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Unisbank E-learning Server Load Balancing Monitoring Using the Round Robin Method

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ABSTRACT :
E-learning in the era of distance education strongly supports the implementation of the teaching and learning process in any educational institution in the world, including in Indonesia. The success of e-learning besides being supported by human resources is also determined by the readiness of the equipment owned by educational institutions. E-learning becomes ineffective when there are too many requests for e-learning usage, causing server overload or crashes. When the e-learning server is overloaded, all parts that are usually connected and interrelated such as lecturers, students, administration, and others become disconnected. Monitoring the e-learning server is needed to keep the e-learning load under control, and the server that has a lot of loads will be divided up so that e-learning will run smoothly without overload. E-learning server monitoring with the Round Robin method was applied to Unisbank e-learning servers and made e-learning not overloaded. The results of the load balancing workload with 1000 connections resulted in a reply time of 0.5 ms, a workload with 5000 connections, a reply time of 0.7 ms and a workload with 10000 connections, a reply time of 0.7 ms
KEYWORDS *round robin, loud balancing, server elearning, unisbank*

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I. INTRODUCTION

Information Technology in the current Corona Pandemic era is very supportive for the implementation of distance learning at all levels of education. The importance of hardware, software and brainware support for the successful implementation of distance learning. Server as the main support in implementing distance learning for a campus is a must for educational institutions. Unisbank's Elearning server is one of the most important concerns at this time. Internet needs are increasing, making internet users need large bandwidth. So it is not uncommon in companies, educational institutions, internet cafes and even in housing to apply multihoming to meet their needs. A multihoming network is a network system that has more than one exit path.

A single server that always gets requests from many users, slowly but surely there will be overloads and crashes, so that it has an impact on requests that cannot be served by a single server. The design of the cluster architecture can be simplified to processes within the operating system. Round Robin is assigned to divide the time of each process in equal portions and in a circular order, running all processes without priority is also known as cyclic executive. Load Balancing is a technique for distributing connection traffic loads on two or more connection lines in a balanced way so that traffic can run optimally, maximize throughput, reduce response time and avoid overload on one connection line (Triono, 2015). A computer network is a collection of two or more computers that are interconnected to communicate data. Data communication that can be done through a computer network can be in the form of text, image, video and sound data. To build a computer network, must pay attention to the situation and conditions of the organization that will build the network. The solution to overcome this overload and crash problem is to create a Unisbank E-learning Server Load Balancing Monitoring Using the Round Robin Method.

II. LITERATURE REVIEW

Previous research was conducted by Abizar Giffari (2018) about The Effect Of Round Robin Technique And Anxiety Toward Students Speaking Achievement At Fort De Kock Nursing Academy. This

study discusses about students who are taught with the Round Robin technique having better speaking skills, compared to using the Memorization Technique for students at the Fort De Kock Nursing Academy. This is because this technique allows students to interact between them by conducting interviews so that their speaking skills can be trained and improved. Students with high anxiety who were taught by using the Round Robin Technique did not have better speaking skills than the students who were taught by the Memorization Technique. This is because they are afraid to take part in speaking anxiety and it can affect their speaking ability. Students with low anxiety taught using the Round Robin technique had better speaking skills than those taught using the Memorization Technique. This is because the Round Robin Technique allows giving students more opportunities for them to practice their English. Especially their talk. Seen in the procedure where students are actively involved in each learning process. There is no interaction between teaching techniques and students' anxiety about speaking ability. This is because the use of these two learning techniques has less influence on students with high and low anxiety

Previous research was also conducted by N. Srilatha, et al (2017) with the topic of Optimal Round Robin CPU Scheduling Algorithm using Manhattan Distance. This research resulted in the performance of the round robin algorithm completely depending on the chosen quantum time. Many attempts have been made in the past to select the optimal time quantum. Some approaches require the use of other algorithms such as first shortest job or priority scheduling, thereby bringing the shortcomings of these algorithms into round robin scheduling. Optimal Round Robin (ORRSM) determines the time quantum by taking into account the similarities or differences in the burst times of all processes in the ready queue. ORRSM does not require priority to be assigned to jobs nor does it require jobs to be sorted by their burst time. This results in better performance of the round robin algorithm with reduced context switches, completion times, and waiting times. The time quantum defined via ORRSM is dynamic in the sense that no user intervention is required and the time quantum is related to time.

