

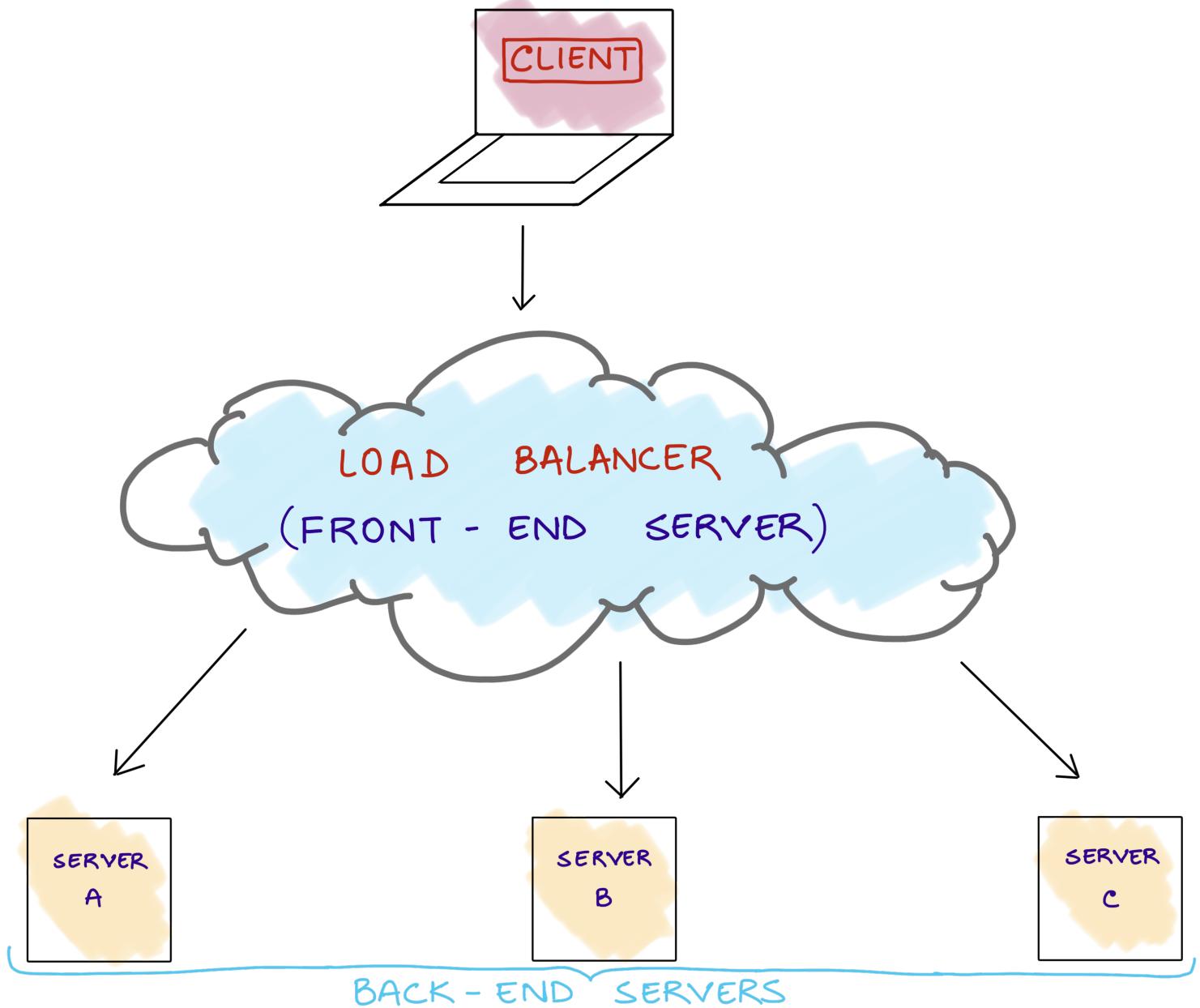
# Automating Webservers Using Ansible

(PERFORMED BY VINIT RAJ)

★ IN THIS PROJECT, WE'LL IMPLEMENT FOLLOWING OBJECTIVES:-

- SETTING UP LOAD BALANCER WHICH WILL WORK AS FRONT-END SERVER.
- USE OF ROUND ROBIN ALGORITHM IN LOAD BALANCING.
- USE OF 'HAProxy' AS FRONT END WEB SERVER.
- USE OF APACHE's HTTPD WEB SERVER AS BACKEND WEB SERVER.
- IMPLEMENT HORIZONTAL SCALING.

💡 DIAGRAMATIC REPRESENTATION OF OUR SETUP :-

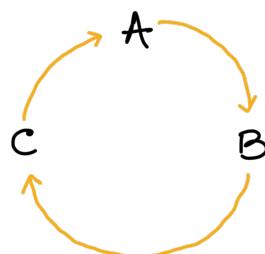


## ★ HOW DOES ROUND ROBIN ALGORITHM WORK?

→ In our case, the Round Robin algorithm will send connections to servers in CYCLIC ORDER.

- 1<sup>st</sup> CONNECTION: Server A.
- 2<sup>nd</sup> CONNECTION: Server B.
- 3<sup>rd</sup> CONNECTION: Server C.
- 4<sup>th</sup> CONNECTION: Server A.

PATTERN :-



★ HERE, OUR FRONT END SERVER ACTS AS 'REVERSE PROXY'.  
A reverse proxy is a server that sits in front of web-servers and forwards client requests to the backend web servers.

## ★ FUNCTIONING OF LOAD BALANCER (FRONT WEB SERVER) :-

- ① REQUEST FROM CLIENT GOES TO LOAD BALANCER.  
↓
- ② LOAD BALANCER CREATES A NEW REQUEST.  
↓
- ③ THIS NEW REQUEST IS SENT TO THE BACKEND SERVER.  
↓
- ④ BACKEND SERVERS SEND THE REQUESTED DATA TO LOAD BALANCER.  
↓
- ⑤ LOAD BALANCER SENDS THE RECEIVED DATA BACK TO CLIENT.

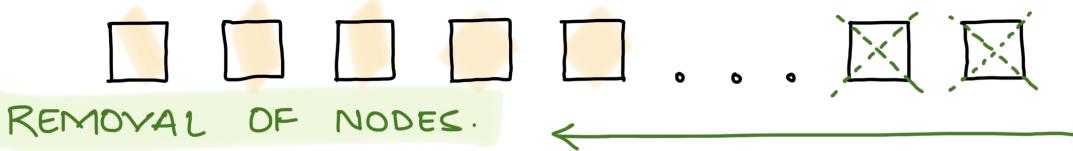
## ★ HORIZONTAL SCALING :-

Horizontal scaling refers to adding additional nodes or machines to the infrastructure to cope new demands.

