PROJECT 3

Apache optimization

APRIL 23, 2025

LAETITIA MOHAMMED 0931512

Network Installation and Administration I

Contents

Task 1 – Multi-Process Module (MPM)

Create the project directory

The web pages for this project should be in the directory: **/var/www/html_project3**

mkdir -p /var/www/html_project3

```
[root@server12 ~]# mkdir -p /var/www/html_project3
[root@server12 ~]# cd /var/www
[root@server12 www]# ll
total 8
drwxr-xr-x.  2 root   root      6 Jan 21 16:23 cgi-bin
drwxr-xr-x.  6 apache apache  145 Apr 17 10:32 htdocs
drwxr-xr-x.  2 root   root      6 Jan 21 16:23 html
drwxr-xr-x. 13 apache apache 4096 Apr 18 00:56 html_project1
drwxr-xr-x.  2 root   root     34 Apr 22 11:02 html_project2
drwxr-xr-x.  2 root   root      6 Apr 23 15:24 html_project3
drwxr-xr-x. 12 apache apache 4096 Apr 21 22:28 virtuals
[root@server12 www]#
```

Create the web page

Add links to all the web pages of this project in the following file:
var/www/html_project3/master_project3.html

touch /var/www/html_project3/master_project3.html

```
[root@server12 www]# touch /var/www/html_project3/master_project3.html
[root@server12 www]#
```

Nano /var/www/html_project3/master_project3.html

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Project Part 3</title>

</head>
<body>
    <h1>Project Part 3 testing</h1>


    <div class="section">
        <h2>Task 2</h2>
        <p><a href="/server-status">To view the server status</a></p>
        <p><a href="/server-info">To view the server information</a></p>
    </div>

   <div class="section">
       <h2>Task 3</h2>
       <p><a href="/cgi-bin/test.pl">execute the CGI Script</a></p>
   </div>


   <div class="section">
       <h2>Task 4</h2>
       <p><a href=http://192.168.100.1/q4/index.php>To execupte the PHP script using 192.168.100.1</a></p>
       <p><a href="/q4/index.php">To execute the PHP script using another subnet</a></p>
   </div>


   <div class="section">
       <h2>Task 5</h2>
       <p><a href="http://192.168.50.10/q5/index.php">To list the employees mysql table</a></p>
   </div>
```

```
    <div class="section">
        <h2>Task 5</h2>
        <p><a href="http://192.168.50.10/q5/index.php">To list the employees mysql table</a></p>
    </div>

    <div class="section">
        <h2>Task 6</h2>
        <p><a href="https://server12">To view the website in SSL</a></p>
    </div>
</body>
</html>
```

Setting permissions to the directory

In order for Apache to utilize the contents of our project3 directory, we need to modify the conditions:

chown -R apache:apache /var/www/html_project3

chmod -R 755 /var/www/html_project3

```
[root@server12 html_project3]# chown -R apache:apache /var/www/html_project3
[root@server12 html_project3]# chmod -R 755 /var/www/html_project3
[root@server12 html_project3]# ll
total 4
-rwxr-xr-x. 1 apache apache 1139 Apr 23 15:38 master_project3.html
[root@server12 html_project3]#
```

Multi-Process Module configuration

We need to uncomment the prefork module in **conf.modules.d/00-mpm.conf** and comment the mpm event module

```
[root@server12 httpd]# vim conf.modules.d/00-mpm.conf
```

```
# prefork MPM: Implements a non-threaded, pre-forking web server
# See: http://httpd.apache.org/docs/2.4/mod/prefork.html
#
# NOTE: If enabling prefork, the httpd_graceful_shutdown SELinux
# boolean should be enabled, to allow graceful stop/shutdown.
#
LoadModule mpm_prefork_module modules/mod_mpm_prefork.so

# worker MPM: Multi-Processing Module implementing a hybrid
# multi-threaded multi-process web server
# See: http://httpd.apache.org/docs/2.4/mod/worker.html
#
#LoadModule mpm_worker_module modules/mod_mpm_worker.so

# event MPM: A variant of the worker MPM with the goal of consuming
# threads only for connections with active processing
# See: http://httpd.apache.org/docs/2.4/mod/event.html
#
#LoadModule mpm_event_module modules/mod_mpm_event.so
~
```

Systemctl restart httpd so that the changes take effect.

Then go to **httpd.conf** and add the following for prefork

```
<IfModule mpm_prefork_module>
    StartServers           12
    MinSpareServers        6
    MaxSpareServers        12
    MaxRequestWorkers      180
    MaxConnectionsPerChild 0
    ServerLimit            180
    ListenBacklog          100
</IfModule>
KeepAlive              On
MaxKeepAliveRequests   50
KeepAliveTimeout       20
Timeout                55
```

Also change the DocumentRoot to html_project3 and the DirectoryIndex to master_project3.html

```
DocumentRoot "/var/www/html_project3"

#
# Relax access to content within /var/www.
#
<Directory "/var/www">
    AllowOverride None
    # Allow open access:
    Require all granted
</Directory>

# Further relax access to the default document root:
<Directory "/var/www/html_project3>
  Options Indexes FollowSymLinks
  AllowOverride None
  Require all granted
</Directory>
```