Another study with the same topic was conducted by Yudhi Arta, (2017) with the topic of Application of the Round Robin Method on Multihoming Networks in Computer Clusters. The conclusions of this test are: Load balance produces less response time and greater throughput than a single server architecture. The load balance system with the round robin method can be applied to multihoming networks. And this system serves to balance internet usage traffic on a multihoming network. and With the weighted round robin scheduling algorithm, the webserver load can be properly distributed to each server with the given weight provisions. In testing the webserver must be given a test process time (timeout) to get a stress load process that is not too long. The longer the testing process, the test results do not produce a good value to be used as a comparison.

a. Hardware Component

(1) Server Load Balancer :

- Processor Intel Xeon E5-2609 v4 1.7Ghz 4 Core
- RAM 4GB
- Gigabit Ethernet

(2) Web Server E-Learning

- Processor Intel Xeon E5-2609 v4 1.7Ghz 4 Core
- RAM 8GB
- Gigabit Ethernet

(3) Client PC

- Intel Core i5
- RAM 4GB
- Gigabit Ethernet

b. NGINX

NGINX is a web server that also functions as an email proxy, reverse proxy, and load balancer. The software structure is asynchronous and event-driven; which allows many requests or requests to be processed at the same time. In addition, NGINX is also scalable. This shows that this service grows and develops along with the increasing number of traffic coming to the website.

The main function of the Server or Web server is to perform or will transfer user request files through a communication protocol that has been determined in such a way. The requested web page consists of text files, videos, images, files and more. the use of a web server serves to transfer all aspects of the filing in a web page including those in the form of text, video, images and more. One example of a Web Server is Apache. Apache (Apache Web Server – The HTTP Web Server) is the most widely used web server on the Internet. This program was first designed for the UNIX environment operating system

III. RESEARCH METHOD

1. Information Architecture

The elearning network connected to the internet will be forwarded to the router which will be routed back to the DNS Server and Web Server, Database Server, Storage Server Elearning. In this model, all user requests will be distributed directly to 1 server, which will result in server overload and crashes. This is due to the large number of users who access e-learning and the e-learning server is only 1, resulting in load accumulation on the server. If 1 server is used for a lot of data such as Web Server, Database Server, Storage Server E-learning then the possibility of overload will be large and will disrupt the course of e-learning using the server (figure 1).

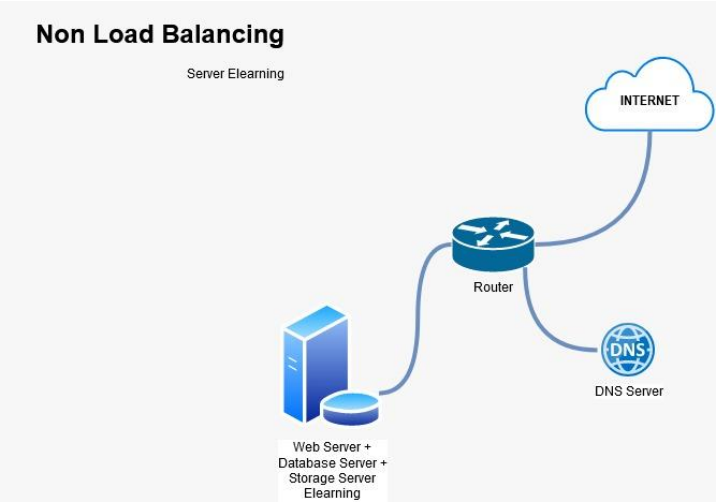

Fig.1. Non Load Balancing

In this load balancing study, the system configuration of the Unisbank Elearning server can be seen in Figure 2. The internet network is channeled through the router and forwarded to the load balancing server. Then by the load balancing server, a division is made or designed so that the incoming network is divided into 2 existing servers, namely Elearning Webserver 1 and Elearning Webserver 2. All data entered in elearning will then be entered in a systemized manner on the database server and will also be stored on the storage server.

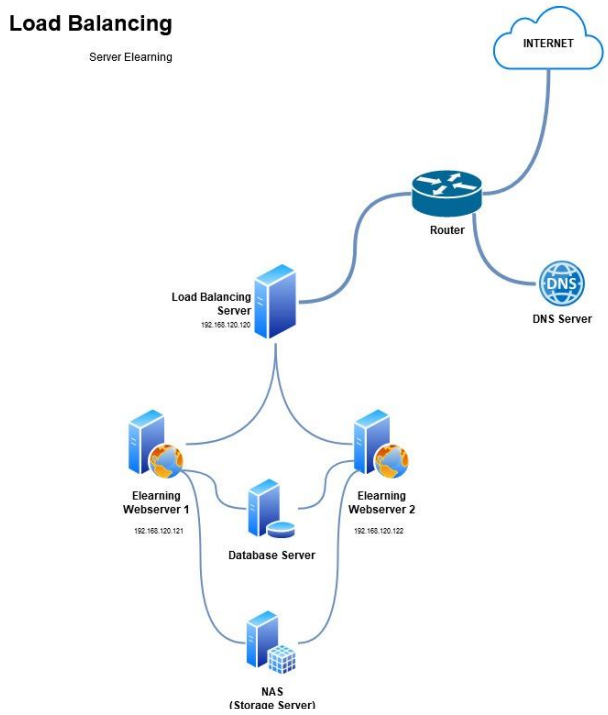

Fig.2. Load Balancing

2. Load Balancing Round Robin Method

The simplest load balancing algorithm is to divide the load in turns and sequentially from one server to another. Load balancing technique across multiple application instances is a commonly used technique to optimize resource utilization, maximize throughput, reduce latency, and ensure fault-tolerant configurations. In this research, NGINX is used as a load balancer. Configuration can be seen in Figure 3.