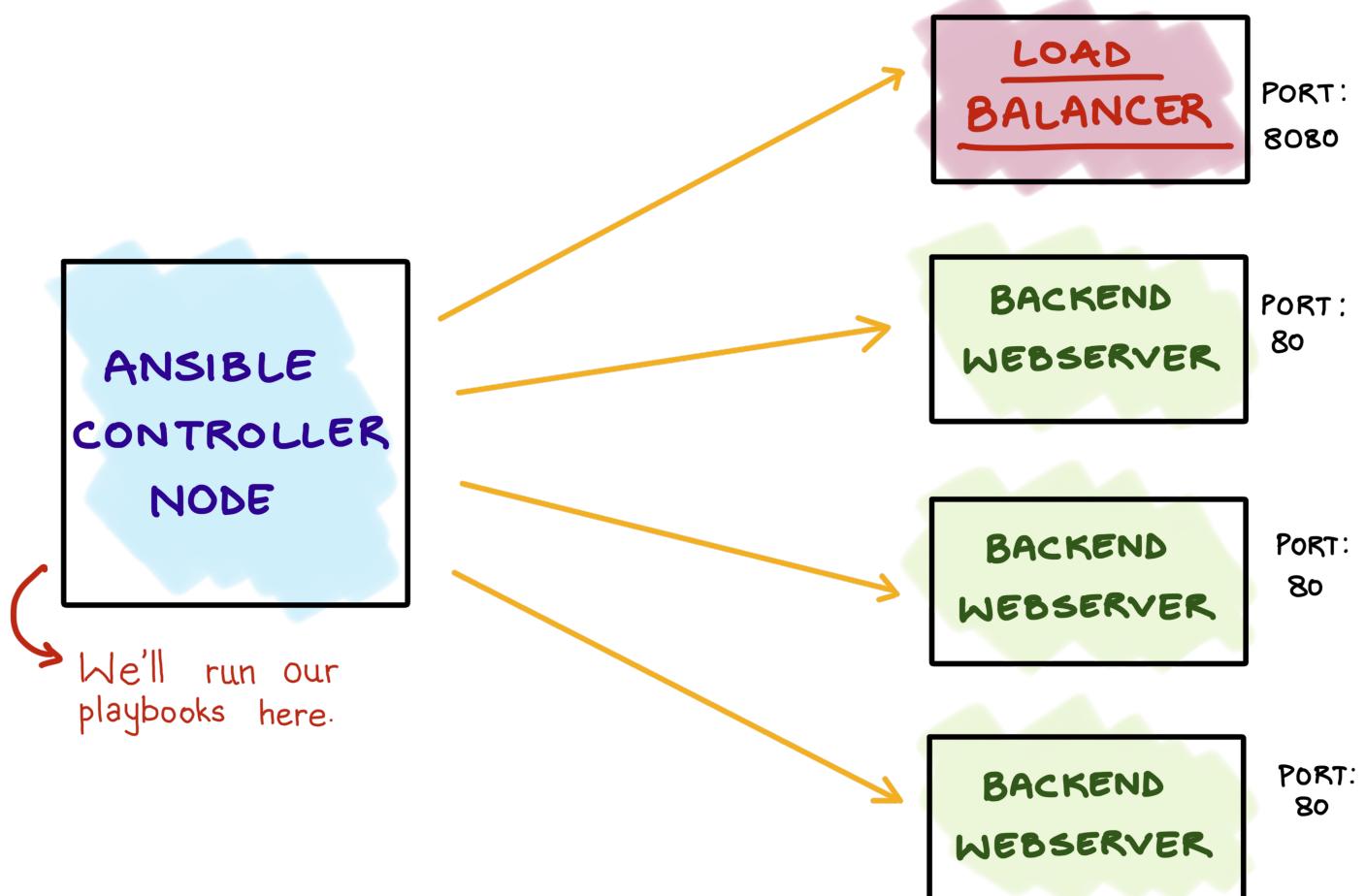
## ● SCALE OUT :-



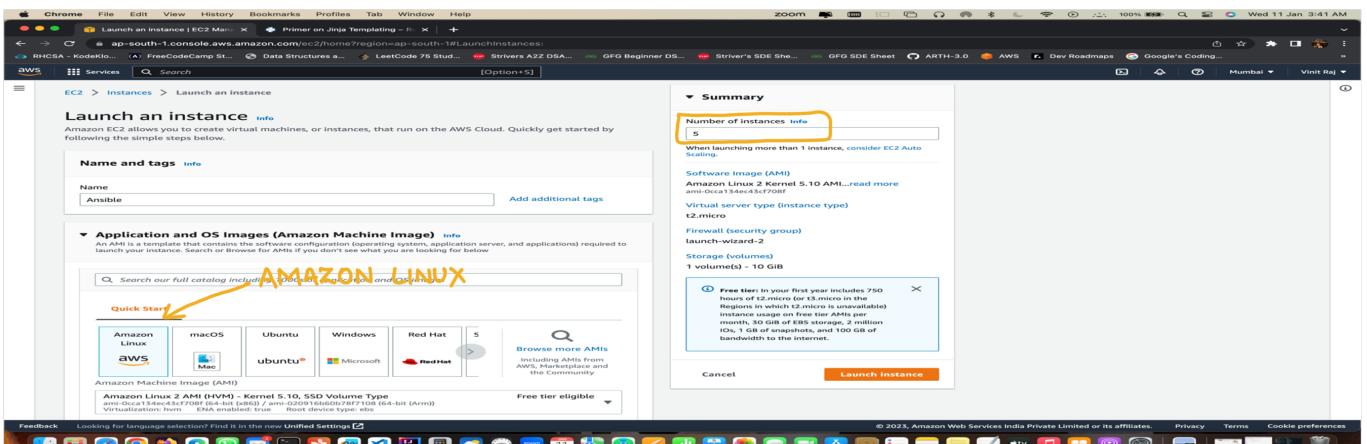
## ● SCALE IN :-



## ★ SCHEMATICS OF OUR SETUP :-



→ HERE, WE'LL LAUNCH 05 INSTANCES OF AMAZON LINUX .



**Instances (5/5) Info**

Find instance by attribute or tag (case-sensitive)

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 ...
Ansible-Controller	i-0286bcc313a4ac2b7	Running	t2.micro	-	No alarms	ap-south-1a	ec2-43-205-127-107.ap...	43.205.127.107
Ansible-Load Balancer	i-01c73ec72cae370b7	Running	t2.micro	-	No alarms	ap-south-1a	ec2-13-235-0-177.ap...	13.235.0.177
Ansible-WebServer1	i-084060a4533424ce9	Running	t2.micro	-	No alarms	ap-south-1a	ec2-3-110-102-42.ap...	3.110.102.42
Ansible-WebServer2	i-01e09c68e30580754	Running	t2.micro	-	No alarms	ap-south-1a	ec2-3-110-181-249.ap...	3.110.181.249
Ansible-WebServer3	i-0286cf6e20e54f187	Running	t2.micro	-	No alarms	ap-south-1a	ec2-65-2-182-99.ap...	65.2.182.99

**Instances: i-0286cf6e20e54f187 (Ansible-WebServer3), i-0286bcc313a4ac2b7 (Ansible-Controller), i-084060a4533424ce9 (Ansible-WebServer1), i-01c73ec72cae370b7 (Ansible-Load Balancer), i-01e09c68e30580754 (Ansible-WebServer2)**

**Monitoring**

1h 3h 12h 1d 3d 1w Custom Add to dashboard

**CPU utilization (%)** No data available. Try adjusting the dashboard time range.

**Status check failed (any) (count)** No data available. Try adjusting the dashboard time range.

**Status check failed (instance) (count)** No data available. Try adjusting the dashboard time range.

**Status check failed (system) (count)** No data available. Try adjusting the dashboard time range.

**Network in (bytes)** No data available. Try adjusting the dashboard time range.

**Network out (bytes)** No data available. Try adjusting the dashboard time range.

**Network packets in (count)** No data available. Try adjusting the dashboard time range.

**Network packets out (count)** No data available. Try adjusting the dashboard time range.

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→ MAKE SURE THAT CONNECTIONS ARE ALLOWED FROM ALL IP ADDRESSES AND FROM ALL PORT NUMBERS.



**Security details**

**Inbound rules**

Name	Security group rule ID	Port range	Protocol	Source	Security groups	Description
-	sgr-0d5169121a4c3314b	All	All	0.0.0.0/0	launch-wizard-2	-

**Outbound rules**

Name	Security group rule ID	Port range	Protocol	Destination	Security groups	Description
-	sgr-0a2e4879f4b76924d	All	All	0.0.0.0/0	launch-wizard-2	-

THIS SETUP IS IMPORTANT.

MAKE SURE THIS IS THE SETTING FOR ALL INSTANCES.

