

Tabel 2.1 Nginx dan Apache Jumlah Proses berdasarkan Waktu [2]

No. of Requests	Total Processing Time (sec)	
	Apache Load Balancer	Nginx Load Balancer
100	14.7	8.39
400	22.8	18.05
900	52.2	36.6
1600	177.2	59.5
2500	192.69	124.31
6400	292.52	186.78
10000	538.55	346.09



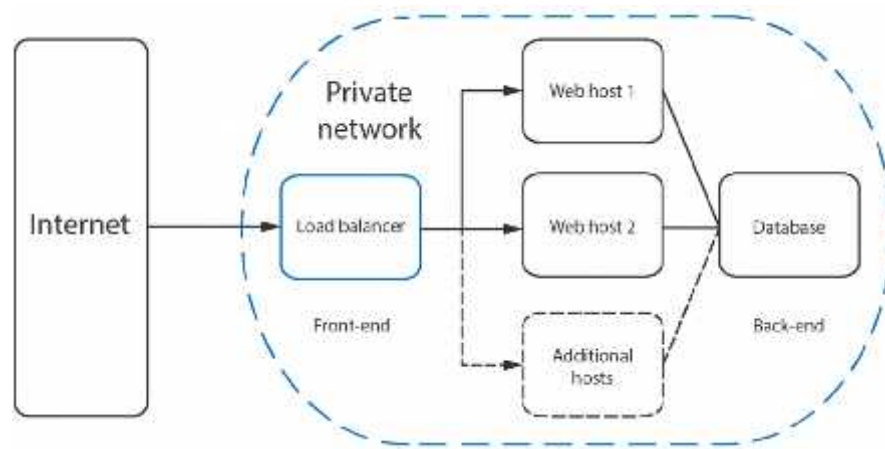
Gambar 2.1 Gartner *Magic quadrant Application Delivery Controller*. Diadopsi dari Gartner
 Quadrant



Gambar 2.2 Tampilan halaman depan blog UMY



Gambar 2.3 Login page blog UMY



Gambar 2.4 Struktur topologi dan mekanisme *load balance*

```

location ~ /\.php$ {
#    root          html;
    fastcgi_pass   unix:/var/run/php/php7.0-fpm.sock;
    fastcgi_split_path_info ^(.+\.php)(/.+)$;
#    fastcgi_pass   127.0.0.1:9000;
    fastcgi_index  index.php;
    fastcgi_param  SCRIPT_FILENAME $document_root$fastcgi_script_name;
#    fastcgi_param  SCRIPT_FILENAME /scripts$fastcgi_script_name;
    include        fastcgi_params;
    fastcgi_intercept_errors on;
    fastcgi_ignore_client_abort off;
    fastcgi_connect_timeout 60;
    fastcgi_send_timeout 180;
    fastcgi_read_timeout 180;
    fastcgi_buffer_size 128k;
    fastcgi_buffers 4 256k;
    fastcgi_busy_buffers_size 256k;
    fastcgi_temp_file_write_size 256k;
}

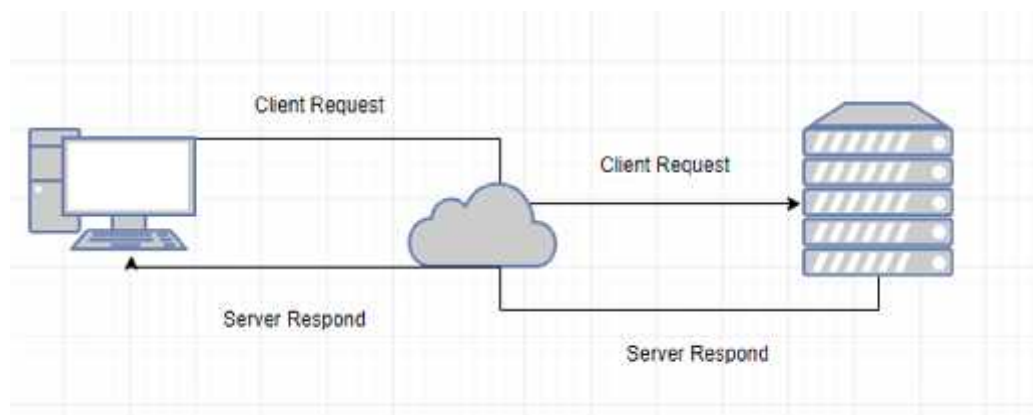
```

