Webserver farm behind Load Balancer Proxy or how to preserve incoming internet IP to local net IP Apache webservers by adding additional haproxy header with remoteip

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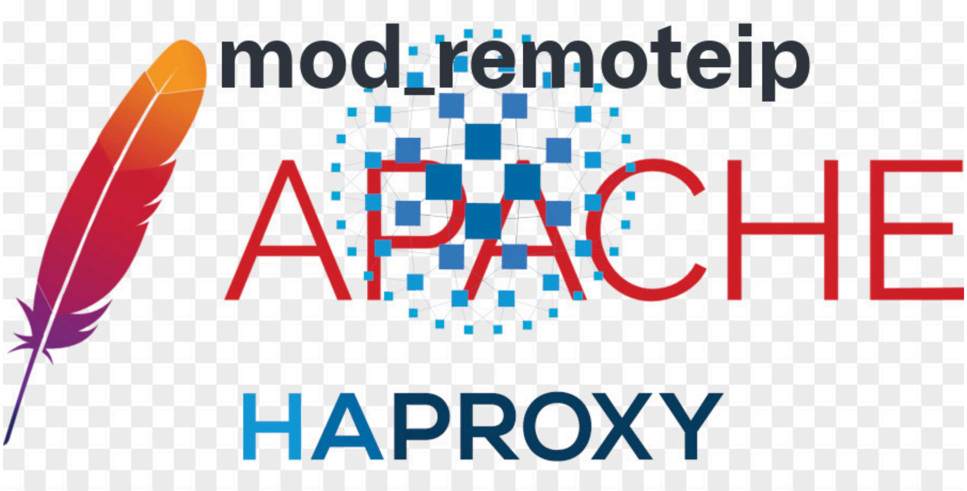
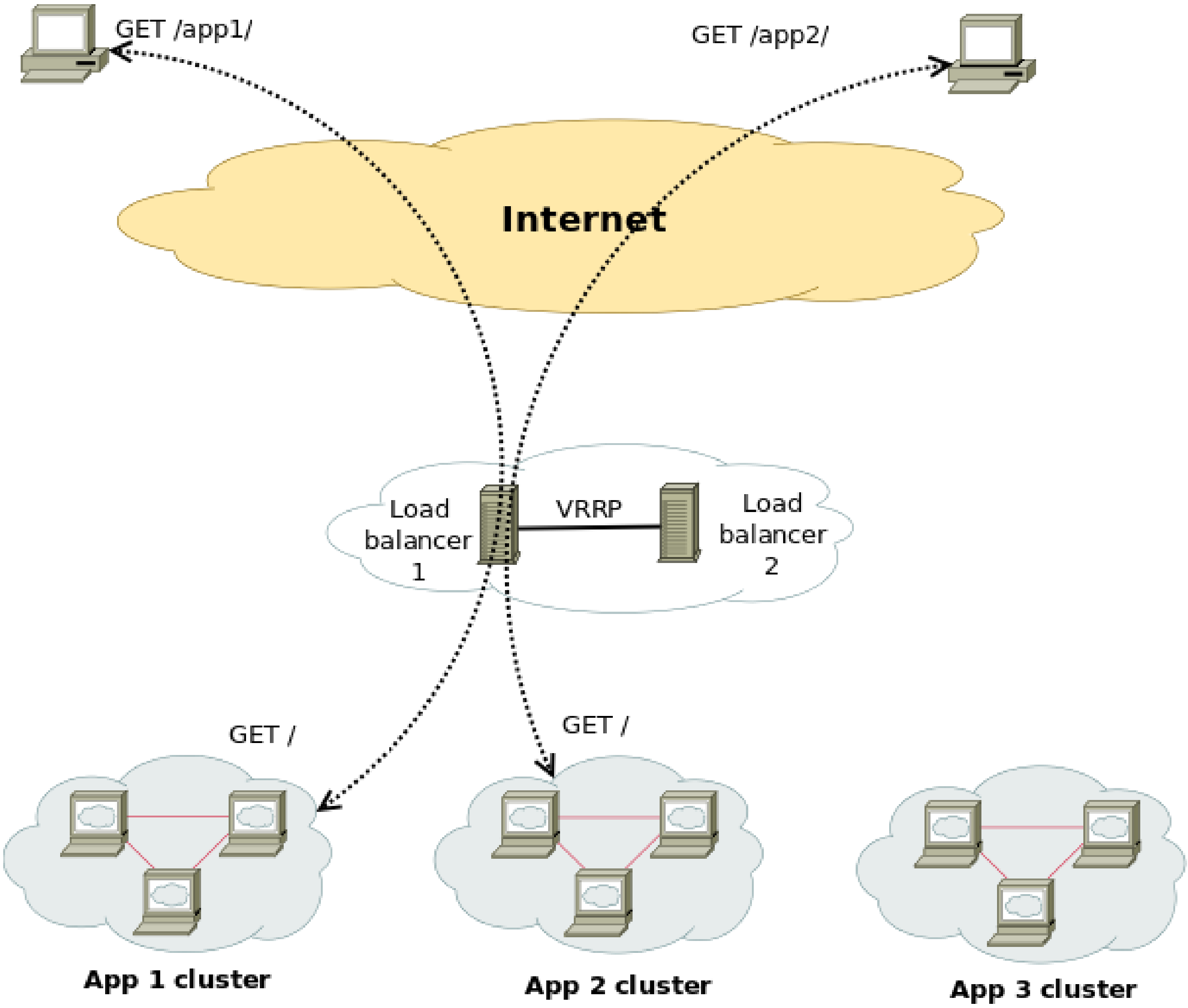