```
<IfModule dir_module>
    DirectoryIndex master_project3.html index.html
</IfModule>
```

Restart apache

Systemctl restart httpd

```
[root@server12 conf]# systemctl restart httpd
[root@server12 conf]#
```

To confirm MPM, do **httpd -V | grep “Server MPM”**

```
[root@server12 conf]# httpd -V | grep "Server MPM"
Server MPM:     prefork
[root@server12 conf]#
```

```
[root@server12 ~]# ps aux | grep httpd
root        3825  0.0  0.4  22932 14920 ?        Ss   16:31   0:00 /usr/sbin/httpd -DFOREGROUND
apache      3827  0.0  0.2  41544  9992 ?        Sl   16:31   0:00 /usr/sbin/httpd -DFOREGROUND
apache      3828  0.0  0.2  41544  9736 ?        Sl   16:31   0:00 /usr/sbin/httpd -DFOREGROUND
apache      3829  0.0  0.2  41544  9736 ?        Sl   16:31   0:00 /usr/sbin/httpd -DFOREGROUND
apache      3830  0.0  0.2  41544  9736 ?        Sl   16:31   0:00 /usr/sbin/httpd -DFOREGROUND
apache      3831  0.0  0.3 238216 12176 ?        Sl   16:31   0:00 /usr/sbin/httpd -DFOREGROUND
apache      3848  0.0  0.2  41544  9864 ?        Sl   16:31   0:00 /usr/sbin/httpd -DFOREGROUND
apache      3859  0.0  0.2  41544  9608 ?        Sl   16:31   0:00 /usr/sbin/httpd -DFOREGROUND
apache      3863  0.0  0.2  41544  9864 ?        Sl   16:31   0:00 /usr/sbin/httpd -DFOREGROUND
apache      3867  0.0  0.2  41544  9864 ?        Sl   16:31   0:00 /usr/sbin/httpd -DFOREGROUND
apache      3870  0.0  0.2  41544  9992 ?        Sl   16:31   0:00 /usr/sbin/httpd -DFOREGROUND
apache      3873  0.0  0.2  41544  9992 ?        Sl   16:31   0:00 /usr/sbin/httpd -DFOREGROUND
apache      3876  0.0  0.2  41544  9608 ?        Sl   16:31   0:00 /usr/sbin/httpd -DFOREGROUND
root        4864  0.0  0.0 221660  2176 pts/0    S+   17:47   0:00 grep --color=auto httpd
[root@server12 ~]#
```

```
[root@server12 ~]# ab -n 200 -c 180 http://192.168.50.10/
This is ApacheBench, Version 2.3 <$Revision: 1913912 $>
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
Licensed to The Apache Software Foundation, http://www.apache.org/

Benchmarking 192.168.50.10 (be patient)
Completed 100 requests
Completed 200 requests
Finished 200 requests


Server Software:        Apache/2.4.62
Server Hostname:        192.168.50.10
Server Port:            80

Document Path:          /
Document Length:        1174 bytes

Concurrency Level:      180
Time taken for tests:   0.270 seconds
Complete requests:      200
Failed requests:        0
Total transferred:      291000 bytes
HTML transferred:       234800 bytes
Requests per second:    740.46 [#/sec] (mean)
Time per request:       243.092 [ms] (mean)
Time per request:       1.351 [ms] (mean, across all concurrent requests)
Transfer rate:          1052.12 [Kbytes/sec] received
```

Task 2 – Apache Server Monitoring

Apache ExtendedStatus allows you to view detailed information about server performance, including request counts and response times, which is useful for monitoring server health.

Enable ExtendedStatus to allow detailed monitoring of Apache server activity on the **192.168.50.0/24 network**

Back in **httpd.conf**, add the line ExtendedStatus **On** and then in a block add the information for server-status like the location, set handler, require ip **192.168.50.0/24.** Repeat for server-info.

```
ExtendedStatus On
<Location /server-status>
    SetHandler server-status
    Require ip 192.168.50.0/24
</Location>
<Location /server-info>
    SetHandler server-info
    Require ip 192.168.50.0/24
</Location>
```

It should look like this on your browser when access with an IP from the 192.168.50.0/24 network followed by /server-status

Apache Server Status for 192.168.50.10 (via 192.168.50.10)

Server Version: Apache/2.4.62 (AlmaLinux)
Server MPM: prefork
Server Built: Jan 10 2025 00:00:00

Current Time: Wednesday, 23-Apr-2025 21:14:19 EDT
Restart Time: Wednesday, 23-Apr-2025 21:13:19 EDT
Parent Server Config. Generation: 1
Parent Server MPM Generation: 0
Server uptime: 59 seconds
Server load: 2.00 0.69 0.29
Total accesses: 2 - Total Traffic: 3 kB - Total Duration: 32
CPU Usage: u.09 s.52 cu0 cs0 - 1.03% CPU load
.0339 requests/sec - 52 B/second - 1536 B/request - 16 ms/request
1 requests currently being processed, 0 workers gracefully restarting, 11 idle workers