Gambar 2.5 Nginx php FastCGI

```
error_page 404 /errors/404.html;  
  
location / {  
    fastcgi_pass 127.0.0.1:9000;  
    fastcgi_intercept_errors on;  
    ...  
}  
  
location /errors/ {  
    # static  
}
```

Gambar 2.6 Nginx fastcgi_intercept_error

```
upstream myapp1 {  
    least_conn;  
    server srv1.example.com;  
    server srv2.example.com;  
    server srv3.example.com;  
}
```

Gambar 2.7 Least connected load balance**Gambar 2.8** Client- Server Communication



Gambar 2.9 IBM *microserver*



Gambar 3.1 PPDIIO Life Cycle

Tabel 3.1 Software dan kegunaannya

No	Software	Fungsi
1	Proxmox	Server Virtualisasi
2	Ubuntu 14.04 LTS	Operating System load balance dan backend server
3	Ubuntu 16.04 LTS	Operating System Laptop penulis sebagai <i>client</i>
4	Nginx	Load balancer dan web server

5	Nano	<i>Editor text</i> berbasis <i>command line</i> pada terminal GNU/Linux, digunakan untuk melakukan <i>editing text</i> pada konfigurasi Nginx dan lainnya
6	Php 7.0	Bahasa pemrograman Wordpress (backend server) serta server scripting pada Nginx
7	Wordpress	CMS pada backend server
8	MariaDB	Database Wordpress
9	Putty ssh client	Alat atau <i>tool</i> yang digunakan sebagai penghubung (<i>remoting</i>) penulis dengan <i>server-server</i> yang akan dikonfigurasi dalam penelitian ini

Tabel 3.2 Spesifikasi perangkat keras *server load balance*

Manufacture	Lenovo
Model	3250 M5
CPU Cores	6 x CPU E5-2620 0 @ 2.00GHz
Processor Type	Intel(R) Xeon(R)
Memory	8GB
HardDisk	2 TB Configured Raid 1

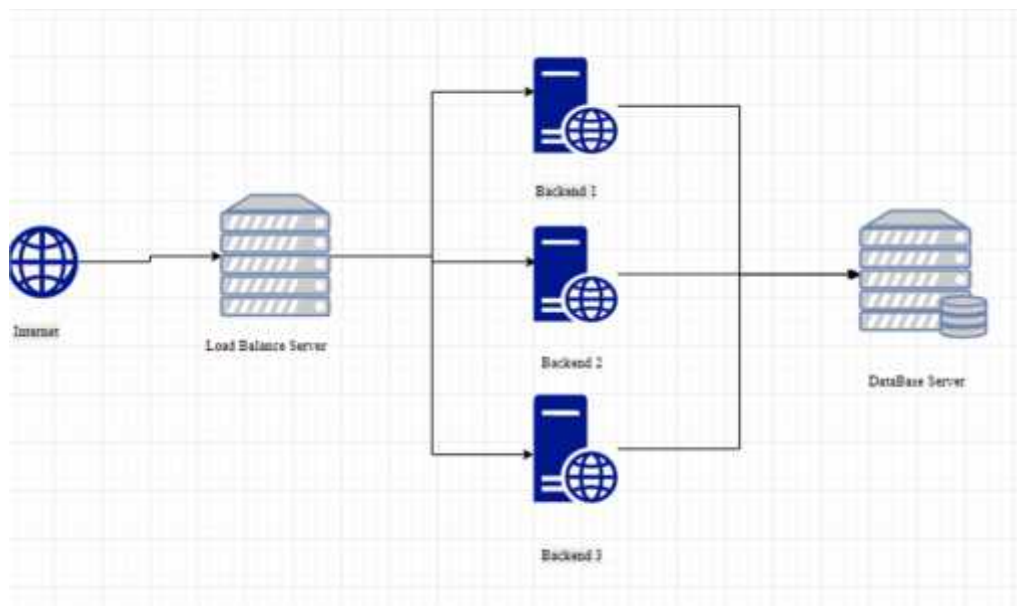
Tabel 3.3 Spesifikasi perangkat keras *server backend*