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## → NOW, INSTALL ANSIBLE IN ANSIBLE CONTROLLER NODE.

```
root@ip-172-31-38-1: ~# sudo amazon-linux-extras install ansible2 → COMMAND TO INSTALL ANSIBLE IN AMAZON LINUX.
Installing ansible
Loaded plugins: extras suggestions, langpacks, priorities, update-motd
Cleaning repos: amzn2-core amzn2extra-ansible2 amzn2extra-docker amzn2extra-kernel-5.10
17 metadata files removed
6 sqlite files removed
0 metadata files removed
Loaded plugins: extras suggestions, langpacks, priorities, update-motd
amzn2-core
amzn2extra-ansible2
amzn2extra-docker
amzn2extra-kernel-5.10
(1/9): amzn2-core/2/x86_64/group_gz
(2/9): amzn2-core/2/x86_64/updateinfo
(3/9): amzn2extra-docker/2/x86_64/primary_db
(4/9): amzn2extra-kernel-5.10/2/x86_64/updateinfo
(5/9): amzn2extra-ansible2/2/x86_64/updateinfo
(6/9): amzn2extra-ansible2/2/x86_64/primary_db
(7/9): amzn2extra-docker/2/x86_64/updateinfo
(8/9): amzn2extra-kernel-5.10/2/x86_64/primary_db
(9/9): amzn2-core/2/x86_64/primary_db
Resolving Dependencies
--> Running transaction check
--> Package ansible.noarch 0:2.9.23-1.amzn2 will be installed
--> Processing Dependency: sshpass for package: ansible-2.9.23-1.amzn2.noarch
--> Processing Dependency: python-paramiko for package: ansible-2.9.23-1.amzn2.noarch
--> Processing Dependency: python-keyczar for package: ansible-2.9.23-1.amzn2.noarch
--> Processing Dependency: python-httplib2 for package: ansible-2.9.23-1.amzn2.noarch
--> Processing Dependency: python-crypto for package: ansible-2.9.23-1.amzn2.noarch
--> Running transaction check
--> Package python-keyczar.noarch 0:0.71c-2.amzn2 will be installed
--> Package python2-crypto.x86_64 0:2.6.1-13.amzn2.0.3 will be installed
--> Processing Dependency: libtomcrypt.so.1() (64bit) for package: python2-crypto-2.6.1-13.amzn2.0.3.x86_64
--> Package python2-httplib2.noarch 0:0.18.1-3.amzn2 will be installed
--> Package python2-paramiko.noarch 0:1.16.1-3.amzn2.0.2 will be installed
--> Processing Dependency: python2-ecdsa for package: python2-paramiko-1.16.1-3.amzn2.0.2.noarch
--> Package sshpass.x86_64 0:1.06-1.amzn2.0.1 will be installed
--> Running transaction check
--> Package libtomcrypt.x86_64 0:1.18.2-1.amzn2.0.1 will be installed

i-0286bcc313a4ac2b7 (Ansible-Controller)
PublicIPs: 43.205.127.107 PrivateIPs: 172.31.38.1
```

## → NOW, ADD THE NODES IN ANSIBLE INVENTORY (# vim /etc/ansible/hosts)

```
# This is the default ansible 'hosts' file.
[load-balancer]
13.235.0.177 ansible_user=root ansible_password=vinitraj LOAD-BALANCER NODE ADDED IN ANSIBLE HOST.

[webserver]
3.110.102.42 ansible_user=root ansible_password=vinitraj WEB SERVER NODE ADDED IN ANSIBLE HOST.
3.110.181.249 ansible_user=root ansible_password=vinitraj

# It should live in /etc/ansible/hosts
#
# - Comments begin with the '#' character
# - Blank lines are ignored
# - Groups of hosts are delimited by [header] elements
# - You can enter hostnames or ip addresses
# - A hostname/ip can be a member of multiple groups

# Ex 1: Ungrouped hosts, specify before any group headers.
```

THIS INVENTORY IS CALLED STATIC INVENTORY. REASON BEING, IT CAN'T ADD HOST(S) AUTOMATICALLY, WE HAVE TO DO IT MANUALLY.

i-0286bcc313a4ac2b7 (Ansible-Controller)

PublicIPs: 43.205.127.107 PrivateIPs: 172.31.38.1

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ap-south-1.console.aws.amazon.com/ec2-instance-connect/ssh?connType=standard&instanceId=i-0286bcc313a4ac2b7&osUser=ec2-user&region=ap-south-1&sshPort=22#/

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```

60 mock2           available  [ =stable ]
61 dnsmasq2.85   available  [ =stable ]
62 kernel-5.15    available  [ =stable ]
63 postgresql14   available  [ =stable ]
64 firefox        available  [ =stable ]
65 lustre         available  [ =stable ]
66 php8.1         available  [ =stable ]
67 awsclil        available  [ =stable ]
[root@ip-172-31-38-1 ~]# vim /etc/ansible/hosts
[root@ip-172-31-38-1 ~]# ansible all --list-hosts
[WARNING]: Invalid characters were found in group names but not replaced, use -vvvv to see details
 hosts (3):
  3.110.102.42
  3.110.181.249
  13.235.0.177
[root@ip-172-31-38-1 ~]# vim /etc/ansible/hosts
[root@ip-172-31-38-1 ~]# ansible all --list-hosts
 hosts (3):
  3.110.102.42 → LOAD BALANCER
  3.110.181.249 } WEB-SERVERS
  13.235.0.177
[root@ip-172-31-38-1 ~]#

```

**COMMAND TO CHECK IF HOSTS HAVE BEEN ADDED CORRECTLY.**

i-0286bcc313a4ac2b7 (Ansible-Controller)

Public IPs: 43.205.127.107 Private IPs: 172.31.38.1

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→ NOW, TEST THE SSH CONNECTION WITH ALL THE NODES:-  
(# ssh root@[IP Addr.])

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ap-south-1.console.aws.amazon.com/ec2-instance-connect/ssh?connType=standard&instanceId=i-0286bcc313a4ac2b7&osUser=ec2-user&region=ap-south-1&sshPort=22#/

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```

[root@ip-172-31-45-196 ~]# logout
Connection to 3.110.102.42 closed.
[root@ip-172-31-38-1 ~]# ssh root@3.110.181.249
The authenticity of host '3.110.181.249 (3.110.181.249)' can't be established.
ECDSA key fingerprint is SHA256:fXJCpsjpszvIhe08I6wC3qYn+YORyaG5ZIVmC+e3eg4.
ECDSA key fingerprint is MD5:d8:52:d6:c6:d0:e5:54:e6:49:dd:ec:47:00:44:ff:6c.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '3.110.181.249' (ECDSA) to the list of known hosts.
root@3.110.181.249's password:
Last login: Tue Jan 10 22:47:42 2023

  _|_ ( _|_ )_ Amazon Linux 2 AMI
  _|_\_|__|_ |

https://aws.amazon.com/amazon-linux-2/
[root@ip-172-31-32-130 ~]# logout
Connection to 3.110.181.249 closed.
[root@ip-172-31-38-1 ~]# ssh root@65.2.182.99
The authenticity of host '65.2.182.99 (65.2.182.99)' can't be established.
ECDSA key fingerprint is SHA256:IV3yrQTVCAs5KJi13VoXQ0591wQ8CWogZTeIG03SF0Gc.
ECDSA key fingerprint is MD5:91:aa:05:67:1c:01:b8:10:b9:0f:56:dd:66:84:bd:d9.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '65.2.182.99' (ECDSA) to the list of known hosts.
root@65.2.182.99's password:
Last login: Tue Jan 10 22:49:38 2023

  _|_ ( _|_ / )_ Amazon Linux 2 AMI
  _|_\_|__|_ |

https://aws.amazon.com/amazon-linux-2/
[root@ip-172-31-39-228 ~]# logout
Connection to 65.2.182.99 closed.
[root@ip-172-31-38-1 ~]#

```

PERFORM THIS  
STEP BEFORE  
RUNNING ANY  
PLAYBOOK COMMAND.