```
__W_______.....................................................
..............................................................
..........................................................
```

Scoreboard Key:
"_" Waiting for Connection, "S" Starting up, "R" Reading Request,
"W" Sending Reply, "K" Keepalive (read), "D" DNS Lookup,
"C" Closing connection, "L" Logging, "G" Gracefully finishing,
"I" Idle cleanup of worker, "." Open slot with no current process

Srv	PID	Acc	M	CPU	SS	Req	Dur	Conn	Child	Slot	Client	Protocol	VHost	Request
0-0	5458	0/1/1	_	0.06	16	14	29	0.0	0.00	0.00	192.168.50.10	http/1.1	fe80::25a5:8f36:8d4d:77b1%ens19	GET / HTTP/1.1
2-0	5460	1/1/1	**W**	0.01	0	0	3	1.8	0.00	0.00	192.168.50.10	http/1.1	fe80::25a5:8f36:8d4d:77b1%ens19	GET /server-status HTTP/1.1

Srv Child Server number - generation
PID OS process ID
Acc Number of accesses this connection / this child / this slot
M Mode of operation

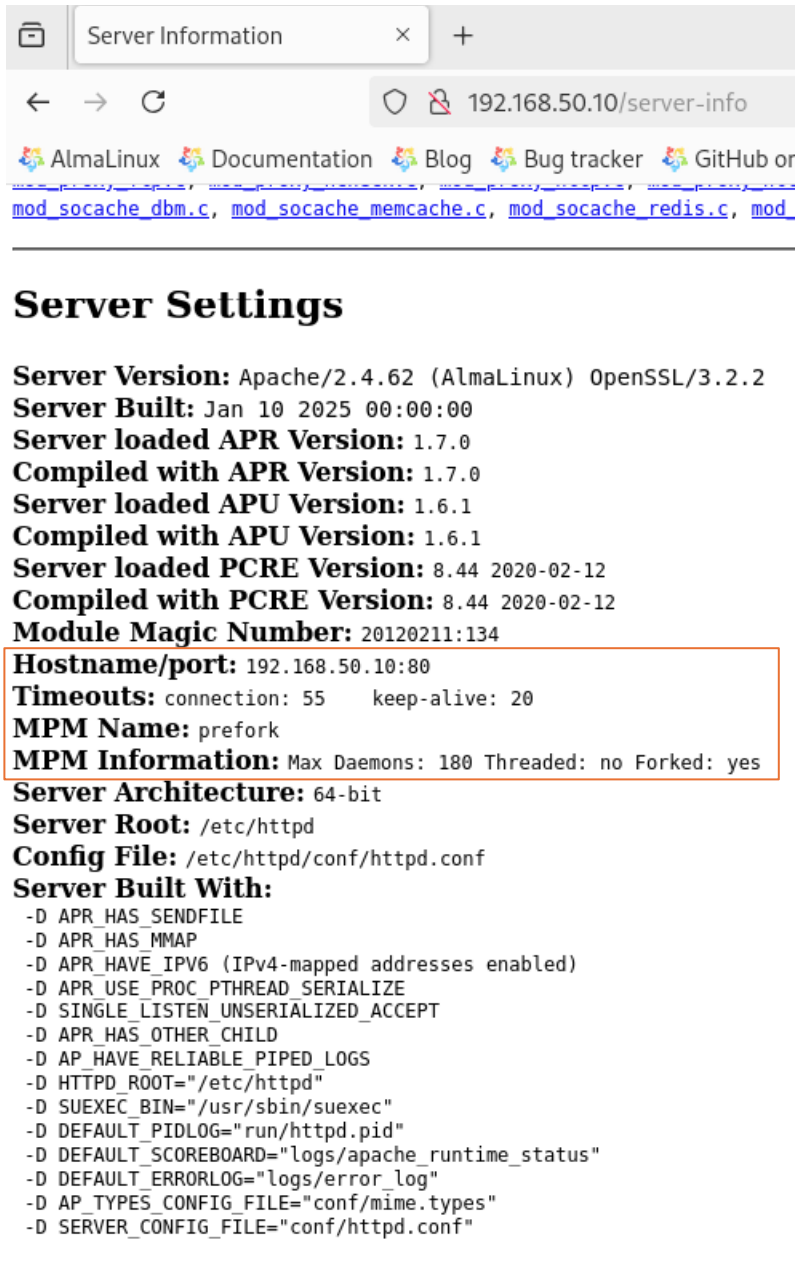
Total accesses: 1411 - Total Traffic: 2.3 MB - Total Duration: 4007
CPU Usage: u3.67 s6.19 cu0 cs0 - .207% CPU load
.296 requests/sec - 495 B/second - 1673 B/request - 2.83983 ms/request
1 requests currently being processed, 0 workers gracefully restarting, 11 idle workers