Manufacture	Lenovo
Model	3650 M4

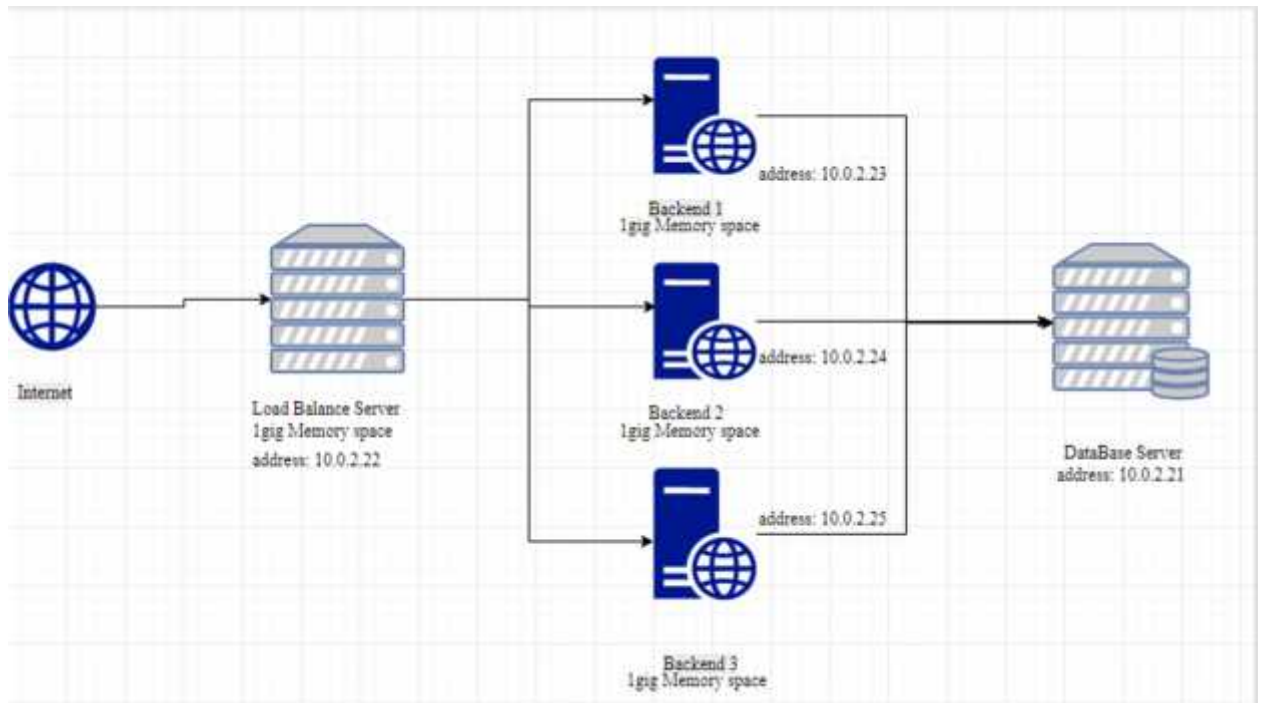
CPU Cores	8 x CPU E3-1231 v3 @ 3.40GHz
Processor Type	Intel(R) Xeon(R)
Memory	32GB
HardDisk	2 TB Configured Raid 1

Tabel 3.4 Spesifikasi Laptop

Manufacture	Asus
Model	A46C
CPU Cores	i5 x 3517u CPU NVIDIA GEFORCE 740M 2GB @ 2.4GHz
Processor Type	Intel(R) HD Graphics
Memory	4GB
HardDisk	500GB



