Super Load Balancing Lab!

Load Balancer HA Proxy or Nginx

Backend Servers1 & 2

Leiter/in - ITIT-Proje... GitHub Flow Git A successful Git bra... PMP Practice Exam... GitHub - danielboh... e Catalina(Tomcat) Cu... Apache Tomcat Har... redirect - Tomcat is...

aws Q Search [Alt+S] Europe (Ireland) ▼ vijayagagla

Ironhack AWS for Education (6866-9977-4218) ▼

EC2 > Instances > i-0b1c1fbbcda4331ee

EC2

Dashboard
AWS Global View
Events

Instances
Instances
Instance Types
Launch Templates
Spot Requests
Savings Plans
Reserved Instances
Dedicated Hosts
Capacity Reservations
Capacity Manager New

Images
AMIs
AMI Catalog

Elastic Block Store

Instance summary for i-0b1c1fbbcda4331ee (LoadBalancer-Backend2-Vijaya) Info

Updated less than a minute ago

Connect | Instance state ▼ | Actions ▼

Instance ID
i-0b1c1fbbcda4331ee

Public IPv4 address
3.250.196.192 | open address

Private IPv4 addresses
172.31.45.132

IPv6 address
–

Instance state
⊘ Running

Public DNS
ec2-3-250-196-192.eu-west-1.compute.amazonaws.com | open address

Hostname type
IP name: ip-172-31-45-132.eu-west-1.compute.internal

Private IP DNS name (IPv4 only)
ip-172-31-45-132.eu-west-1.compute.internal

Answer private resource DNS name
IPv4 (A)

Instance type
t2.micro

Elastic IP addresses
–

Auto-assigned IP address
3.250.196.192 [Public IP]

VPC ID
vpc-0df92408ce1504f65

AWS Compute Optimizer finding
ⓘ Opt-in to AWS Compute Optimizer for recommendations.
| Learn more

IAM role
–

Subnet ID
subnet-0d9b489c27e18f759

Auto Scaling Group name
–

IMDSv2
Required

Instance ARN
arn:aws:ec2:eu-west-1:686699774218:instance/i-0b1c1f
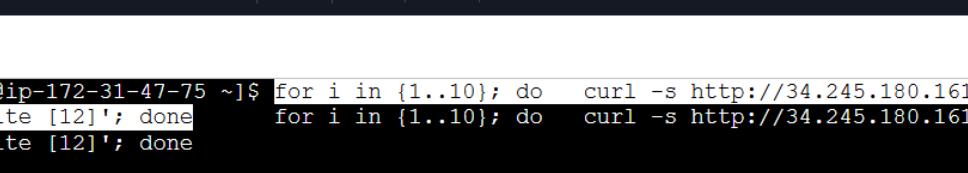bbcda4331ee

Managed
false

Load Balancing with HA Proxy

Test : Command Line

```
[ec2-user@ip-172-31-47-75 ~]$ for i in {1..10}; do   curl -s http://34.245.180.161 | grep -o 'Website [12]'; done
Website 1
Website 2
Website 1
Website 2
Website 1
Website 2
Website 1
Website 2
Website 1
Website 2
[ec2-user@ip-172-31-47-75 ~]$
```

Test : Statistics Interface

HAProxy version 3.0.5-8e879a5, released 2024/09/19

Statistics Report for pid 2128

> General process information

pid = 2128 (process #1, nbproc = 1, nbthread = 1)
uptime = 0d 0h49m07s; warnings = 0
system limits: memmax = unlimited; ulimit-n = 8029
maxsock = 8029; maxconn = 4000; reached = 0; maxpipes = 0
current conns = 3, current pipes = 0/0; conn rate = 3/sec; bit rate = 0.271 kbps
Running tasks: 0/19 (0 niced); idle = 100 %

active UP	backup UP
active UP, going down	backup UP, going down
active DOWN, going up	backup DOWN, going down
active or backup DOWN	not checked
active or backup DOWN for maintenance (MAINT)	
active or backup SOFT STOPPED for maintenance	

Note: "NOLB"/"DRAIN" = UP with load-balancing disabled.