Having a Proxy server for Load Balancing is a common solutions to assure High Availability of Web Application service behind a proxy.
You can have for example 1 Apache HTTPD webservers serving traffic Actively on one Location (i.e. one city or Country) and 3 configured in the F5 LB or haproxy to silently keep up and wait for incoming connections as an ***(Active Failure) Backup solution***.

Lets say the Webservers usually are set to have local class C IPs as 192.168.0.XXX or 10.10.10.XXX and living in isolated DMZed well firewalled LAN network and Haproxy is configured to receive traffic via a Internet IP **109.104.212.13** address and send the traffic in **mode tcp** via a NATTed connection (e.g. due to the network address translation the source IP of the incoming connections from Intenet clients appears as the NATTed IP **192.168.1.50**.

The result is that all incoming connections from ***haproxy -> webservers*** will be logged in Webservers **/var/log/apache2/access.log** wrongly as incoming from source IP: **192.168.1.50,** meaning all the information on the source Internet Real IP gets lost.



How to pass Real (Internet) Source IPs from Haproxy "mode tcp" to Local LAN Webservers ?

Usually the normal way to work around this with Apache Reverse Proxies configured is to use **HTTP_X_FORWARDED_FOR** variable in haproxy when using *HTTP traffic application* that is proxied (.e.g haproxy.cfg has **mode http** configured), you have to add to **listen** *listener_name* directive or **frontend** Frontend_of_proxy

```
option forwardfor
```

option http-server-close

However unfortunately, IP Header preservation with ***X_FORWADED_FOR HTTP-Header*** is not possible when haproxy is configured to forward traffic using **mode tcp**.

Thus when you're forced to use **mode tcp to completely pass any traffic incoming to Haproxy from itself to End side, the** solution is to

- Use **mod_remoteip** infamous module that is part of standard Apache installs both on apache2 installed from (.deb) package or httpd rpm (on redhats / centos).

1. Configure Haproxies to send received connects as send-proxy traffic

The idea is very simple all the received requests from outside clients to Haproxy are to be send via the haproxy to the webserver in a PROXY protocol string, this is done via send-proxy

send-proxy* - *send a PROXY protocol string

Rawly my current **/etc/haproxy/haproxy.cfg** looks like this:

```
global
    log /dev/log    local0
    log /dev/log    local1 notice
    chroot /var/lib/haproxy
    user haproxy
    group haproxy
    daemon
    maxconn 99999
    nbproc          1
    nbthread 2
    cpu-map         1 0
    cpu-map         2 1
```

```
defaults
    log     global
    mode    tcp

    timeout connect 5000
    timeout connect 30s
    timeout server 10s

   timeout queue 5s
  timeout tunnel 2m
  timeout client-fin 1s
  timeout server-fin 1s

         option forwardfor

   retries                 15




 frontend http-in
        mode tcp

         option tcplog
    log global

         option logasap
        option forwardfor
        bind 109.104.212.130:80
  fullconn 20000
default_backend http-websrv
backend http-websrv
    balance source
        maxconn 3000

 stick match src
  stick-table type ip size 200k expire 30m
    stick on src

    server ha1server-1 192.168.0.205:80 check send-proxy weight 254 backup
    server ha1server-2 192.168.1.15:80 check send-proxy weight 255
    server ha1server-3 192.168.2.30:80 check send-proxy weight 252 backup
    server ha1server-4 192.168.1.198:80 check send-proxy weight 253 backup
        server ha1server-5 192.168.0.1:80 maxconn 3000 check send-proxy weight 251 backup
 frontend https-in
        mode tcp

         option tcplog
        log global

         option logasap
        option forwardfor
    maxconn 99999
     bind 109.104.212.130:443
    default_backend https-websrv
        backend https-websrv
    balance source
        maxconn 3000
    stick on src
  stick-table type ip size 200k expire 30m

        server ha1server-1 192.168.0.205:443 maxconn 8000 check send-proxy weight 254
backup
        server ha1server-2 192.168.1.15:443 maxconn 10000 check send-proxy weight 255
    server ha1server-3 192.168.2.30:443 maxconn 8000 check send-proxy weight 252 backup
    server ha1server-4 192.168.1.198:443 maxconn 10000 check send-proxy weight 253 backup
        server ha1server-5 192.168.0.1:443 maxconn 3000 check send-proxy weight 251
backup

 listen stats
  mode http
  option httplog
  option http-server-close
  maxconn 10
  stats enable
  stats show-legends
  stats refresh 5s
  stats realm Haproxy\ Statistics
  stats admin if TRUE
```