Gambar 4.1 Desain Topologi Fisik



Gambar 4.3 Desain Topologi Logikal

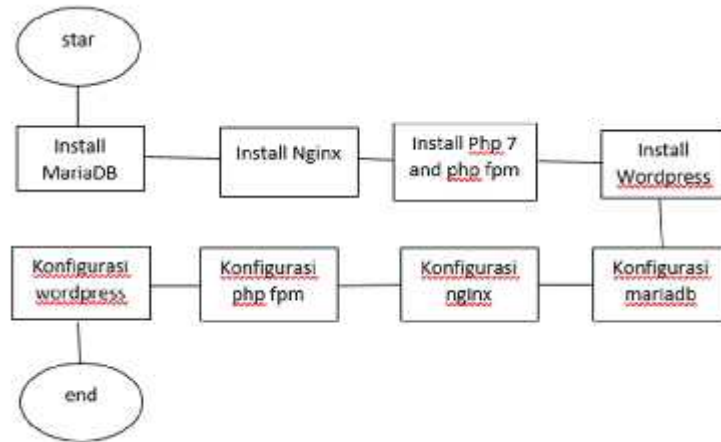
```

upstream test {
    least_conn;
    server 10.0.2.23;
    server 10.0.2.24;
    server 10.0.2.25;
}

server {
    listen 80;
    server_name loadbtest.umy.ac.id;

    location / {
        proxy_pass http://test;
    }
}
  
```

Gambar 4.4 Pengaturan *Load Balance Least Connected*



Gambar 4.5 Langkah Kerja Implementasi *Load Balance*

```

upstream test {
    least_conn;
    server 10.0.2.23;
    server 10.0.2.24;
    server 10.0.2.25;
}
  
```

Gambar 4.6 Pengaturan *Load Balance*

```
CREATE DATABASE wordpress;
```

Gambar 4.7 Membuat Database pada MySQL

```

MariaDB [(none)]> show databases;
+-----+
| Database |
+-----+
| information_schema |
| dbBlogUMY2 |
| mysql |
| performance_schema |
| wepe |
| wepe23 |
| wepe25 |
+-----+
7 rows in set (0.03 sec)
  
```


Gambar 4.8 Menampilkan Keseluruhan Database

```

link https://code.wordpress
// ** MySQL settings - You can get
/** The name of the database for W
define('DB_NAME', 'wepe');

/** MySQL database username */
define('DB_USER', ' ');

/** MySQL database password */
define('DB_PASSWORD', ' ');

/** MySQL hostname */
define('DB_HOST', '10.0.2.21');

link https://code.wordpress
* @package WordPress
*/
// ** MySQL settings - You can get
/** The name of the database for W
define('DB_NAME', 'wepe23');

/** MySQL database username */
define('DB_USER', ' ');

/** MySQL database password */
define('DB_PASSWORD', ' ');

/** MySQL hostname */
define('DB_HOST', '10.0.2.21');

link https://code.wordpress
// ** MySQL settings - You can get
/** The name of the database for W
define('DB_NAME', 'wepe25');

/** MySQL database username */
define('DB_USER', ' ');

/** MySQL database password */
define('DB_PASSWORD', ' ');

/** MySQL hostname */
define('DB_HOST', '10.0.2.21');

```

Gambar 4.9 Wordpress Remot Database Konfigurasi

```

#skip-external-locking
#
# Instead of skip-networking the default is now to listen only on
# localhost which is more compatible and is not less secure.
bind-address          = 0.0.0.0

```

Gambar 4.10 Remote Database Konfigurasi

```

listen      80;
server_name 10.0.2.25;
root /usr/share/nginx/wp/wordpress;
index index.php;
limit_conn backend3 limit_conn 1;
limit_req zone=mybackend3 burst=10 nodelay;

port_in_redirect off;
server_tokens off;
autoindex off;

client_max_body_size 15m;
client_body_buffer_size 128k;

#charset koi8-r;
access_log /var/log/nginx/testaccess.log main;
error_log /var/log/nginx/testerror.log;

location / {
    limit_conn backend3 limit_conn 1;
    limit_req zone=mybackend3 burst=10 nodelay;
    try_files $uri $uri/ /index.php?$args;
    autoindex off;
}

