**HAProxy Load Balancer Project**

**Overview**

This project sets up HAProxy as a load balancer to distribute traffic between multiple backend web servers. It ensures high availability and scalability for web applications by balancing HTTP requests between multiple instances.

**Project Components**

* **HAProxy**: Acts as the load balancer.
* **Apache Web Servers**: Backend servers handling HTTP requests.
* **Ubuntu 24.04 LTS**: The operating system running HAProxy and Apache.
* **AWS EC2 Instances**: Hosting HAProxy and backend web servers.

**Architecture**

Client → HAProxy (Load Balancer) → Backend Servers (Apache)

HAProxy listens on port **80** (or 8080 if Apache is also running) and forwards traffic to the backend servers in a round-robin fashion.

**Prerequisites**

* A Linux server (Ubuntu 24.04 LTS)
* HAProxy installed (sudo apt install haproxy -y)
* Apache installed on backend servers (sudo apt install apache2 -y)
* AWS EC2 instances with security groups configured for HTTP traffic

**Configuration**

**1. Install HAProxy**

sudo apt update && sudo apt install haproxy -y

**2. Configure HAProxy**

Edit the HAProxy configuration file:

sudo nano /etc/haproxy/haproxy.cfg

Add the following configuration:

frontend http\_front

bind \*:80

default\_backend http\_back

backend http\_back

balance roundrobin

server web1 <Backend\_Server\_1\_IP>:80 check

server web2 <Backend\_Server\_2\_IP>:80 check

Replace <Backend\_Server\_1\_IP> and <Backend\_Server\_2\_IP> with the actual IPs of your backend web servers.

**3. Restart HAProxy**

sudo systemctl restart haproxy

**4. Handling Port Conflicts**

If Apache is running on the same server and using port 80, HAProxy will fail to start. You can either:

* **Stop Apache** (if only HAProxy is needed):
* sudo systemctl stop apache2
* sudo systemctl disable apache2
* sudo systemctl restart haproxy
* **Change HAProxy Port** (if Apache is required): Modify the bind directive in /etc/haproxy/haproxy.cfg to use a different port:
* frontend http\_front
* bind \*:8080
* default\_backend http\_back

Then restart HAProxy:

sudo systemctl restart haproxy

**Verification**

* Check HAProxy status:
* sudo systemctl status haproxy
* Test load balancing: Open a web browser and visit http://<HAProxy\_IP> (or http://<HAProxy\_IP>:8080 if using port 8080). Refresh the page multiple times to see traffic switching between backend servers.

**Troubleshooting**

* **Check HAProxy logs:**
* sudo journalctl -xeu haproxy
* **Test HAProxy configuration for errors:**
* sudo haproxy -f /etc/haproxy/haproxy.cfg -c
* **Verify running processes on port 80:**
* sudo netstat -tulnp | grep :80

**Conclusion**

This project successfully sets up HAProxy as a load balancer for web traffic distribution. It enhances reliability and scalability for web applications by forwarding HTTP requests between multiple backend servers efficiently.

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