After preparing your haproxy.cfg and reloading haproxy in /var/log/haproxy.log you should have the

Real Source IPs logged in:

```
root@webserver:~# tail -n 10 /var/log/haproxy.log
Apr 15 22:47:34 pcfr_hware_local_ip haproxy[2914]: 159.223.65.16:58735
[15/Apr/2022:22:47:34.586] https-in https-websrv/ha1server-2 1/0/+0 +0 -- 7/7/7/7/0 0/0
Apr 15 22:47:34 pcfr_hware_local_ip haproxy[2914]: 20.113.133.8:56405
[15/Apr/2022:22:47:34.744] https-in https-websrv/ha1server-2 1/0/+0 +0 -- 7/7/7/7/0 0/0
Apr 15 22:47:35 pcfr_hware_local_ip haproxy[2914]: 54.36.148.248:15653
[15/Apr/2022:22:47:35.057] https-in https-websrv/ha1server-2 1/0/+0 +0 -- 7/7/7/7/0 0/0
Apr 15 22:47:35 pcfr_hware_local_ip haproxy[2914]: 185.191.171.35:26564
[15/Apr/2022:22:47:35.071] https-in https-websrv/ha1server-2 1/0/+0 +0 -- 8/8/8/8/0 0/0
Apr 15 22:47:35 pcfr_hware_local_ip haproxy[2914]: 213.183.53.58:42984
[15/Apr/2022:22:47:35.669] https-in https-websrv/ha1server-2 1/0/+0 +0 -- 6/6/6/6/0 0/0
Apr 15 22:47:35 pcfr_hware_local_ip haproxy[2914]: 159.223.65.16:54006
[15/Apr/2022:22:47:35.703] https-in https-websrv/ha1server-2 1/0/+0 +0 -- 7/7/7/7/0 0/0
Apr 15 22:47:36 pcfr_hware_local_ip haproxy[2914]: 192.241.113.203:30877
[15/Apr/2022:22:47:36.651] https-in https-websrv/ha1server-2 1/0/+0 +0 -- 4/4/4/4/0 0/0
Apr 15 22:47:36 pcfr_hware_local_ip haproxy[2914]: 185.191.171.9:6776
[15/Apr/2022:22:47:36.683] https-in https-websrv/ha1server-2 1/0/+0 +0 -- 5/5/5/5/0 0/0
Apr 15 22:47:36 pcfr_hware_local_ip haproxy[2914]: 159.223.65.16:64310
[15/Apr/2022:22:47:36.797] https-in https-websrv/ha1server-2 1/0/+0 +0 -- 6/6/6/6/0 0/0
Apr 15 22:47:36 pcfr_hware_local_ip haproxy[2914]: 185.191.171.3:23364
[15/Apr/2022:22:47:36.834] https-in https-websrv/ha1server-2 1/1/+1 +0 -- 7/7/7/7/0 0/0
```

2. Enable remoteip proxy protocol on Webservers

Login to each Apache HTTPD and ***to enable remoteip module*** run:

```
# a2enmod remoteip
```

On Debians, the command should produce a right symlink to **mods-enabled/** directory

```
# ls -al /etc/apache2/mods-enabled/*remote*
lrwxrwxrwx 1 root root 31 Mar 30  2021 /etc/apache2/mods-enabled/remoteip.load -> ../mods-available/remoteip.load
```

3. Modify remoteip.conf file and allow IPs of haproxies or F5s

Configure RemoteIPTrustedProxy for every Source IP of haproxy to allow it to send X-Forwarded-For header to Apache,

