: active (running) since Wed 2022-01-19 21:25:23 IST; 50min ago
 Main PID: 1452 (nginx)  ◄
    Tasks: 3 (limit: 8048)
   Memory: 14.7M
   CGroup: /system.slice/nginx.service
           ├─1452 nginx: master process /usr/sbin/nginx
           ├─1457 nginx: worker process
           └─1458 nginx: worker process
```

Here i modify index.html file for respective both Node /Virtula machine as you can see bellow.

For---- Nginx_Node_01

```
[root@Nginx_Node_01 ~]# cd /usr/share/nginx/html
[root@Nginx_Node_01 html]# ls
404.html  50x.html  index.html  nginx-logo.png  poweredby.png  ◄
[root@Nginx_Node_01 html]# echo "Nginx Node01 - Welcome to My First Nginx Web Server" > index.html
[root@Nginx_Node_01 html]#
[root@Nginx_Node_01 html]#
```

For---- Nginx_Node_02

```
[root@Nginx_Node_02 ~]# systemctl start nginx
[root@Nginx_Node_02 ~]# systemctl enable nginx
[root@Nginx_Node_02 ~]# systemctl status nginx
● nginx.service - The nginx HTTP and reverse proxy server
   Loaded: loaded (/usr/lib/systemd/system/nginx.service; enabled; vendor preset: disabled)
   Active: active (running) since Wed 2022-01-19 21:27:32 IST; 49min ago
 Main PID: 1437 (nginx)
    Tasks: 3 (limit: 8048)
   Memory: 14.3M
   CGroup: /system.slice/nginx.service
           ├─1437 nginx: master process /usr/sbin/nginx
           ├─1438 nginx: worker process
           └─1439 nginx: worker process
[root@Nginx_Node_02 ~]# cd /usr/share/nginx/html
[root@Nginx_Node_02 html]#
[root@Nginx_Node_02 html]# echo "Nginx Node02 - Welcome to My 2nd Nginx Web Server" > index.html
```

Allow Nginx port (80) in the firewall in both Virtual Machine using below command.

```
[root@Nginx_Node_01 html]# firewall-cmd --permanent --add-service=http
Warning: ALREADY_ENABLED: http
success
[root@Nginx_Node_01 html]#
[root@Nginx_Node_01 html]# firewall-cmd --reload
success
[root@Nginx_Node_01 html]# systemctl status firewalld
● firewalld.service - firewalld - dynamic firewall daemon
   Loaded: loaded (/usr/lib/systemd/system/firewalld.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2022-01-19 21:25:15 IST; 57min ago
```

STEP:-5

First i will Login to haproxy server and run the curl command couple of times to see whether traffic is distributed in round-robin way.

```
[root@haproxy_Server haproxy]# curl 192.168.122.244
Nginx Node01 - Welcome to My First Nginx Web Server
[root@haproxy_Server haproxy]# curl 192.168.122.244
Nginx Node02 - Welcome to My 2nd Nginx Web Server
[root@haproxy_Server haproxy]# curl 192.168.122.244
Nginx Node01 - Welcome to My First Nginx Web Server
[root@haproxy_Server haproxy]# vim haproxy.cfg
[root@haproxy_Server haproxy]# 
```

this confirms haproxy is working properly as it is given traffic between two nodes as you can see.

Let's i am verify from the Web browser and check where is working properly or not.

```
←  →  C   ⚠ Not secure | 192.168.122.244
⠿ Apps  M Gmail  ▶ YouTube  ♀ Maps

Nginx Node01 - Welcome to My First Nginx Web Server
```

You can see Above and bellow browser confirms that HAProxy has configured successfully on CentOS 8.

HAProxy version 1.8.27-493ce0b, released 2020/11/06
Statistics Report for pid 58190

We can also view HAProxy statistics from log file **(/var/log/haproxy-access.log)**.