```
W__________....................................................
..............................................................
..................................................
```

Scoreboard Key:
"_" Waiting for Connection, "S" Starting up, "R" Reading Request,
"W" Sending Reply, "K" Keepalive (read), "D" DNS Lookup,
"C" Closing connection, "L" Logging, "G" Gracefully finishing,
"I" Idle cleanup of worker, "." Open slot with no current process

Srv	PID	Acc	M	CPU	SS	Req	Dur	Conn	Child	Slot	Client	Protocol	VHost	Request
0-0	3827	1/81/81	**W**	0.83	0	0	318	6.9	0.13	0.13	192.168.50.10	http/1.1	192.168.50.10:80	GET /server-status HTTP/1.1
1-0	3828	0/139/139	_	0.84	2	0	344	0.0	0.21	0.21	192.168.50.10	http/1.1	192.168.50.10:80	GET / HTTP/1.0
2-0	3829	0/83/83	_	0.71	2	1	304	0.0	0.12	0.12	192.168.50.10	http/1.1	192.168.50.10:80	GET / HTTP/1.0
3-0	3830	0/156/156	_	0.83	2	1	437	0.0	0.23	0.23	192.168.50.10	http/1.1	192.168.50.10:80	GET / HTTP/1.0
4-0	3831	0/83/83	_	0.85	2	0	334	0.0	0.13	0.13	192.168.50.10	http/1.1	192.168.50.10:80	GET / HTTP/1.0
5-0	3848	0/71/71	_	0.74	2	0	257	0.0	0.10	0.10	192.168.50.10	http/1.1	192.168.50.10:80	GET / HTTP/1.0
6-0	3859	0/91/91	_	0.71	2	0	257	0.0	0.13	0.13	192.168.50.10	http/1.1		
7-0	3863	0/90/90	_	0.72	2	0	288	0.0	0.13	0.13	192.168.50.10	http/1.1		
8-0	3867	0/172/172	_	0.89	2	0	482	0.0	0.40	0.40	192.168.50.10	http/1.1	192.168.50.10:80	GET / HTTP/1.0
9-0	3870	0/150/150	_	0.77	2	0	322	0.0	0.23	0.23	192.168.50.10	http/1.1	192.168.50.10:80	GET / HTTP/1.0
10-0	3873	0/212/212	_	0.80	2	0	316	0.0	0.32	0.32	192.168.50.10	http/1.1	192.168.50.10:80	GET / HTTP/1.0
11-0	3876	0/83/83	_	0.80	2	0	343	0.0	0.12	0.12	192.168.50.10	http/1.1	192.168.50.10:80	GET / HTTP/1.0

This is the output of server-info



Task 3 – CGI

Configure your web server to use cgi-bins

In **httpd.conf**, add a directory block under ScriptAlias for cgi-bin. The ScriptAlias path of /var/www/cgi-bin is where we'll be placing our Perl script

```
    ScriptAlias /cgi-bin/ "/var/www/cgi-bin/"
<Directory "/var/www/cgi-bin">
    AllowOverride None
    Options +ExecCGI
    AddHandler cgi-script .cgi .pl
    Require all granted
</Directory>
```

Creating the Perl script

Creating the file and changing permissions

First, make sure the cgi-bin directory is already present in /var/www/

```
[root@server12 conf]# cd /var/www/
[root@server12 www]# ll
total 8
drwxr-xr-x.  2 root   root      6 Jan 21 16:23 cgi-bin
drwxr-xr-x.  6 apache apache  145 Apr 17 10:32 htdocs
drwxr-xr-x.  2 root   root      6 Jan 21 16:23 html
drwxr-xr-x. 13 apache apache 4096 Apr 18 00:56 html_project1
drwxr-xr-x.  2 root   root     34 Apr 22 11:02 html_project2
drwxr-xr-x.  2 apache apache   34 Apr 23 15:27 html_project3
drwxr-xr-x. 12 apache apache 4096 Apr 21 22:28 virtuals
[root@server12 www]#
```

It is, so we'll create the script file and change permissions to allow Apache use of this script

```
[root@server12 cgi-bin]# touch test.pl
[root@server12 cgi-bin]# ll
```

Change the permissions with

Chmod +x /var/www/cgi-bin/test.pl

```
[root@server12 cgi-bin]# touch test.pl
[root@server12 cgi-bin]# ll
total 0
-rw-r--r--. 1 root root 0 Apr 24 10:13 test.pl
[root@server12 cgi-bin]# chmod +x /var/www/cgi-bin/test.pl
[root@server12 cgi-bin]# ll
total 0
-rwxr-xr-x. 1 root root 0 Apr 24 10:13 test.pl
[root@server12 cgi-bin]#
```

The script

Vim /var/www/cgi-bin/test.pl

Enter:

#!/usr/bin/perl

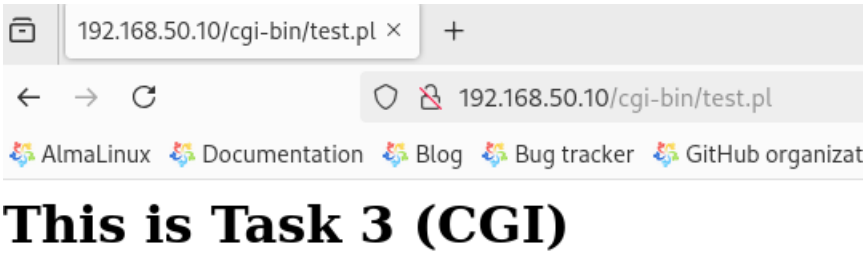
print "Content-type: text/html\n\n";
print "<html><body><h1>This is Task 3 (CGI)</h1></body></html>";