Here are few examples, from my apache working config on ***Debian 11.2 (Bullseye)***:

```
webserver:~# cat remoteip.conf
RemoteIPHeader X-Forwarded-For
RemoteIPTrustedProxy 192.168.0.1
RemoteIPTrustedProxy 192.168.0.205
RemoteIPTrustedProxy 192.168.1.15
RemoteIPTrustedProxy 192.168.0.198
RemoteIPTrustedProxy 192.168.2.33
RemoteIPTrustedProxy 192.168.2.30
RemoteIPTrustedProxy 192.168.0.215
#RemoteIPTrustedProxy 51.89.232.41
```

On RedHat / Fedora other RPM based Linux distrubutions, you can do the same by including inside httpd.conf or virtualhost configuration something like:

```
RemoteIPHeader X-Forwarded-For
RemoteIPInternalProxy 192.168.0.0/16
RemoteIPTrustedProxy 192.168.0.215/32
```

4. Enable RemoteIP Proxy Protocol in apache2.conf / httpd.conf or Virtualhost custom config

Modify both haproxy / haproxies config as well as enable the **RemoteIP** module on Apache webservers (**VirtualHosts** if such used) and either in block or in main http config include:

```
RemoteIPProxyProtocol On
```

5. Change default configured Apache LogFormat

In **Domain Vhost** or **apache2.conf / httpd.conf**

Default logging Format will be something like:

```
LogFormat "%h %l %u %t \"%r\" %>s %O \"%{Referer}i\" \"%{User-Agent}i\"" combined
```

or

```
LogFormat "%v:%p %h %l %u %t \"%r\" %>s %O \"%{Referer}i\" \"%{User-Agent}i\"" combined
```

Once you find it in **/etc/apache2/apache2.conf / httpd.conf** or **Vhost**, you have to comment out this by adding shebang infont of sentence make it look as follows:

```
LogFormat "%v:%p %a %l %u %t \"%r\" %>s %O \"%{Referer}i\" \"%{User-Agent}i\"" vhost_combined
LogFormat "%a %l %u %t \"%r\" %>s %O \"%{Referer}i\" \"%{User-Agent}i\"" combined
LogFormat "%a %l %u %t \"%r\" %>s %O" common
LogFormat "%{Referer}i -> %U" referer
LogFormat "%{User-agent}i" agent
```

The Changed LogFormat instructs Apache to log the client IP as recorded by mod_remoteip (%a) rather than hostname (%h). For a full explanation of all the options check the official HTTP Server documentation page apache_mod_config on Custom Log Formats.

and reload each Apache server.

on Debian:

```
# apache2ctl -k reload
```

On CentOS

```
# systemctl restart httpd
```

6. Check proxy protocol is properly enabled on Apaches

remoteip module will enable Apache to expect a proxy connect header passed to it otherwise it will respond with **Bad Request**, because it will detect a plain HTML request instead of Proxy Protocol CONNECT, here is the usual telnet test to fetch the index.htm page.

```
root@webserver:~# telnet localhost 80
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.
GET / HTTP/1.1

HTTP/1.1 400 Bad Request
Date: Fri, 15 Apr 2022 19:04:51 GMT
Server: Apache/2.4.51 (Debian)
Content-Length: 312
Connection: close
Content-Type: text/html; charset=iso-8859-1



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________________________________________
Apache/2.4.51 (Debian) Server at localhost Port 80

Connection closed by foreign host.
```

You can test with curl simulating the proxy protocol CONNECT with:

```
root@webserver:~# curl --insecure --haproxy-protocol https://192.168.2.30
```

_uacct = "UA-2102595-3";
urchinTracker();

var gaJsHost = (("https:" == document.location.protocol) ? "https://ssl." : "http://");
document.write(unescape("%3Cscript src='" + gaJsHost + "google-analytics.com/ga.js' type='text/javascript'%3E%3C/script%3E"));

try {
var pageTracker = _gat._getTracker("UA-2102595-6");
pageTracker._trackPageview();
} catch(err) {}

```
       --haproxy-protocol
              (HTTP) Send a HAProxy PROXY protocol v1 header at the beginning of the connection. This is used by some load balancers and reverse proxies
              to indicate the client's true IP address and port.

              This option is primarily useful when sending test requests to a service that expects this header.

              Added in 7.60.0.
```