```
[root@haproxy_Server ~]# tail -f /var/log/haproxy-access.log
Jan 19 23:19:54 localhost haproxy[58190]: 192.168.122.244:36552 [19/Jan/2022:23:19:54.694] http_balancer nginx_webservers/Nginx_Node_02 0/0/1/2/3 200 281 - - ---- 1/1/0/0/0 0/0 "GET / HTTP/1.1"
Jan 19 23:19:56 localhost haproxy[58190]: 192.168.122.244:36560 [19/Jan/2022:23:19:56.173] http_balancer nginx_webservers/Nginx_Node_01 0/0/1/2/3 200 283 - - ---- 1/1/0/0/0 0/0 "GET / HTTP/1.1"
Jan 19 23:20:04 localhost haproxy[58190]: 192.168.122.1:35786 [19/Jan/2022:23:20:04.834] http_balancer http_balancer/<STATS> 0/0/0/0/0 200 14762 - - LR-- 1/1/0/0/0 0/0 "GET /haproxy?stats HTTP/1.1"
Jan 19 23:20:05 localhost haproxy[58190]: 192.168.122.1:35786 [19/Jan/2022:23:20:05.279] http_balancer nginx_webservers/Nginx_Node_02 0/0/1/21/22 404 4144 - - ---- 2/2/0/0/0 0/0 "GET /favicon.ico HTTP/1.1"
Jan 19 23:20:15 localhost haproxy[58190]: 192.168.122.1:35790 [19/Jan/2022:23:20:15.363] http_balancer nginx_webservers/Nginx_Node_01 0/0/1/1/2 200 283 - - ---- 1/1/0/0/0 0/0 "GET / HTTP/1.1"
Jan 19 23:20:22 localhost haproxy[58190]: 192.168.122.1:35790 [19/Jan/2022:23:20:22.364] http_balancer nginx_webservers/Nginx_Node_02 0/0/0/6/7 200 281 - - ---- 2/2/0/0/0 0/0 "GET / HTTP/1.1"
Jan 19 23:20:23 localhost haproxy[58190]: 192.168.122.1:35790 [19/Jan/2022:23:20:23.931] http_balancer nginx_webservers/Nginx_Node_01 0/0/1/1/3 200 283 - - ---- 2/2/0/0/0 0/0 "GET / HTTP/1.1"
Jan 19 23:20:24 localhost haproxy[58190]: 192.168.122.1:35790 [19/Jan/2022:23:20:24.974] http_balancer nginx_webservers/Nginx_Node_02 0/0/2/0/4 200 281 - - ---- 2/2/0/0/0 0/0 "GET / HTTP/1.1"
Jan 19 23:20:26 localhost haproxy[58190]: 192.168.122.1:35790 [19/Jan/2022:23:20:26.162] http_balancer nginx_webservers/Nginx_Node_01 0/0/1/2/3 200 283 - - ---- 2/2/0/0/0 0/0 "GET / HTTP/1.1"
Jan 20 00:39:47 localhost haproxy[58190]: 192.168.122.1:35946 [20/Jan/2022:00:39:47.361] http_balancer http_balancer/<STATS> 0/0/0/1/1 200 15042 - - LR-- 2/2/0/0/0 0/0 "GET /haproxy?stats HTTP/1.1"

Jan 20 00:43:22 localhost haproxy[58190]: 192.168.122.1:35952 [20/Jan/2022:00:43:22.359] http_balancer http_balancer/<STATS> 0/0/0/0/1 200 15046 - - LR-- 2/2/0/0/0 0/0 "GET /haproxy?stats HTTP/1.1"
Jan 20 00:43:27 localhost haproxy[58190]: 192.168.122.1:35952 [20/Jan/2022:00:43:27.312] http_balancer http_balancer/<STATS> 0/0/0/0/0 200 15046 - - LR-- 2/2/0/0/0 0/0 "GET /haproxy?stats HTTP/1.1"
```

Thursday January 20,12:45:44 AM