Display option:
- Scope :
- Hide 'DOWN' servers
- Disable refresh
- Refresh now
- CSV export
- JSON export (schema)

External resources:
- Primary site
- Updates (v3.0)
- Online manual

web_frontend

	Queue			Session rate			Sessions					Bytes		Denied		Errors			Warnings		Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis									
Frontend				1	10	-	1	3	3 000	59			120 840	215 260	0	0	19					OPEN								

web_backend

		Queue			Session rate			Sessions					Bytes		Denied		Errors			Warnings		Status	LastChk	Server					Dwntme	Thrtle
		Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
	website1	0	0	-	0	5		0	1	-	128	128	3m14s	60 044	107 987		0		0	0	0	0	49m7s UP	L7OK/200 in 1ms	1/1	Y	-	0	0	0s	-
	website2	0	0	-	0	5		0	1	-	127	127	5m52s	60 796	107 273		0		0	0	0	0	49m7s UP	L7OK/200 in 1ms	1/1	Y	-	0	0	0s	-
	Backend	0	0		0	10		0	1	300	255	255	3m14s	120 840	215 260	0	0		0	0	0	0	49m7s UP		2/2	2	0		0	0s	

Choose the action to perform on the checked servers : Apply

stats

		Queue			Session rate			Sessions					Bytes		Denied		Errors			Warnings		Status	LastChk	Server					Dwntme	Thrtle
		Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
	Frontend				2	2	-	2	2	3 000	8			2 191	27 340	0	0	3					OPEN								
	Backend	0	0		0	2		0	1	300	2	0	0s	2 191	27 340	0	0		2	0	0	0	49m7s UP		0/0	0	0		0	0s	

Test : Simulate Backend Failure

```
[ec2-user@ip-172-31-47-75 ~]$ for i in {1..10}; do   curl -s http://34.245.180.161 | grep
-o 'Website [12]'; done          for i in {1..10}; do   curl -s http://34.245.180.161 | grep
-o 'Website [12]'; done
Website 2
Website 2
Website 2
Website 2
Website 2
Website 2
Website 2
Website 2
Website 2
Website 2
[ec2-user@ip-172-31-47-75 ~]$
```

HAProxy version 3.0.5-8e879a5, released 2024/09/19

Statistics Report for pid 2128

> General process information

pid = 2128 (process #1, nbproc = 1, nbthread = 1)
uptime = 0d 5h50m46s; warnings = 1
system limits: memmax = unlimited; ulimit-n = 8029
maxsock = 8029; maxconn = 4000; reached = 0; maxpipes = 0
current conns = 2; current pipes = 0/0; conn rate = 1/sec; bit rate = 253.149 kbps
Running tasks: 0/18 (0 niced); idle = 100 %

active UP		backup UP
active UP, going down		backup UP, going down
active DOWN, going up		backup DOWN, going up
active or backup DOWN		not checked
active or backup DOWN for maintenance (MAINT)		
active or backup SOFT STOPPED for maintenance		

Note: "NOLB"/"DRAIN" = UP with load-balancing disabled.

Display option:
- Scope :
- Show all servers
- Enable refresh
- Refresh now
- CSV export
- JSON export (schema)

External resources:
- Primary site
- Updates (v3.0)
- Online manual

web_frontend

	Queue			Session rate			Sessions						Bytes		Denied		Req	Errors			Warnings		Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis										
Frontend	0	10	-	0	3	3 000	85						130 140	249 408	0	0	29					OPEN								

web_backend

		Queue			Session rate			Sessions					Bytes		Denied			Errors			Warnings		Status	LastChk	Server						
		Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis			Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
	website1	0	0	-	0	5		0	1	-	147	147	45s	67 785	124 437		0		0	0	0	0	5h50m UP	L7OK/200 in 1ms	1/1	Y	-	0	0	0s	-
	Backend	0	0		0	10		0	1	300	281	281	45s	130 140	249 408	0	0		0	0	0	0	5h50m UP (1/2)		1/1	1	0		0	0s	

Choose the action to perform on the checked servers : [   ] [Apply]

stats

	Queue			Session rate			Sessions						Bytes		Denied		Req	Errors			Warnings		Status	LastChk	Server						
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis			Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle	
Frontend	1	3	-	2	3	3 000	59						18 435	812 607	0	0	31					OPEN									
Backend	0	0		0	2		0	1	300	4	4	0s	18 435	812 607	0	0		4	0	0	0	5h50m UP (0/0)		0/0	0	0		0	0s		