```
#!/usr/bin/perl
print "Content-type: text/html\n\n";
print "<html><body><h1>This is Task 3 (CGI)</h1></body></html>";
~
~
```

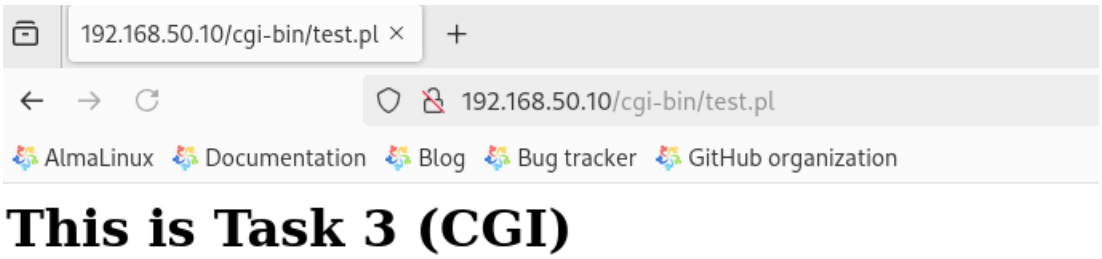
Save and quit.

Testing the script

In the web browser, test the script by entering the url **192.168.50.10/cgi-bin/test.pl**



By clicking the link:



Our Perl script is functional and our link works.

Task 4 – PHP

Configure your web server to use PHP.

Create a PHP script that displays the message **"Hello my friend!"** in the web browser for users whose IP address belongs to the **192.168.100.0/24** subnet and displays **"Hello stranger!"** for all other users outside this subnet.

Place this PHP script in the **/var/www/html_project3/q4 directory.**

PHP (Hypertext Preprocessor) is a widely-used server-side scripting language designed for web development. It is embedded in HTML and is particularly suited for creating dynamic web pages, handling forms, and interacting with databases

Install PHP

dnf install php -y

```
[root@server12 ~]# dnf install php -y
```

```
Installed:
  nginx-filesystem-2:1.20.1-20.el9.alma.1.noarch   php-8.0.30-1.el9_2.x86_64           php-cli-8.0.30-1.el9_2.x86_64
  php-fpm-8.0.30-1.el9_2.x86_64                    php-mbstring-8.0.30-1.el9_2.x86_64  php-opcache-8.0.30-1.el9_2.x86_6
  php-xml-8.0.30-1.el9_2.x86_64

Complete!
[root@server12 ~]#
```

Apache has to be restarted after installing PHP

Systemctl restart httpd

```
[root@server12 ~]# systemctl restart httpd
[root@server12 ~]#
```

Create the q4 directory

Since we'll be placing the PHP script in the q4 directory, we need to first create it.

mkdir -p /var/www/html_project3/q4

```
[root@server12 ~]# mkdir -p /var/www/html_project3/q4
[root@server12 ~]# cd /var/www/html_project3
[root@server12 html_project3]# ll
total 4
-rwxr-xr-x. 1 apache apache 1134 Apr 24 10:28 master_project3.html
drwxr-xr-x. 2 root   root      6 Apr 24 11:32 q4
[root@server12 html_project3]#
```

Create index.php

```
[root@server12 html_project3]# touch /var/www/html_project3/q4/index.php
[root@server12 html_project3]# cd q4
[root@server12 q4]# ll
total 0
-rw-r--r--. 1 root root 0 Apr 24 11:34 index.php
[root@server12 q4]#
```

Change permissions for index.php

Like the test.pl script, we have to change the permissions so that Apache can execute this index.php

```
[root@server12 q4]# chmod +x /var/www/html_project3/q4/index.php
[root@server12 q4]# ll
total 0
-rwxr-xr-x. 1 root root 0 Apr 24 11:34 index.php
[root@server12 q4]#
```

The script

Open the index.php file and insert the contents of the script

Vim index.php (if already in the q4 directory)

Vim /var/www/html_project3/q4/index.php (if not)

Below is a simple script that displays “Hello my friend!” to users in the 192.168.100.0/24 subnet and “Hello stranger!” for any user outside the subnet.