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→ NOW, CHECK THE CONNECTION BETWEEN MANAGER AND CONTROLLER NODES :-

```
apple Chrome File Edit View History Bookmarks Profiles Tab Window Help zoom 100% 11 Jan 4:28 AM
Instances | EC2 Management EC2 Instance Connect Primer on Jinja Templating - R + ap-south-1.console.aws.amazon.com/ec2-instance-connect/ssh?connType=standard&instanceId=i-0286bcc313a4ac2b7&osUser=ec2-user&region=ap-south-1&sshPort=22#/ RHCSA - Kodekl... FreeCodeCamp St... Data Structures a... LeetCode 75 Stud... Strivers A2Z DSA... GFG Beginner DS... Striver's SDE She... GFG SDE Sheet ARTH-3.0 AWS Dev Roadmaps Google's Coding... »
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https://aws.amazon.com/amazon-linux-2/
[root@ip-172-31-39-228 ~]# logout
Connection to 65.2.182.99 closed.
[root@ip-172-31-38-1 ~]# ansible all -m ping COMMAND USED TO TEST THE CONNECTION.
[WARNING]: Platform linux on host 3.110.181.249 is using the discovered Python interpreter at /usr/bin/python, but future installation of another Python interpreter could change this. See https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html for more information.
3.110.181.249 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python"
  },
  "changed": false,
  "ping": "pong"
}
[WARNING]: Platform linux on host 3.110.102.42 is using the discovered Python interpreter at /usr/bin/python, but future installation of another Python interpreter could change this. See https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html for more information.
3.110.102.42 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python"
  },
  "changed": false,
  "ping": "pong"
}
[WARNING]: Platform linux on host 13.235.0.177 is using the discovered Python interpreter at /usr/bin/python, but future installation of another Python interpreter could change this. See https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html for more information.
13.235.0.177 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python"
  },
  "changed": false,
  "ping": "pong"
}
[root@ip-172-31-38-1 ~]#
```

→ INSIDE CONTROLLER NODE, WE'LL CREATE A DIRECTORY NAMED 'code' :- (# mkdir code) → (# cd code)

→ NOW, WE WILL CREATE PLAYBOOK FILE FOR LOAD-BALANCER WITH FOLLOWING CONTENT: (# vim lb.yml)

```
- hosts: loadbalancer    OUR HOST IS LOAD BALANCER.  
tasks:  
- name: "Installing HAProxy Load Balancer"  
  package:  
    name: "haproxy"      NAME OF THE LOAD BALANCING SERVICE WE'LL USE.  
    state: present  
  
- name: "Registering webservers by adding them in configuration file"  
  template:  
    src: "local.conf.j2"  HERE, INSTEAD OF COPY, WE'LL USE TEMPLATE (TO GET THE FUNCTIONALITIES OF JINJA TEMPLATING)  
    dest: "/etc/haproxy/haproxy.cfg"  
  
- name: "Starting the Load Balancer"  
  service:  
    name: "haproxy"  
    state: restarted  
    enabled: true
```

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ap-south-1.console.aws.amazon.com/ec2-instance-connect/ssh?connType=standard&instanceId=i-0286bcc313a4ac2b7&osUser=ec2-user&region=ap-south-1&sshPort=22#

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```
[root@ip-172-31-39-228 ~]# logout
Connection to 65.2.182.99 closed.
[root@ip-172-31-38-1 ~]# ansible all -m ping
[WARNING]: Platform linux on host 3.110.181.249 is using the discovered Python interpreter at /usr/bin/python, but future installation of another Python interpreter could change this. See https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html for more information.
3.110.181.249 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python"
    },
    "changed": false,
    "ping": "pong"
}
[WARNING]: Platform linux on host 3.110.102.42 is using the discovered Python interpreter at /usr/bin/python, but future installation of another Python interpreter could change this. See https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html for more information.
3.110.102.42 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python"
    },
    "changed": false,
    "ping": "pong"
}
[WARNING]: Platform linux on host 13.235.0.177 is using the discovered Python interpreter at /usr/bin/python, but future installation of another Python interpreter could change this. See https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html for more information.
13.235.0.177 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python"
    },
    "changed": false,
    "ping": "pong"
}
[root@ip-172-31-38-1 ~]# mkdir code
[root@ip-172-31-38-1 ~]# cd code
[root@ip-172-31-38-1 code]# vim lb.yml
[No write since last change]
/bin/bash: q: command not found
shell returned 127
Press ENTER or type command to continue
[root@ip-172-31-38-1 code]# vim lb.yml
[root@ip-172-31-38-1 code]# ansible-playbook --syntax-check lb.yml COMMAND TO CHECK THE SYNTAX.
playbook: lb.yml → THIS MEANS OUR PLAYBOOK FILE IS ERROR FREE!
[root@ip-172-31-38-1 code]#
```

# ansible-playbook --syntax-check filename.yml  
COMMAND TO CHECK ERROR IN PLAYBOOK FILE.

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Mac OS X Dock icons

→ NOW, WE'LL CREATE TEMPLATE CONFIGURATION FILE FOR HAProxy WHICH WILL REGISTER WEBSERVERS IN HAProxy :- (# vim local.conf.j2)

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**frontend loadbalancer** THIS MEANS LOADBALANCER NODE WILL BE USED AS FRONT END SERVER.

**bind \*:8080** THIS BINDS LOADBALANCER NODE WITH PORT NO. : 8080

**timeout client 10s**

**defualt\_backend webserver** THIS SETS WEBSERVER NODES AS DEFAULT BACKEND SERVER(S).

**backend webserver**

**balance roundrobin** THIS LETS ROUND ROBIN ALGORITHM DO THE BALANCING.

**timeout connect 10s**

**timeout server 10s**

**{% for ip in groups['webserver'] %}** SYNTAX OF FOR LOOP IN JINJA TEMPLATE.

**server app{{ loop.index }} {{ ip }}:80** GROUPS['WEBSERVER'] IS A MAGIC VARIABLE OF ANSIBLE : WHICH GIVES EVERY SINGLE IP ADDRESS PRESENT IN THE INVENTORY ADDED IN IT'S GROUP.

**{% endfor %}** BINDS IP ADDRESS OF WEBSERVERS WITH PORT NO. 80.

LOOP. INDEX RETURNS 0: IF LOOP IS RUNNING FOR FIRST TIME;  
RETURNS 02 : IF LOOP IS RUNNING FOR THE SECOND TIME.  
RETURNS 'n': IF LOOP IS RUNNING FOR THE n<sup>th</sup> TIME.

→ NOW, WE'LL CREATE PLAYBOOK FILE FOR OUR WEB SERVERS WITH FOLLOWING CONTENT :- (# vim webserver.yml)

```
aws | Services | Q Search [Option+S] | Mumbai | Vinit Raj
- hosts: webserver
  tasks:
    - name: "Installing Web Server (HTTPD)"
      package:
        name: "httpd"
        state: present

    - name: "Installing PHP package"
      package:
        name: "php"
        state: present

    - name: "Deploying (copying) Web Page"
      copy:
        HERE, WE'LL USE COPY MODULE BECAUSE WE NEED TO COPY THE CONTENT AS-IT-IS.
        src: "index.php"
        dest: "/var/www/html" DEFAULT LOCATION TO HOST / DEPLOY WEBPAGE FOR HTTPD WEB SERVER.

    - name: "Starting Web Server Now"
      service:
        name: "httpd"
        state: started
        enabled: true
```

→ NOW, WE'LL CREATE INDEX.PHP WEBPAGE FOR HTTPD WEB SERVER:-

(# vim index.php)

```
aws | Services | Q Search [Option+S] | Mumbai | Vinit Raj
<pre>
  <?php
    print_r($_SERVER);
  ?>
</pre>
```

THIS COMMAND PRINTS THE DETAILS OF SERVER THE CLIENT IS CONNECTED TO.  
WE ARE USING THIS TO VERIFY THAT THE LOAD BALANCER IS USING ROUND ROBIN ALGORITHM TO BALANCE CONNECTION REQUESTS.

→ NOW, IT'S TIME TO DEPLOY OUR SERVERS AND WEBPAGE:-

FIRST, I'LL DEPLOY BACKEND SERVER(S) :- (# ansible-playbook webserver.yml)

```
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Instances | EC2 Management | EC2 Instance Connect | Primer on Jinja Templating - R | zoom | 100% | Wed 11 Jan 5:57 AM
ap-south-1.console.aws.amazon.com/ec2-instance-connect/csh?connType=standard&instanceId=i-0286bcc313a4ac2b7&osUser=ec2-user&region=ap-south-1&sshPort=22#/ AWS Services | Q Search [Option+S] | Mumbai | Vinit Raj
[No write since last change]
/bin/bash: q: command not found
shell returned 127

Press ENTER or type command to continue
[root@ip-172-31-38-1 code]# date
Wed Jan 11 00:06:37 UTC 2023
[root@ip-172-31-38-1 code]# vim webserver.yml
[root@ip-172-31-38-1 code]# vim index.php

