

ANALYSIS OF LOAD BALANCING PERFORMANCE ON CLUSTER COMPUTING WITH PROXMOX VE

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01 ABSTRACT

This research aims to examine the performance of load balancing on a cluster. Load balancing is a solution for large access load and minimizes downtime in serving requests from users. Load balancing distributes loads of traffic evenly to the servers with particular algorithms. In this research, the server for load balancing cluster is implemented using LVS topology via direct routing and use round-robin algorithm on Proxmox VE for load balancing. Proxmox VE is in charge of dividing virtual resource server into four virtual environments, two nodes as load balancing clusters and two nodes as web servers. The results of research conducted with loads of 250, 500 & 1000 users show that load balancing system reduces the maximum response time up to 4165 ms with 0% of packet loss, compared to utilization of single server with the maximum response time up to 7269 ms and 22.48% packet loss. The load balancing system on clusters also manages to failover with an average value of downtime 16.6 seconds.

KEYWORD:

Cluster Computing, Failover, Load Balancing, Proxmox VE

02 METHODS

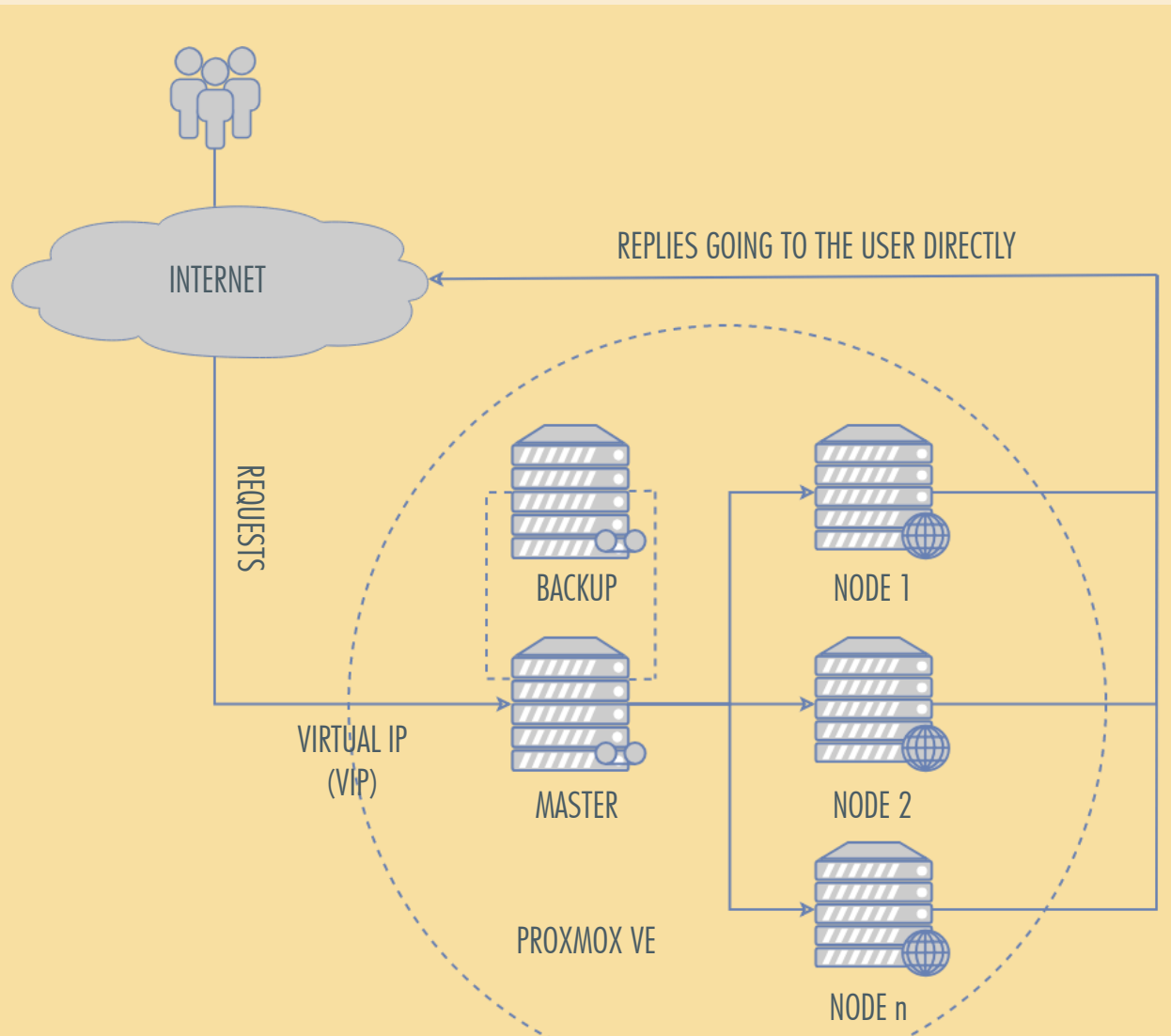


FIGURE 1. LINUX VIRTUAL SERVER TOPOLOGY VIA DIRECT ROUTING ON PROXMOX VE