```php
<?php
$client_ip = $_SERVER['REMOTE_ADDR'];
$subnet = '192.168.100';
if (strpos($client_ip, $subnet) === 0) {
            echo "Hello my friend!";
} else {
            echo "Hello stranger!";
}
?>
```

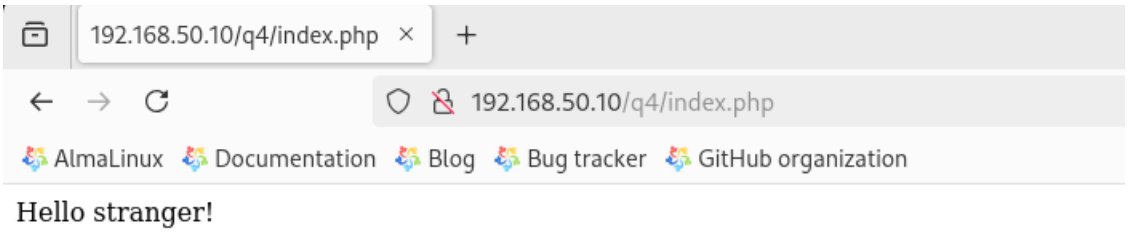
Save and quit.

Restart Apache

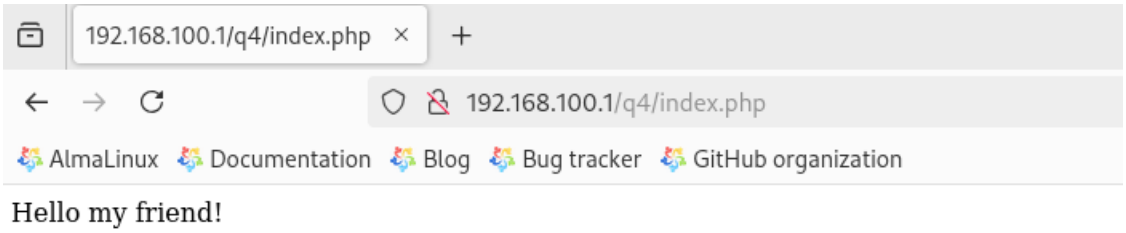
```
[root@server12 ~]# systemctl restart httpd
[root@server12 ~]#
```

In the browser, verify the correct welcome message shows when accessing from 192.168.100.1 and 192.168.50.10

From 192.68.50.10



From 192.168.100.1



TASK 5 – MYSQL/PHP

1. Install MySQL and create a database company.

2. Create in this database an “employees” table that contains two fields: name and salary. 3. Insert several records into the table, then verify the contents.

4. Create a PHP script that connects to this database and displays the contents of the employees table in the web browser as an HTML table.

5. Place this PHP script in the /var/www/html_project3/q5 directory.

Install MYSQL

Dnf -y install mysql-server

```
[root@server12 ~]# dnf -y install mysql-server
Last metadata expiration check: 2:10:14 ago on Thu 24 Apr 2025 10:24:37 AM.
Dependencies resolved.
================================================================================
 Package                    Architecture  Version                  Repository  Size
================================================================================
Installing:
 mysql-server               x86_64        8.0.41-2.el9_5           appstream   17 M
Installing dependencies:
 mariadb-connector-c-config noarch        3.2.6-1.el9_0            appstream  9.7 k
 mecab                      x86_64        0.996-3.el9.4            appstream  346 k
 mysql                      x86_64        8.0.41-2.el9_5           appstream  2.8 M
 mysql-common               x86_64        8.0.41-2.el9_5           appstream   68 k
 mysql-errmsg               x86_64        8.0.41-2.el9_5           appstream  499 k
 mysql-selinux              noarch        1.0.13-1.el9_5           appstream   36 k
 protobuf-lite              x86_64        3.14.0-13.el9            appstream  233 k

Transaction Summary
```

```
Installed:
  mariadb-connector-c-config-3.2.6-1.el9_0.noarch mecab-0.996-3.el9.4.x86_64          mysql-8.0.41-2.el9_5.x86_64
  mysql-errmsg-8.0.41-2.el9_5.x86_64              mysql-selinux-1.0.13-1.el9_5.noarch mysql-server-8.0.41-2.el9_5.x86_64
```

Start and enable the MySQL service to launch at boot time

systemctl enable --now mysqld

```
[root@server12 ~]# systemctl enable --now mysqld
Created symlink /etc/systemd/system/multi-user.target.wants/mysqld.service → /usr/lib/systemd/system/mysqld.service.
[root@server12 ~]#
```

Check the status of the MySQL service

systemctl status mysqld

```
[root@server12 ~]# systemctl status mysqld
● mysqld.service - MySQL 8.0 database server
     Loaded: loaded (/usr/lib/systemd/system/mysqld.service; enabled; preset: disabled)
     Active: active (running) since Thu 2025-04-24 12:37:38 EDT; 1min 7s ago
    Process: 41644 ExecStartPre=/usr/libexec/mysql-check-socket (code=exited, status=0/SUCCESS)
    Process: 41666 ExecStartPre=/usr/libexec/mysql-prepare-db-dir mysqld.service (code=exited, status=0/SUCCESS)
   Main PID: 41740 (mysqld)
     Status: "Server is operational"
      Tasks: 37 (limit: 22830)
     Memory: 452.8M
        CPU: 8.640s
     CGroup: /system.slice/mysqld.service
             └─41740 /usr/libexec/mysqld --basedir=/usr

Apr 24 12:37:28 server12 systemd[1]: Starting MySQL 8.0 database server...
Apr 24 12:37:28 server12 mysql-prepare-db-dir[41666]: Initializing MySQL database
Apr 24 12:37:38 server12 systemd[1]: Started MySQL 8.0 database server.
[root@server12 ~]#
```

Connecting to MySQL

Access the MySQL command-line interface as root

mysql -u root

```
[root@server12 ~]# mysql -u root
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 8
Server version: 8.0.41 Source distribution

Copyright (c) 2000, 2025, Oracle and/or its affiliates.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql>
```

Creating the Database

Show databases;

```
mysql> show databases;
+--------------------+
| Database           |
+--------------------+
| information_schema |
| mysql              |
| performance_schema |
| sys                |
+--------------------+
4 rows in set (0.20 sec)

mysql>
```

create database company;