```

Gambar 4.11 Nginx konfigurasi 1

```

# proxy the PHP scripts to Apache listening on 127.0.0.1:80
#
#location ~ /\.php$ {
#    proxy_pass http://127.0.0.1;
#}

# pass the PHP scripts to FastCGI server listening on 127.0.0.1:9000
#
location ~ /\.php$ {
#    root            html;
    fastcgi_pass    127.0.0.1:9000;
    fastcgi_index   index.php;
    fastcgi_param   SCRIPT_FILENAME $document_root$fastcgi_script_name;
    include         fastcgi_params;
    fastcgi_split_path_info ^(.+\.(php|php5))(/.+)?$;
    fastcgi_intercept_errors on;
    fastcgi_ignore_client_abort off;
    fastcgi_connect_timeout 60;
    fastcgi_send_timeout 180;
    fastcgi_read_timeout 180;
    fastcgi_buffer_size 128k;
    fastcgi_buffers 4 256k;
    fastcgi_busy_buffers_size 256k;
    fastcgi_temp_file_write_size 256k;
}

# deny access to .htaccess files, if Apache's document root
# concurs with nginx's one
#
location ~ /\.ht {
    deny all;
}

```

Gambar 4.12 Nginx konfigurasi 2

```

location /some/path/ {
    proxy_set_header Host $host;
    proxy_set_header X-Real-IP $remote_addr;
    proxy_pass http://localhost:8000;
}

```

Gambar 4.13 Pengaturan *proxy_pass* berdasarkan *file path*

```

server {
    listen      80;
    server_name example.org www.example.org;
    ...
}

server {
    listen      80;
    server_name *.example.org;
    ...
}

```

Gambar 4.14 *Server Block*

```

log_format main '$remote_addr - $remote_user [$time_local] "$request" '
                '$status $body_bytes_sent "$http_referer" '
                '"$http_user_agent" "$http_x_forwarded_for" '
                '"$host" sn="$server_name" '
                'rt=$request_time '
                'ua="$upstream_addr" us="$upstream_status" '
                'ut="$upstream_response_time" ul="$upstream_response_length" '
                'cs=$upstream_cache_status' ;

access_log /var/log/nginx/access.log main;

```

Gambar 4.15 *Nginx http log module*

```

gzip on;
gzip_comp_level 3;
gzip_static on;
gzip_disable "msie6";
gzip_vary on;
gzip_proxied any;
gzip_min_length 1000;
gzip_buffers 16 8k;
gzip_http_version 1.1;
gzip_types text/css text/javascript text/xml text/plain text/x-component
application/javascript application/x-javascript application/json
application/xml application/rss+xml font/truetype application/x-font-ttf
font/opentype application/vnd.ms-fontobject image/svg+xml;

```

Gambar 4.16 *Nginx Gzip Compression Module*

```

client_max_body_size 100k;
client_body_timeout 10;
client_header_timeout 10;
client_body_buffer_size 128k;
client_header_buffer_size 1k;
large_client_header_buffers 2 4k;

```

Gambar 4.17 Nginx client body buffer size

```

upstream test {
    least_conn;
    server 10.0.2.23;
    server 10.0.2.24;
    server 10.0.2.25;
}

```

Gambar 4.18 Nginx TCP Load Balance

```

limit_conn_zone $binary_remote_addr zone=backend1_limit_conn:5m;
limit_req_zone $binary_remote_addr zone=mybackend1:10m rate=5r/s;

```

```

location / {
    limit_conn backend1_limit_conn 1;
    limit_req zone=mybackend1 burst=10 nodelay;
    try_files $uri $uri/ /index.php?$args;
}

```

Gambar 4.19 Nginx Ddos Proteksi

```

worker_processes 1;

error_log /var/log/nginx/error.log warn;
pid /var/run/nginx.pid;

events {
    worker_connections 1024;
}