PLAY [webserver] ****
TASK [Gathering Facts] ****
[WARNING]: Platform linux on host 3.110.102.42 is using the discovered Python interpreter at /usr/bin/python, but future installation of another Python interpreter could change this. See https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html for more information.
ok: [3.110.102.42]
[WARNING]: Platform linux on host 3.110.181.249 is using the discovered Python interpreter at /usr/bin/python, but future installation of another Python interpreter could change this. See https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html for more information.
ok: [3.110.181.249]

TASK [Installing Web Server (HTTPD)] ****
changed: [3.110.181.249]
changed: [3.110.102.42] ↑

TASK [Installing PHP package] ****
changed: [3.110.181.249] ↑
changed: [3.110.102.42] ↑

TASK [Deploying (copying) Web Page] ****
changed: [3.110.102.42] ↑
changed: [3.110.181.249] ↑

TASK [Starting Web Server Now]
changed: [3.110.181.249]
changed: [3.110.102.42] ↑

PLAY RECAP ****
3.110.102.42 : ok=5   changed=4   unreachable=0   failed=0   skipped=0   rescued=0   ignored=0
3.110.181.249 : ok=5   changed=4   unreachable=0   failed=0   skipped=0   rescued=0   ignored=0

[root@ip-172-31-38-1 code]#
```

→ NOW, WE'LL DEPLOY FRONTEND WEB SERVER WHICH ALSO ACTS AS LOAD BALANCER :- (# ansible-playbook lb.yml)

Instances | EC2 Management C X EC2 Instance Connect X Primer on Jinja Templating - R X

ap-south-1.console.aws.amazon.com/ec2-instance-connect/ssh?comType=standard&instanceId=i-0286bcc313a4ac2b7&osUser=ec2-user&region=ap-south-1&sshPort=22#

RHCSA - KodeKlo... A FreeCodeCamp St... Data Structures a... LeetCode 75 Stud... Strivers A2Z DSA... GFG Beginner DS... Striver's SDE She... GFG SDE Sheet ARTH-3.0 AWS Dev Roadmaps Google's Coding... Mumbai Vinit Raj

AWS Services Search [Option+S]

```
[root@ip-172-31-38-1 code]# vim lb.yml
[root@ip-172-31-38-1 code]# ansible-playbook lb.yml

PLAY [loadbalancer] ****
TASK [Gathering Facts] ****
[WARNING]: Platform linux on host 13.235.0.177 is using the discovered Python interpreter at /usr/bin/python, but future installation of another Python interpreter could change this. See https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html for more information.
ok: [13.235.0.177]

TASK [Installing HAProxy Load Balancer] ****
ok: [13.235.0.177]

TASK [Registering webservers by adding them in configuration file] ****
fatal: [13.235.0.177]: FAILED! => {"changed": false, "msg": "Could not find or access 'local.cfg.j2' in searched in:\\n\\t\\root\\code\\templates\\local.cfg.j2\\n\\t\\root\\code\\local.cfg.j2\\n\\t\\root\\code\\temp\\ates\\local.cfg.j2\\n\\t\\root\\code\\local.cfg.j2 on the Ansible Controller.\\nIf you are using a module and expect the file to exist on the remote, see the remote_src option"}

PLAY RECAP ****
13.235.0.177 : ok=2    changed=0    unreachable=0    failed=1    skipped=0    rescued=0    ignored=0

[root@ip-172-31-38-1 code]# ls
index.php  lb.yml  local.conf.j2  webserver.yml
[root@ip-172-31-38-1 code]# vim lb.yml
[root@ip-172-31-38-1 code]# ansible-playbook lb.yml

PLAY [loadbalancer] ****
TASK [Gathering Facts] ****
[WARNING]: Platform linux on host 13.235.0.177 is using the discovered Python interpreter at /usr/bin/python, but future installation of another Python interpreter could change this. See https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html for more information.
ok: [13.235.0.177]

TASK [Installing HAProxy Load Balancer] ****
ok: [13.235.0.177] ←

TASK [Registering webservers by adding them in configuration file] ****
changed: [13.235.0.177] ←

TASK [Starting the Load Balancer] ****
changed: [13.235.0.177] ←

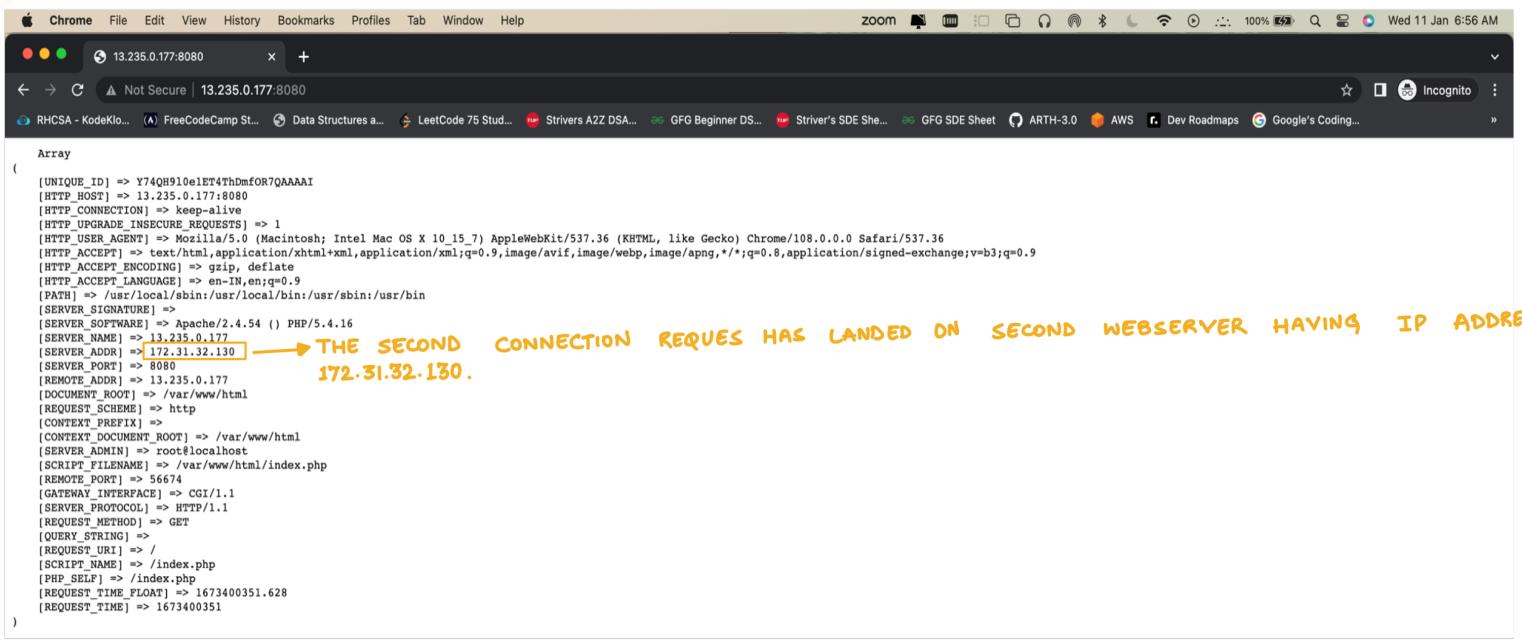
PLAY RECAP ****
13.235.0.177 : ok=4    changed=2    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0