```
mysql> create database company;
Query OK, 1 row affected (0.06 sec)

mysql>
```

Verify that Company was created

Show databases;

```
mysql> show databases;
+--------------------+
| Database           |
+--------------------+
| company            |
| information_schema |
| mysql              |
| performance_schema |
| sys                |
+--------------------+
5 rows in set (0.01 sec)

mysql>
```

Creating the Employees Table

Select the 'company' database

use company;

CREATE TABLE employees (

name VARCHAR(50),

salary INT

);

INSERT INTO employees (name, salary) VALUES

('Alain Gagnon', 70000),

('Bobby Sinclair', 100000),

('Jean-Paul Lemieux', 200000);

SELECT * FROM employees;

EXIT;

Verify the employees table with

SELECT * FROM employees;

```
mysql> SELECT * FROM employees;
+-------------------+--------+
| name              | salary |
+-------------------+--------+
| Alain Gagnon      |  70000 |
| Bobby Sinclair    | 100000 |
| Jean-Paul Lemieux | 200000 |
+-------------------+--------+
3 rows in set (0.02 sec)

mysql>
```

Granting Privileges

Create a user with full access from a remote host

```
mysql> create user 'root'@'server-12' identified by 'alma';
Query OK, 0 rows affected (0.24 sec)

mysql>
```

Grant all privileges to this user

grant all privileges on *.* to 'root'@'server12' with grant option;

(error in the screenshot. I corrected it to server12)

```
mysql> grant all privileges on *.* to 'root'@'server-12' with grant option;
Query OK, 0 rows affected (0.05 sec)
```

Apply the changes:

flush privileges;

```
mysql> flush privileges;
Query OK, 0 rows affected (0.08 sec)
```

To exit, enter **EXIT;**

```
mysql> EXIT;
Bye
[root@server12 ~]#
```

Create PHP Script

Creating the q5 directory

mkdir -p /var/www/html_project3/q5

```
[root@server12 ~]# mkdir -p /var/www/html_project3/q5
[root@server12 ~]#
```

```
[root@server12 ~]# cd /var/www/html_project3
[root@server12 html_project3]# ll
total 4
-rwxr-xr-x. 1 apache apache 1153 Apr 24 11:55 master_project3.html
drwxr-xr-x. 2 root   root     23 Apr 24 11:42 q4
drwxr-xr-x. 2 root   root      6 Apr 24 13:13 q5
[root@server12 html_project3]#
```

Create the index.php

touch /var/www/html_project3/q5/index.php

```
[root@server12 q5]# touch /var/www/html_project3/q5/index.php
[root@server12 q5]# ll
total 0
-rw-r--r--. 1 root root 0 Apr 24 13:16 index.php
[root@server12 q5]#
```

Modify the permissions for index.php so that Apache can execute

```
-rw-r--r--. 1 root root 0 Apr 24 13:16 index.php
[root@server12 q5]# chmod +x /var/www/html_project3/q5/index.php
[root@server12 q5]# ll
total 0
-rwxr-xr-x. 1 root root 0 Apr 24 13:16 index.php
[root@server12 q5]#
```

The script

Like we did with the other script, vim the index.php file and create a PHP script that connects to this database and displays the contents of the employees table in the web browser as an HTML table

Vim index.php

```php
<?php
// To debug
ini_set('display_errors', 1);
ini_set('display_startup_errors', 1);
error_reporting(E_ALL);
// Variables
$servername = "192.168.50.10";
$username = "root";
$password = "alma";
$dbname = "company";
// Create the connexion
$conn = new mysqli($servername, $username, $password, $dbname);
// Verify the connexion
if ($conn->connect_error) {
die("Connection failed: " . $conn->connect_error);
}
$sql = "SELECT * FROM employees";
$result = $conn->query($sql);
if ($result->num_rows > 0) {
// Results
while($row = $result->fetch_assoc()) {
echo "Name: " . $row["name"]. " - Salary: " .
$row["salary"]."$".  "<br>";
}
} else {
echo "0 results";
}
$conn->close();
?>
~
```

Save and quit.

Install PHP MySQL Connector

Dnf install php-mysqlnd

```
[root@server12 q5]# sudo dnf install php-mysqlnd
Last metadata expiration check: 3:01:42 ago on Thu 24 Apr 2025 10:24:37 AM.
Dependencies resolved.
================================================================================
 Package                        Architecture                Version
--------------------------------------------------------------------------------
Installing:
 php-mysqlnd                    x86_64                      8.0.30-1.el9_2

Transaction Summary
================================================================================
Install  1 Package