```

Gambar 4.20 Nginx Worker Process and Worker Connection

```
root@cluster03:/etc/nginx# lscpu | egrep '^Thread|^Core|^Socket|^CPU\('
CPU(s): 1
Thread(s) per core: 1
Core(s) per socket: 1
Socket(s): 1
```

Gambar 4.21 Jumlah CPU Core

```
gzip on;
gzip_comp_level 2;
gzip_static on;
gzip_disable "msie6";
gzip_vary on;
gzip_proxied any;
gzip_min_length 1000;
gzip_buffers 16 8k;
gzip_http_version 1.1;
gzip_types text/css text/javascript text/xml text/plain text/x-component
application/javascript application/x-javascript application/json
application/xml application/rss+xml font/truetype application/x-font-ttf
font/opentype application/vnd.ms-fontobject image/svg+xml;
```

Gambar 4.22 Nginx Gzip Compression

```
Sep 29 13:45 access.log.10.gz
Sep 26 12:54 access.log.11.gz
Sep 25 13:32 access.log.12.gz
Sep 23 15:17 access.log.13.gz
Sep 22 17:57 access.log.14.gz
Okt 24 13:08 access.log.2.gz
Okt 23 09:35 access.log.3.gz
Okt 19 15:24 access.log.4.gz
Okt 14 14:37 access.log.5.gz
Okt 11 09:29 access.log.6.gz
Okt 6 11:17 access.log.7.gz
Okt 4 15:25 access.log.8.gz
Sep 30 13:30 access.log.9.gz
```

Gambar 4.23 Nginx Gzip Static

```

# X-Frame-Options is to prevent from clickJacking attack
add_header X-Frame-Options SAMEORIGIN;

# disable content-type sniffing on some browsers.
add_header X-Content-Type-Options nosniff;

# This header enables the Cross-site scripting (XSS) filter
add_header X-XSS-Protection "1; mode=block";

# This will enforce HTTP browsing into HTTPS and avoid ssl stripping attack
add_header Strict-Transport-Security "max-age=31536000; includeSubdomains;";

```

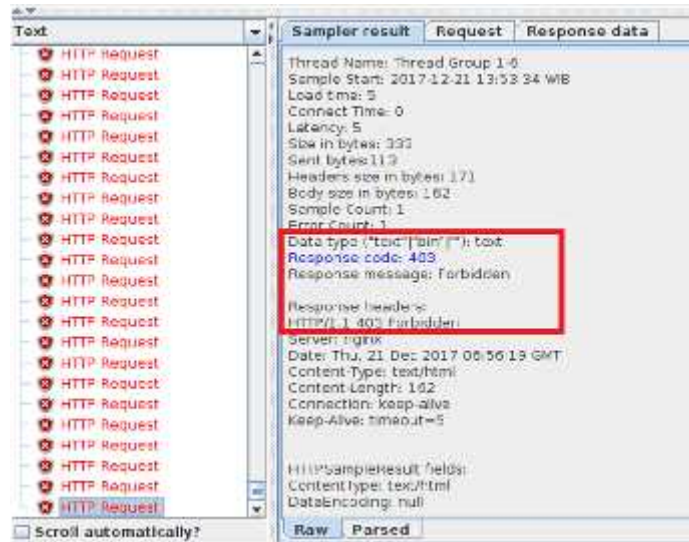
Gambar 4.24 Nginx HTTP secure Header



Gambar 4.27 Backend Server 3

Thread Properties	
Number of Threads (users):	15
Ramp-Up Period (in seconds):	3
Loop Count:	<input checked="" type="checkbox"/> Forever

Gambar 4.28 Pengaturan jumlah user/request DDOS



Gambar 4.29 HTTP Request DOS



Gambar 4.30 Nginx Connection Request Result

```
#charset koi8-r;
access_log /var/log/nginx/access.log main;
error_log /var/log/nginx/error.log;
location / {
    limit_conn backend1_limit_conn 1;
    limit_req zone=mybackend1 burst=10 nodelay;
    limit_req_status 403;
    try_files $uri $uri/ /index.php?$args;
}
```

Gambar 4.31 Nginx *Limit Connection and Request*