1. **Round Robin** – Requests are distributed evenly across the servers, with server weights taken into consideration. This method is used by default (there is no directive for enabling it):

```
upstream backend {
    # no load balancing method is specified for Round Robin
    server backend1.example.com;
    server backend2.example.com;
}
```

Fig.3. Load Balancing Configuration

IV. HASIL DAN PEMBAHASAN

1. Load Balancing Configuration in NGINX

The following is Figure 4, the round robin formulation on the Unisbank elearning server used in the study.

```
http {
  upstream moodle {
   server 192.168.120.238;
   server 192.168.120.204;
  }

  server {
      listen 80;
      location / {
          proxy_pass http://moodle;
      }
  }
}
```

Fig.4. SourceCode Round Robin

2. Load Balancing Test

Tests are carried out using the httperf application (read: h-t-t-perf) to generate requests to the load balancing server simultaneously with a number of connections on the destination port 80 (webserver) and request home page urls. Load Balancing test was carried out on 1000 connections, 5000 connections and 10000 connections.

```
httperf --hog --server 192.168.120.200 --num-conn 1000 --ra 1000 timeout 5
```

a. Test load balancing with workloads with a multiplier model, namely with 1000 connections (figure 5), with a reply time of 0.5 ms.

```
root@tik:~# httperf --hog --server 192.168.120.200 --num-conn 1000 --ra 1000 timeout 5
httperf --hog --client=0/1 --server=192.168.120.200 --port=80 --uri=/ --rate=1000 --send-buffer=4096 --recv-buffer=1638
4 --num-conns=1000 --num-calls=1
httperf: warning: open file limit > FD_SETSIZE; limiting max. # of open files to FD_SETSIZE
Maximum connect burst length: 2

Total: connections 1000 requests 1000 replies 1000 test-duration 1.000 s

Connection rate: 999.9 conn/s (1.0 ms/conn, <=3 concurrent connections)
Connection time [ms]: min 0.4 avg 0.5 max 2.3 median 0.5 stddev 0.1
Connection time [ms]: connect 0.0
Connection length [replies/conn]: 1.000

Request rate: 999.9 req/s (1.0 ms/req)
Request size [B]: 68.0

Reply rate [replies/s]: min 0.0 avg 0.0 max 0.0 stddev 0.0 (0 samples)
Reply time [ms]: response 0.5 transfer 0.0
Reply size [B]: header 261.0 content 290.0 footer 0.0 (total 551.0)
Reply status: 1xx=0 2xx=0 3xx=1000 4xx=0 5xx=0

CPU time [s]: user 0.18 system 0.80 (user 18.1% system 80.5% total 98.6%)
Net I/O: 604.4 KB/s (5.0*10^6 bps)

Errors: total 0 client-timo 0 socket-timo 0 connrefused 0 connreset 0
Errors: fd-unavail 0 addrunavail 0 ftab-full 0 other 0
root@tik:~#
```

Fig.5. workload httperf with 1000 connection

b. Test load balancing with workloads with a multiplier model, namely with 5000 connections (figure 6), with a reply time of 0.5 ms.

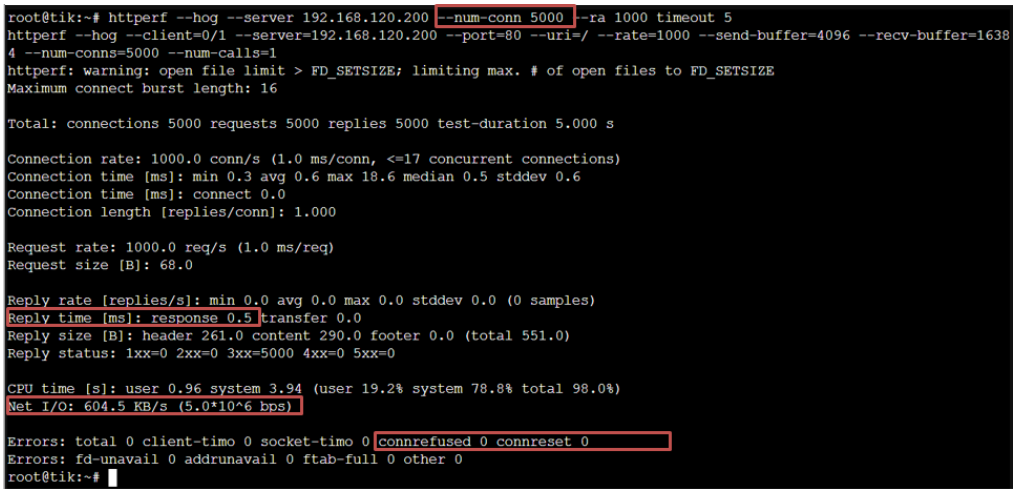

Fig.6. workload httperf with 5000 connection

c. Test load balancing with workloads with a multiplier model, namely with 10000 connections (figure 7), with a reply time of 0.7 ms.