7. Check apache log if remote Real Internet Source IPs are properly logged

```
 root@webserver:~# tail -n 10 /var/log/apache2/access.log

 213.183.53.58 - - [15/Apr/2022:22:18:59 +0300] "GET /proxy/browse.php?u=https%3A%2F%2
Fsteamcommunity.com%2Fmarket%2Fitemordershistogram%3Fcountry HTTP/1.1" 200 12701
"https://www.pc-freak.net" "Mozilla/5.0 (Windows NT 10.0; Win64; x64; rv:98.0)
Gecko/20100101 Firefox/98.0"
88.198.48.184 - - [15/Apr/2022:22:18:58 +0300] "GET /blog/iq-world-rank-country-smartest-
nations/?cid=1330192 HTTP/1.1" 200 29574 "-" "Mozilla/5.0 (compatible; DataForSeoBot/1.0;
+https://dataforseo.com/dataforseo-bot)"
213.183.53.58 - - [15/Apr/2022:22:19:00 +0300] "GET /proxy/browse.php?u=https%3A%2F%2F
steamcommunity.com%2Fmarket%2Fitemordershistogram%3Fcountry
HTTP/1.1" 200 9080 "https://www.pc-freak.net" "Mozilla/5.0 (Windows NT 10.0; Win64; x64;
rv:98.0) Gecko/20100101 Firefox/98.0"
159.223.65.16 - - [15/Apr/2022:22:19:01 +0300] "POST //blog//xmlrpc.php HTTP/1.1" 200 5477
"-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko)
Chrome/89.0.4389.114 Safari/537.36"
159.223.65.16 - - [15/Apr/2022:22:19:02 +0300] "POST //blog//xmlrpc.php HTTP/1.1" 200 5477
"-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko)
Chrome/89.0.4389.114 Safari/537.36"
213.91.190.233 - - [15/Apr/2022:22:19:02 +0300] "POST /blog/wp-admin/admin-ajax.php
HTTP/1.1" 200 1243 "https://www.pc-freak.net/blog/wp-
admin/post.php?post=16754&action=edit" "Mozilla/5.0 (Windows NT 6.1; Win64; x64; rv:89.0)
Gecko/20100101 Firefox/89.0"
46.10.215.119 - - [15/Apr/2022:22:19:02 +0300] "GET /images/saint-Paul-and-Peter-holy-
icon.jpg HTTP/1.1" 200 134501 "https://www.google.com/" "Mozilla/5.0 (Windows NT 10.0;
Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/100.0.4896.75 Safari/537.36
Edg/100.0.1185.39"
185.191.171.42 - - [15/Apr/2022:22:19:03 +0300] "GET
/index.html.latest/tutorials/tutorials/penguins/vestnik/penguins/faith/vestnik/ HTTP/1.1" 200
11684 "-" "Mozilla/5.0 (compatible; SemrushBot/7~bl; +http://www.semrush.com/bot.html)"

 116.179.37.243 - - [15/Apr/2022:22:19:50 +0300] "GET /blog/wp-content/cookieconsent.min.js
HTTP/1.1" 200 7625 "https://www.pc-freak.net/blog/how-to-disable-nginx-static-requests-access-
log-logging/" "Mozilla/5.0 (compatible; Baiduspider-render/2.0;
+http://www.baidu.com/search/spider.html)"
116.179.37.237 - - [15/Apr/2022:22:19:50 +0300] "GET /blog/wp-content/plugins/google-
analytics-dashboard-for-wp/assets/js/frontend-gtag.min.js?ver=7.5.0 HTTP/1.1" 200 8898
```

```
"https://www.pc-freak.net/blog/how-to-disable-nginx-static-requests-access-log-logging/"
"Mozilla/5.0 (compatible; Baiduspider-render/2.0; +http://www.baidu.com/search/spider.html)"
```

You see from above output remote Source IPs in green are properly logged, so haproxy Cluster is correctly forwarding connections passing on in the Haproxy generated Initial header the Real IP of its remote connect IPs.

Sum it up, What was done?

HTTP_X_FORWARD_FOR is impossible to set, when haproxy is used on mode tcp and all traffic is sent as received from TCP IPv4 / IPv6 Network stack, e.g. modifying any HTTP sent traffic inside the headers is not possible as this might break up the data.

Thus Haproxy was configured to send all its received data by sending initial proxy header with the X_FORWARDED usual Source IP data, then remoteip Apache module was used to make Apache receive and understand haproxy sent Header which contains the original Source IP via the send-proxy functionality and example was given on how to test the remoteip on Webserver is working correctly.

Finally you've seen how to check configured haproxy and webserver are able to send and receive the End Client data with the originator real source IP correctly and those Internet IP is properly logged inside both haproxy and apaches.