SCENARIO 1 :

Implemented using Linux Virtual Server (LVS) topology via direct routing on Proxmox VE and round-robin algorithm for load balancing

SCENARIO 2 :

Performed to find out the response time and the number of packet loss with load of 250, 500, and 1000 users between single server with load balancing on cluster computing.

SCENARIO 3 :

Intends to prove that the failover on load balancing can manage to requests copying of the process and configuration from Master to Backup with an average value of downtime.

EXPERIMENTS

03 HARDWARE & SOFTWARE

HOST

- CPU Octa Core @ 2.5 GHz
- Memory 4 GB DDR3
- Storage 300 GB (IDE)
- Operating System Proxmox VE 4.1
- Network Adapter 1 : Custom (PCnet -FAST III)

- CPU Single Core @ 2.5 GHz
- Memory 500 MB DDR3
- Storage 50 GB (Local-LVM)
- Operating System CentOS 6.0 Final (i386-minimal)
- Network Adapter 1-4 : Bridge (vmbri)
- Ipsadm (Piranha)
- LAMP (Linux-Apache-MySQL-PHP)

GUEST

USER

- CPU Octa Core @ 1.9 GHz
- Memory 8 GB DDR3
- Storage 500 GB
- Operating System Windows 10
- Network Adapter : VB Ethernet Adapter
- WebServer Stress Tool 8
- Net Uptime Monitor

04 RESULTS

TABEL 1. SUMMARY EXPERIMENT RESULT FOR LOAD OF 250 USERS

	Clicks	Errors	Errors [%]	Time Spent [ms]	Avg. Click Time [ms]
Load Balancer	4,291	0	0.00	12,325,289	2,872
Single Server	3,941	36	0.91	12,792,645	3,276