[root@ip-172-31-38-1 code]#
```

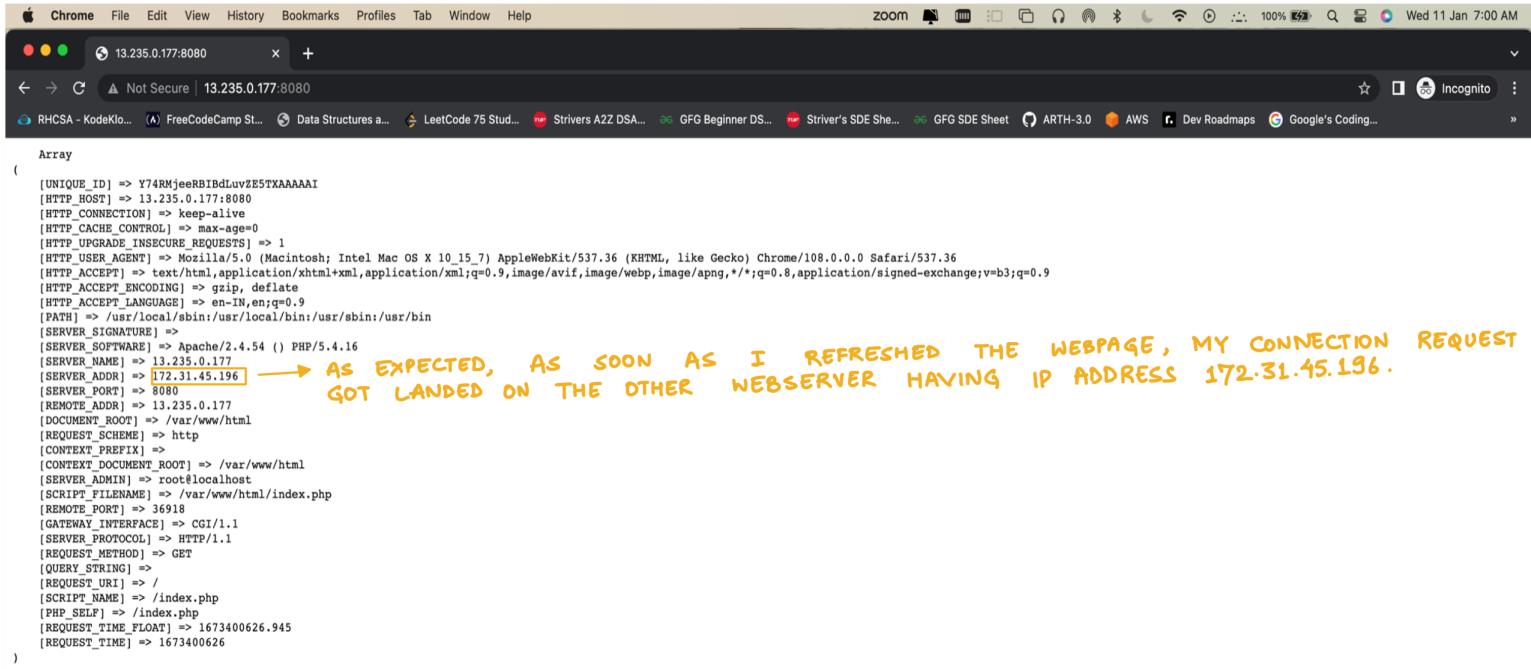
→ NOW, TIME TO CHECK IF OUR LOAD BALANCER IS WORKING PROPERLY OR NOT :- (<http://13.235.0.177:8080>)  
IP ADDRESS OF LOAD-BALANCER

```
Array
{
    [UNIQUE_ID] => Y740ggYQy2em195uDtdQ3AAAAAQ
    [HTTP_HOST] => 13.235.0.177:8080
    [HTTP_CONNECTION] => keep-alive
    [HTTP_UPGRADE_INSECURE_REQUESTS] => 1
    [HTTP_USER_AGENT] => Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/108.0.0.0 Safari/537.36
    [HTTP_ACCEPT] => text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b3;q=0.9
    [HTTP_PURPOSE] => prefetch
    [HTTP_ACCEPT_ENCODING] => gzip, deflate
    [HTTP_ACCEPT_LANGUAGE] => en-IN,en;q=0.9,hi-IN;q=0.8,hi;q=0.7,en-GB;q=0.6,en-US;q=0.5
    [PATH] => /usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin
    [SERVER_SIGNATURE] =>
    [SERVER_SOFTWARE] => Apache/2.4.54 () PHP/5.4.16
    [SERVER_NAME] => 13.235.0.177
    [SERVER_ADDR] => 172.31.45.196 → FIRST CONNECTION REQUEST LANDED TO SERVER HAVING IP ADD.: 172.31.45.196
    [SERVER_PORT] => 8080
    [REMOTE_ADDR] => 13.235.0.177
    [DOCUMENT_ROOT] => /var/www/html
    [REQUEST_SCHEME] => http
    [CONTEXT_PREFIX] =>
    [CONTEXT_DOCUMENT_ROOT] => /var/www/html
    [SERVER_ADMIN] => root@localhost
    [SCRIPT_FILENAME] => /var/www/html/index.php
    [REMOTE_PORT] => 52436
    [GATEWAY_INTERFACE] => CGI/1.1
    [SERVER_PROTOCOL] => HTTP/1.1
    [REQUEST_METHOD] => GET
    [QUERY_STRING] =>
    [REQUEST_URI] => /
    [SCRIPT_NAME] => /index.php
    [PHP_SELF] => /index.php
    [REQUEST_TIME_FLOAT] => 1673399938.296
    [REQUEST_TIME] => 1673399938
}
```

- NOW, WE'LL GO THE SAME URL FROM ANOTHER BROWSER. (PREFERABLY FROM INCOGNITO MODE).



- NOW IF I REFRESH THIS PAGE, THE NEXT CONNECTION SHOULD BE SENT TO THE OTHER SERVER.



THIS IS ENOUGH TO PROVE THAT OUR LOAD BALANCER IS WORKING EXACTLY THE WAY IT SHOULD!

★ NOW, TO PERFORM HORIZONTAL SCALING, ALL WE NEED TO DO IS :

WE JUST NEED TO ADD THE DETAILS OF OUR NEW NODE AND THEN RE-RUN THE ANSIBLE-PLAYBOOK COMMAND.

↓

WE HAVE WRITTEN OUR CODE IN SUCH A WAY THAT THE SERVER WILL GET ADDED IN THE LIST JUST BY RE-RUNNING ‘ONE SINGLE COMMAND’.

(# vim /etc/ansible/hosts)

```
# This is the default ansible 'hosts' file.
[loadbalancer]
13.235.0.177 ansible_user=root ansible_password=vinitraj

[webserver]
3.110.102.42 ansible_user=root ansible_password=vinitraj
3.110.181.249 ansible_user=root ansible_password=vinitraj
65.2.182.99 ansible_user=root ansible_password=vinitraj → WE HAVE ADDED OUR NEW HOST IN WEB SERVER GROUP.

# It should live in /etc/ansible/hosts
#
# - Comments begin with the '#' character
# - Blank lines are ignored
# - Groups of hosts are delimited by [header] elements
# - You can enter hostnames or ip addresses
# - A hostname/ip can be a member of multiple groups

# Ex 1: Ungrouped hosts, specify before any group headers.

## green.example.com
## blue.example.com
## 192.168.100.1
## 192.168.100.10
```

NOW JINJA TEMPLATE FILE WILL AUTOMATICALLY ADD THIS NODE IN BACKEND WEBSERVERS LIST.

HORIZONTAL SCALING IS DONE!

Feedback Looking for language selection? Find it in the new Unified Settings

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→ TIME TO RE-RUN THE PLAYBOOK COMMANDS :-

(#ansible-playbook webserver.yml)  
(#ansible-playbook lb.yml)

```
ok: [3.110.181.249]
changed: [65.2.182.99]

TASK [Installing PHP package] *****
^[[Aok: [3.110.102.42]
ok: [3.110.181.249]
changed: [65.2.182.99]

TASK [Deploying (copying) Web Page] *****
ok: [3.110.181.249]
ok: [3.110.102.42]
changed: [65.2.182.99]

TASK [Starting Web Server Now] *****
ok: [3.110.181.249]
ok: [3.110.102.42]
changed: [65.2.182.99]

PLAY RECAP *****
1.110.102.42      : ok=5    changed=0    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
3.110.181.249     : ok=5    changed=0    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
65.2.182.99       : ok=5    changed=4    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0

[root@ip-172-31-38-1 code]# ansible-playbook lb.yml

PLAY [loadbalancer] *****

TASK [Gathering Facts] *****
[WARNING]: Platform linux on host 13.235.0.177 is using the discovered Python interpreter at /usr/bin/python, but future installation of another Python interpreter could change this. See https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html for more information.
ok: [13.235.0.177]