Load Balancing with NGINX

```
[ec2-user@ip-172-31-47-75 ~]$ nginx -v
nginx version: nginx/1.28.0
```

```
[ec2-user@ip-172-31-47-75 ~]$ sudo nginx -t
nginx: [warn] conflicting server name "_" on 0.0.0.0:80, ignored
nginx: the configuration file /etc/nginx/nginx.conf syntax is ok
nginx: configuration file /etc/nginx/nginx.conf test is successful
```

```
[ec2-user@ip-172-31-47-75 ~]$ sudo systemctl status nginx
● nginx.service - The nginx HTTP and reverse proxy server
     Loaded: loaded (/usr/lib/systemd/system/nginx.service; enabled; preset: disabled)
     Active: active (running) since Fri 2026-01-23 21:50:52 UTC; 18s ago
   Main PID: 13749 (nginx)
      Tasks: 2 (limit: 1120)
     Memory: 2.5M
        CPU: 57ms
     CGroup: /system.slice/nginx.service
             ├─13749 "nginx: master process /usr/sbin/nginx"
             └─13750 "nginx: worker process"

Jan 23 21:50:52 ip-172-31-47-75.eu-west-1.compute.internal systemd[1]: Starting nginx.ser
vice - The nginx HTTP and reverse proxy server...
Jan 23 21:50:52 ip-172-31-47-75.eu-west-1.compute.internal nginx[13747]: nginx: [warn] co
nflicting server name "_" on 0.0.0.0:80, ignored
Jan 23 21:50:52 ip-172-31-47-75.eu-west-1.compute.internal nginx[13747]: nginx: the confi
guration file /etc/nginx/nginx.conf syntax is ok
Jan 23 21:50:52 ip-172-31-47-75.eu-west-1.compute.internal nginx[13747]: nginx: configura
tion file /etc/nginx/nginx.conf test is successful
Jan 23 21:50:52 ip-172-31-47-75.eu-west-1.compute.internal nginx[13748]: nginx: [warn] co
nflicting server name "_" on 0.0.0.0:80, ignored
Jan 23 21:50:52 ip-172-31-47-75.eu-west-1.compute.internal systemd[1]: Started nginx.serv
ice - The nginx HTTP and reverse proxy server.
```

```
[ec2-user@ip-172-31-47-75 ~]$ curl http://34.245.180.161/health
NGINX Load Balancer is healthy_
```

Command Line

```
[ec2-user@ip-172-31-47-75 ~]$ for i in {1..10}; do
  curl -s http://34.245.180.161 | grep -o 'Website [12]'
done
Website 1
Website 2
Website 1
Website 2
Website 1
Website 2
Website 1
Website 2
Website 1
Website 2
```

Test 5: Simulate Backend Failure

```
[ec2-user@ip-172-31-47-75 ~]$ curl -v http://34.245.180.161 2>&1 | grep -i 'x-'
[ec2-user@ip-172-31-47-75 ~]$ sudo tail -f /var/log/nginx/loadbalancer_error.log
2026/01/23 22:06:09 [error] 13750#13750: *59 connect() failed (111: Connection refused) while connecting to upstream, client: 188.136.228.218, server: _, request: "GET
 / HTTP/1.1", upstream: "http://3.253.88.77:80/", host: "34.245.180.161"
2026/01/23 22:06:10 [error] 13750#13750: *59 connect() failed (111: Connection refused) while connecting to upstream, client: 188.136.228.218, server: _, request: "GET
 / HTTP/1.1", upstream: "http://3.253.88.77:80/", host: "34.245.180.161"
2026/01/23 22:06:11 [error] 13750#13750: *59 connect() failed (111: Connection refused) while connecting to upstream, client: 188.136.228.218, server: _, request: "GET
 / HTTP/1.1", upstream: "http://3.253.88.77:80/", host: "34.245.180.161"

2026/01/23 22:07:13 [error] 13750#13750: *73 connect() failed (111: Connection refused) while connecting to upstream, client: 188.136.228.218, server: _, request: "GET
 / HTTP/1.1", upstream: "http://3.253.88.77:80/", host: "34.245.180.161"
```

Testing and Validation

```
[ec2-user@ip-172-31-47-75 ~]$ ./test_load_balancing.sh
Testing load balancing to 34.245.180.161
Executing 20 requests...

Request 1: Website 2
Request 2: Website 1
Request 3: Website 2
Request 4: Website 1
Request 5: Website 2
Request 6: Website 1
Request 7: Website 2
Request 8: Website 1
Request 9: Website 2
Request 10: Website 1
Request 11: Website 2
Request 12: Website 1
Request 13: Website 2
Request 14: Website 1
Request 15: Website 2
Request 16: Website 1
Request 17: Website 2
Request 18: Website 1
Request 19: Website 2
Request 20: Website 1

=== Results ===
Website 1: 10 requests (50%)
Website 2: 10 requests (50%)
```