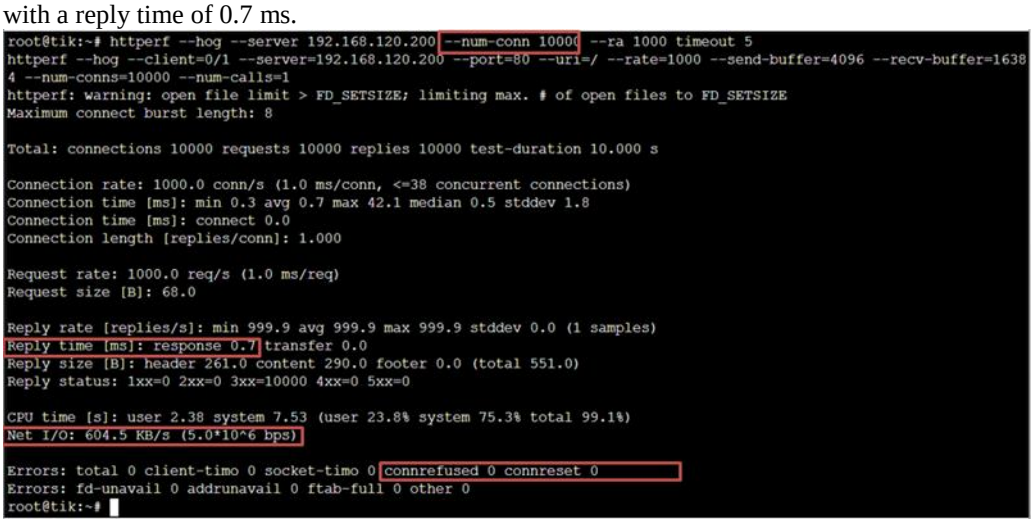

Fig.7. workload httperf with 1000 connection

3. Test Results Throughput and Response Time Server Elearning

The following are the results of the load balancing test on Unisbank e-learning with a workload of 1000 connections, 5000 connections and 10000 connections (table 1).

. Table. 1. Throughput and Response Time Server Elearning test results

Number of Connections	Throughput (Kbps)	Response Time (ms)	Request Lost
1.000	604.4 KB/s	0.5 ms	0
5.000	604.4 KB/s	0.5 ms	0
10.000	604.4 KB/s	0.7 ms	0

V. CONCLUSION

a. Throughput by testing using a round robin load balancing algorithm is worth 604.4 KB/s
b. The response time in testing using a load balancing round algorithm is 0.5 ms.
c. The use of the Round Robin load balancing method is able to share user requests across several e-learning web servers so that the needs of e-learning users will be more optimal (not overloaded or crashing).

REFERENCES

[1] Ambia Rachman Haryadi. 2010. " Load Balancing Menggunakan Linux Virtual Server (LVS) Via Network Address Translation (NAT) Pada PT. Bank Syariah".

[2] Abizar Giffari. 2018. The Effect Of Round Robin Technique And Anxiety Toward Students Speaking Achievement At Fort De Kock Nursing Academy. Language Education Program, Universitas Negeri Padang. International Journal of Educational Dynamics (IJEDS), Vol. 1 No. 1 (pp. 211-221) December 2018, p_ISSN 2655-4852, e_ISSN 2655-5093
[3] Imam Maghribi Mursal. 2011. "Desain dan Implementasi Load Balancing Jaringan Lokal Pada CV. Sukses Makmur Mandiri Palembang
[4] N. Srilatha, dkk. 2017. Optimal Round Robin CPU Scheduling Algorithm using Manhattan Distance. International Journal of Electrical and Computer Engineering (IJECE) Vol. 7, No. 6, December 2017, pp. 3664~3668 ISSN: 2088-8708, DOI: 10.11591/ijece.v7i6.pp3664-3668
[5] Yudhi Arta. 2017. Penerapan Metode Round Robin Pada Jaringan Multihoming Di Computer Cluster. IT Journal Research and Development. Vol.1, No.2, Maret 2017

Fatkhul Amin, et. al. "Monitoring Load Balancing Server E-learning Unisbank Menggunakan Metode Round Robin."*American Journal of Engineering Research (AJER)*, vol. 10(9), 2021, pp. 139-144.