TASK [Installing HAProxy Load Balancer] *****
ok: [13.235.0.177]

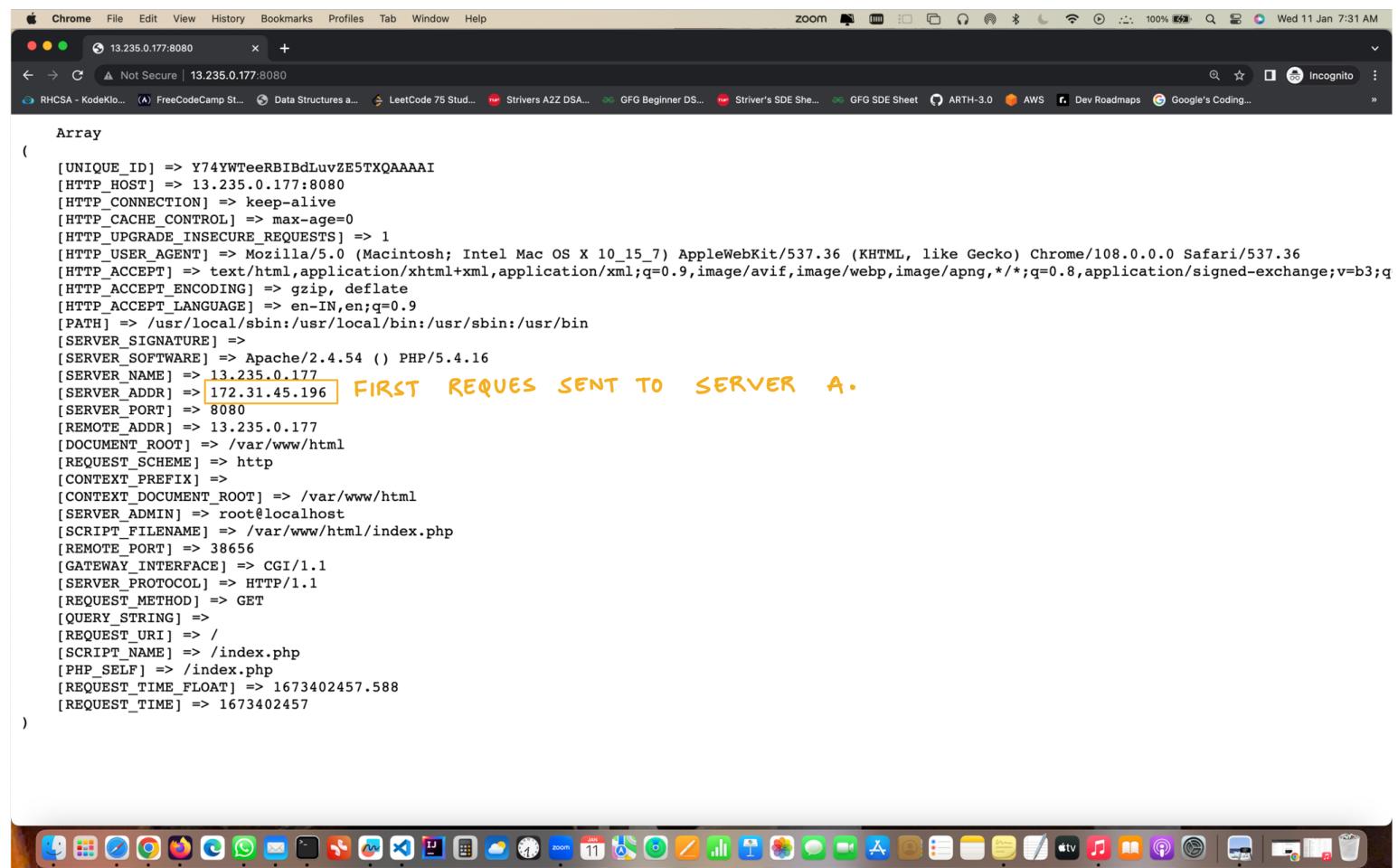
TASK [Registering web servers by adding them in configuration file] *****
changed: [13.235.0.177]

TASK [Starting the Load Balancer] *****
changed: [13.235.0.177]

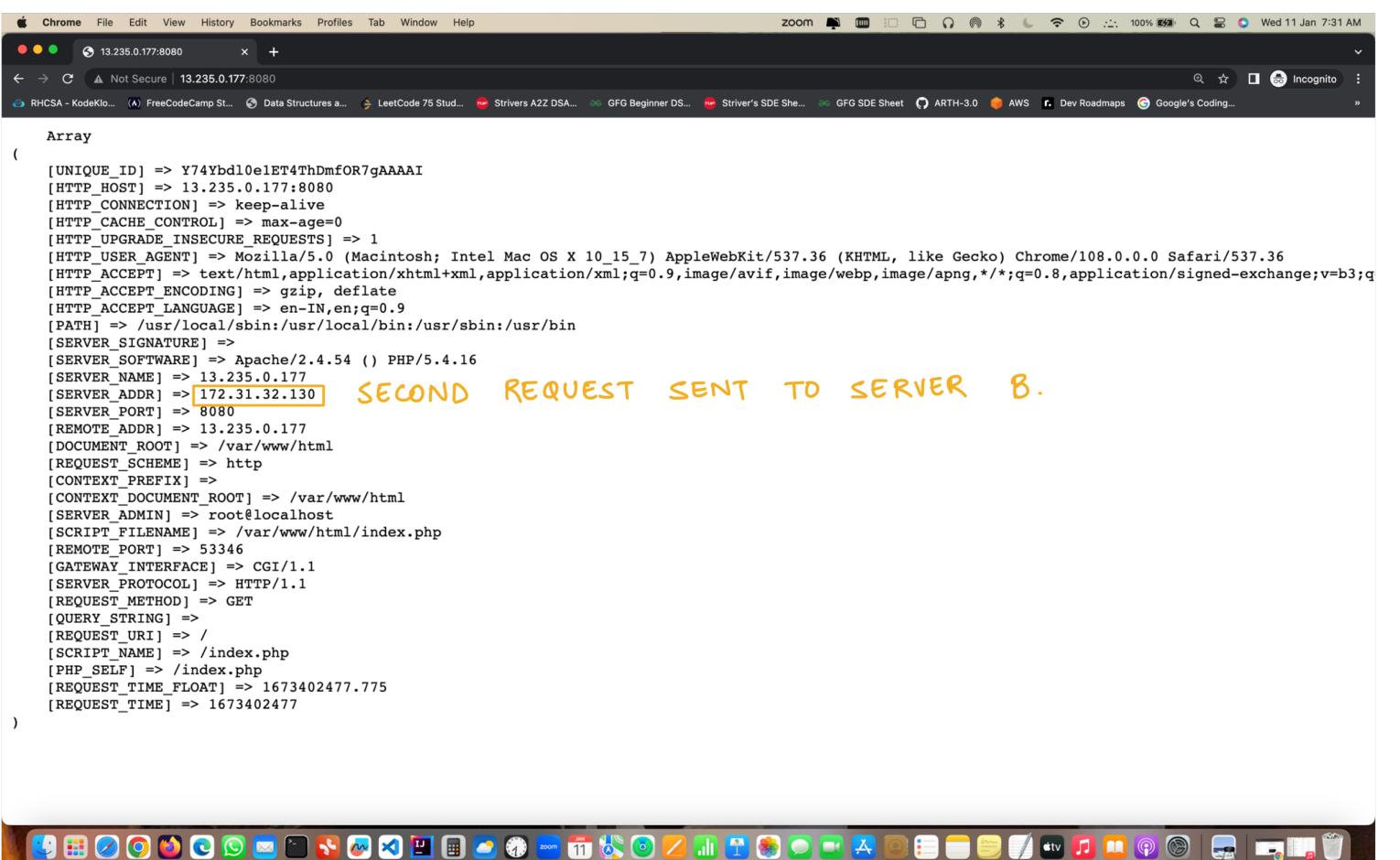
PLAY RECAP *****
13.235.0.177      : ok=4    changed=2    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0

[root@ip-172-31-38-1 code]#
```

→ TIME TO VISIT OUR WEBSITE (LOADBALANCER IP :8080) :-