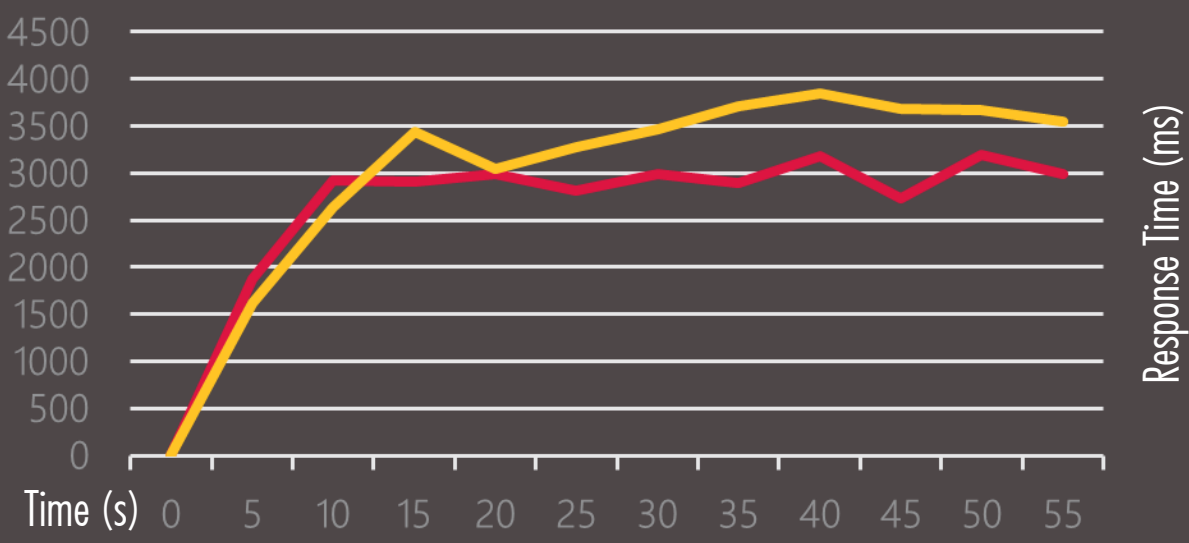


FIGURE 2. COMPARISON OF SERVER RESPONSE TIME FOR LOAD OF 250 USERS

TABEL 2. SUMMARY EXPERIMENT RESULT FOR LOAD OF 500 USERS

	Clicks	Errors	Errors [%]	Time Spent [ms]	Avg. Click Time [ms]
Load Balancer	3,784	0	0.00	15,220,957	4,022
Single Server	3,594	239	6.65	19,424,124	5,790

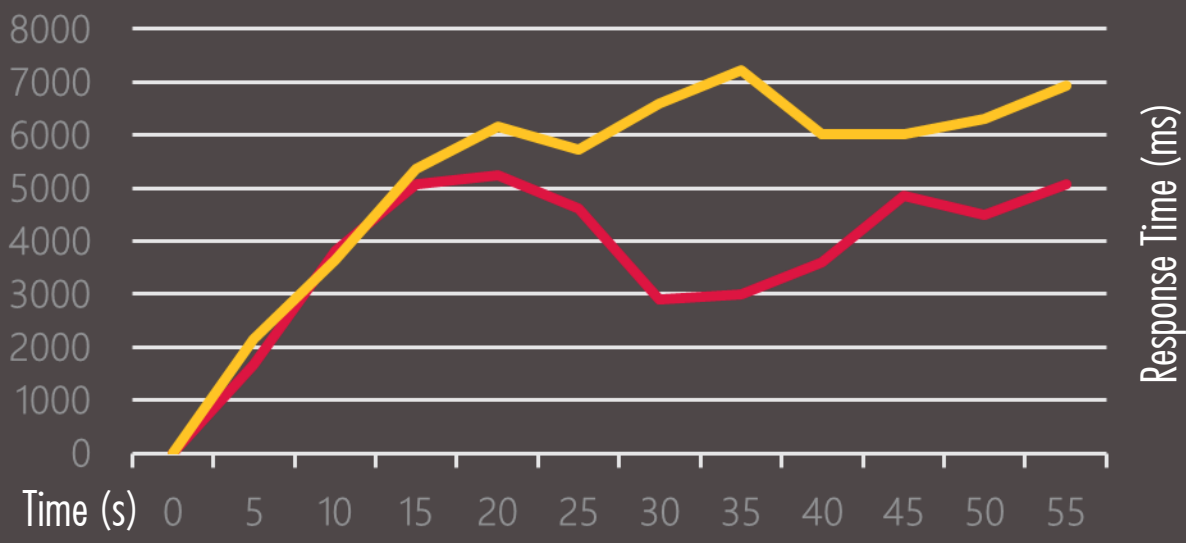


FIGURE 4. COMPARISON OF SERVER RESPONSE TIME FOR LOAD OF 500 USERS

TABEL 3. SUMMARY EXPERIMENT RESULT FOR LOAD OF 1000 USERS

	Clicks	Errors	Errors [%]	Time Spent [ms]	Avg. Click Time [ms]
Load Balancer	3,395	0	0.00	14,138,671	4,165
Single Server	3,934	884	22.47	22,170,186	7,269



FIGURE 4. COMPARISON OF SERVER RESPONSE TIME FOR LOAD OF 1000 USERS

TABEL 4. THE TEST RESULTS FAILOVER OF LOAD BALANCING ON CLUSTER

Failover	Downtime
1	16 s
2	17 s
3	17 s
4	19 s
5	16 s
6	13 s
7	18 s
8	19 s
9	17 s
10	14 s

05 CONCLUSION

- Server Load Balancing Cluster can be implemented using LVS topology via Direct Routing On Proxmox VE. Proxmox VE divides virtual server resources into several virtual environments that are node/guest.
- Load balancer system with round-robin algorithm gets maximum average response time of up to 4165 ms with a percentage of 0% on packet loss, while in a single server up to 7269 ms with a value of 22.48% for packet loss.
- To increase server availability, the system load balancing cluster manages to failover with an average value of downtime obtained at 16.6 seconds.

06 REFERENCES

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