```
Array
(
    [UNIQUE_ID] => Y74YWTeerBIBdLuvZE5TXQAAAAI
    [HTTP_HOST] => 13.235.0.177:8080
    [HTTP_CONNECTION] => keep-alive
    [HTTP_CACHE_CONTROL] => max-age=0
    [HTTP_UPGRADE_INSECURE_REQUESTS] => 1
    [HTTP_USER_AGENT] => Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/108.0.0.0 Safari/537.36
    [HTTP_ACCEPT] => text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,*/*;q=0.8,application/signed-exchange;v=b3;q
    [HTTP_ACCEPT_ENCODING] => gzip, deflate
    [HTTP_ACCEPT_LANGUAGE] => en-IN,en;q=0.9
    [PATH] => /usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin
    [SERVER_SIGNATURE] =>
    [SERVER_SOFTWARE] => Apache/2.4.54 () PHP/5.4.16
    [SERVER_NAME] => 13.235.0.177
    [SERVER_ADDR] => 172.31.45.196 FIRST REQUEST SENT TO SERVER A.
    [SERVER_PORT] => 8080
    [REMOTE_ADDR] => 13.235.0.177
    [DOCUMENT_ROOT] => /var/www/html
    [REQUEST_SCHEME] => http
    [CONTEXT_PREFIX] =>
    [CONTEXT_DOCUMENT_ROOT] => /var/www/html
    [SERVER_ADMIN] => root@localhost
    [SCRIPT_FILENAME] => /var/www/html/index.php
    [REMOTE_PORT] => 38656
    [GATEWAY_INTERFACE] => CGI/1.1
    [SERVER_PROTOCOL] => HTTP/1.1
    [REQUEST_METHOD] => GET
    [QUERY_STRING] =>
    [REQUEST_URI] => /
    [SCRIPT_NAME] => /index.php
    [PHP_SELF] => /index.php
    [REQUEST_TIME_FLOAT] => 1673402457.588
    [REQUEST_TIME] => 1673402457
)
```



```
Array
(
    [UNIQUE_ID] => Y74Ybd10e1ET4ThDmfOR7gAAAAI
    [HTTP_HOST] => 13.235.0.177:8080
    [HTTP_CONNECTION] => keep-alive
    [HTTP_CACHE_CONTROL] => max-age=0
    [HTTP_UPGRADE_INSECURE_REQUESTS] => 1
    [HTTP_USER_AGENT] => Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/108.0.0.0 Safari/537.36
    [HTTP_ACCEPT] => text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,*/*;q=0.8,application/signed-exchange;v=b3;q
    [HTTP_ACCEPT_ENCODING] => gzip, deflate
    [HTTP_ACCEPT_LANGUAGE] => en-IN,en;q=0.9
    [PATH] => /usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin
    [SERVER_SIGNATURE] =>
    [SERVER_SOFTWARE] => Apache/2.4.54 () PHP/5.4.16
    [SERVER_NAME] => 13.235.0.177
    [SERVER_ADDR] => 172.31.32.130 SECOND REQUEST SENT TO SERVER B.
    [SERVER_PORT] => 8080
    [REMOTE_ADDR] => 13.235.0.177
    [DOCUMENT_ROOT] => /var/www/html
    [REQUEST_SCHEME] => http
    [CONTEXT_PREFIX] =>
    [CONTEXT_DOCUMENT_ROOT] => /var/www/html
    [SERVER_ADMIN] => root@localhost
    [SCRIPT_FILENAME] => /var/www/html/index.php
    [REMOTE_PORT] => 53346
    [GATEWAY_INTERFACE] => CGI/1.1
    [SERVER_PROTOCOL] => HTTP/1.1
    [REQUEST_METHOD] => GET
    [QUERY_STRING] =>
    [REQUEST_URI] => /
    [SCRIPT_NAME] => /index.php
    [PHP_SELF] => /index.php
    [REQUEST_TIME_FLOAT] => 1673402477.775
    [REQUEST_TIME] => 1673402477
)
```

Array

```
[UNIQUE_ID] => Y74YeDWZH9z5762n5GYxtwAAAAE
[HTTP_HOST] => 13.235.0.177:8080
[HTTP_CONNECTION] => keep-alive
[HTTP_CACHE_CONTROL] => max-age=0
[HTTP_UPGRADE_INSECURE_REQUESTS] => 1
[HTTP_USER_AGENT] => Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/108.0.0.0 Safari/537.36
[HTTP_ACCEPT] => text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b3;q
[HTTP_ACCEPT_ENCODING] => gzip, deflate
[HTTP_ACCEPT_LANGUAGE] => en-IN,en;q=0.9
[PATH] => /usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin
[SERVER_SIGNATURE] =>
[SERVER_SOFTWARE] => Apache/2.4.54 () PHP/5.4.16
[SERVER_NAME] => 13.235.0.177
[SERVER_ADDR] => 172.31.39.228 THIRD REQUEST SENT TO SERVER C.
[SERVER_PORT] => 8080
[REMOTE_ADDR] => 13.235.0.177
[DOCUMENT_ROOT] => /var/www/html
[REQUEST_SCHEME] => http
[CONTEXT_PREFIX] =>
[CONTEXT_DOCUMENT_ROOT] => /var/www/html
[SERVER_ADMIN] => root@localhost
[SCRIPT_FILENAME] => /var/www/html/index.php
[REMOTE_PORT] => 50056
[GATEWAY_INTERFACE] => CGI/1.1
[SERVER_PROTOCOL] => HTTP/1.1
[REQUEST_METHOD] => GET
[QUERY_STRING] =>
[REQUEST_URI] => /
[SCRIPT_NAME] => /index.php
[PHP_SELF] => /index.php
[REQUEST_TIME_FLOAT] => 1673402488.667
[REQUEST_TIME] => 1673402488
```



Array

```
[UNIQUE_ID] => Y74ZomT-mUwhp3F47GLVUAAAAAA
[HTTP_HOST] => 13.235.0.177:8080
[HTTP_CONNECTION] => keep-alive
[HTTP_CACHE_CONTROL] => max-age=0
[HTTP_UPGRADE_INSECURE_REQUESTS] => 1
[HTTP_USER_AGENT] => Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/108.0.0.0 Safari/537.36
[HTTP_ACCEPT] => text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b3;q
[HTTP_ACCEPT_ENCODING] => gzip, deflate
[HTTP_ACCEPT_LANGUAGE] => en-IN,en;q=0.9
[PATH] => /usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin
[SERVER_SIGNATURE] =>
[SERVER_SOFTWARE] => Apache/2.4.54 () PHP/5.4.16
[SERVER_NAME] => 13.235.0.177
[SERVER_ADDR] => 172.31.45.196 FOURTH REQUEST SENT TO SERVER A AGAIN.
[SERVER_PORT] => 8080
[REMOTE_ADDR] => 13.235.0.177
[DOCUMENT_ROOT] => /var/www/html
[REQUEST_SCHEME] => http
[CONTEXT_PREFIX] =>
[CONTEXT_DOCUMENT_ROOT] => /var/www/html
[SERVER_ADMIN] => root@localhost
[SCRIPT_FILENAME] => /var/www/html/index.php
[REMOTE_PORT] => 42548
[GATEWAY_INTERFACE] => CGI/1.1
[SERVER_PROTOCOL] => HTTP/1.1
[REQUEST_METHOD] => GET
[QUERY_STRING] =>
[REQUEST_URI] => /
[SCRIPT_NAME] => /index.php
[PHP_SELF] => /index.php
[REQUEST_TIME_FLOAT] => 1673402786.257
[REQUEST_TIME] => 1673402786
```



THIS PROVES OUR WEB SERVERS ARE WORKING  
EXACTLY THE WAY THEY SHOULD !

ROUND ROBIN ALGORITHM IS BALANCING THE  
CONNECTION REQUESTS CORRECTLY.

ADDING A BACKEND WEB SERVER AT THE  
END AND GETTING IT TO WORK PROPERLY :  
SUCCESSFULLY IMPLEMENTED HORIZONTAL  
SCALING .

— VINIT RAJ