Total download size: 148 k
Installed size: 450 k
Is this ok [y/N]: y
Downloading Packages:
php-mysqlnd-8.0.30-1.el9_2.x86_64.rpm
--------------------------------------------------------------------------------
```

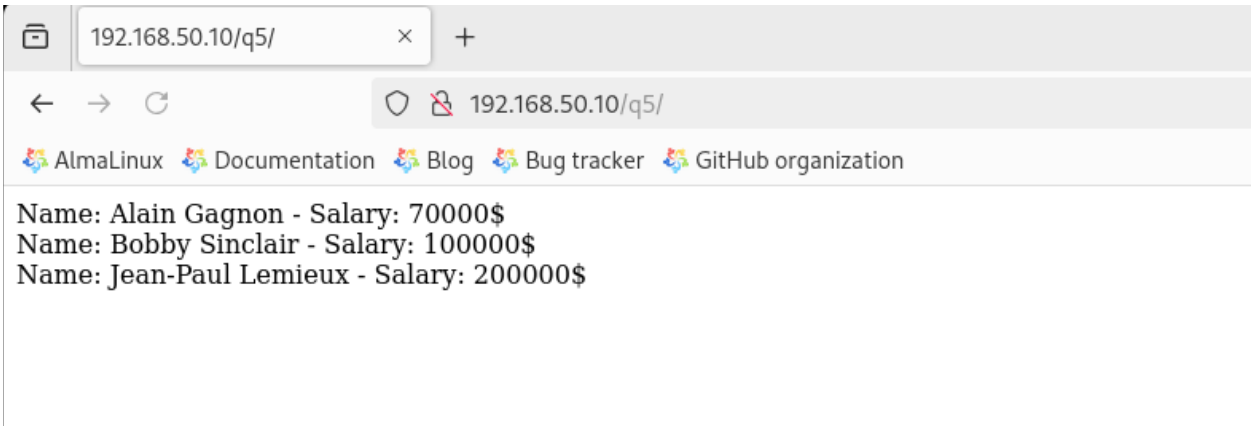
Systemctl restart php-fpm

Enable network connection with httpd in selinux

setsebool -P httpd_can_network_connect 1

```
[root@server12 q5]# systemctl restart php-fpm
[root@server12 q5]# setsebool -P httpd_can_network_connect 1
[root@server12 q5]#
```

Test the script



Task 6: SSL

Configure Apache for SSL and test HTTPS access

Test access to your server using the https security protocol by navigating to: https://serverX (where X is your assigned server number).

Install mod_ssl

dnf install mod_ssl -y

```
[root@server12 ~]# dnf install mod_ssl -y
```

```
Dependencies resolved.
================================================================================
 Package                        Architecture                    Version
================================================================================
Installing:
 mod_ssl                        x86_64                          1:2.4.62-1.el9_5.2

Transaction Summary
================================================================================
Install  1 Package

Total download size: 109 k
Installed size: 272 k
Downloading Packages:
mod_ssl-2.4.62-1.el9_5.2.x86_64.rpm
--------------------------------------------------------------------------------
Total
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing        :
  Installing       : mod_ssl-1:2.4.62-1.el9_5.2.x86_64
  Running scriptlet: mod_ssl-1:2.4.62-1.el9_5.2.x86_64
  Verifying        : mod_ssl-1:2.4.62-1.el9_5.2.x86_64

Installed:
  mod_ssl-1:2.4.62-1.el9_5.2.x86_64
```

Create the directory

mkdir /etc/httpd/ssl

```
[root@server12 ~]# cd /etc/httpd
[root@server12 httpd]# ll
total 4
drwxr-xr-x. 2 root root   88 Apr 24 14:00 conf
drwxr-xr-x. 2 root root  114 Apr 24 14:45 conf.d
drwxr-xr-x. 2 root root 4096 Apr 24 14:45 conf.modules.d
lrwxrwxrwx. 1 root root   19 Jan 21 16:25 logs -> ../../var/log/httpd
lrwxrwxrwx. 1 root root   29 Jan 21 16:25 modules -> ../../usr/lib64/httpd/modul
lrwxrwxrwx. 1 root root   10 Jan 21 16:25 run -> /run/httpd
drwxr-xr-x. 2 root root    6 Apr 24 14:47 ssl
lrwxrwxrwx. 1 root root   19 Jan 21 16:25 state -> ../../var/lib/httpd
[root@server12 httpd]#
```

Generate Certificate

sudo openssl req -x509 -nodes -days 365 -newkey rsa:2048 \

-keyout /etc/httpd/ssl/server.key \

-out /etc/httpd/ssl/server.crt \

```
[root@server12 ssl]# sudo openssl req -x509 -nodes -days 365 -newkey rsa:2048     -keyout /etc/httpd/ssl/server.key     -out /etc/httpd/ssl/server.cr
```

```
You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a DN.
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
Country Name (2 letter code) [XX]:
State or Province Name (full name) []:Quebec
Locality Name (eg, city) [Default City]:Montreal
Organization Name (eg, company) [Default Company Ltd]:
Organizational Unit Name (eg, section) []:
Common Name (eg, your name or your server's hostname) []:server12
Email Address []:
```

Configure **/etc/httpd/conf.d/ssl.conf** with our **server name**, **SSLCertificateFile** and **SSLCertificateKeyFile** changing the path to **/etc/httpd/ssl/server.crt and server.key**

```
# General setup for the virtual host, inherited from global configuration
#DocumentRoot "/var/www/html"
ServerName server12:443
```

```
#   Point SSLCertificateFile at a PEM encoded certificate.  If
#   the certificate is encrypted, then you will be prompted for a
#   pass phrase.  Note that restarting httpd will prompt again.  Keep
#   in mind that if you have both an RSA and a DSA certificate you
#   can configure both in parallel (to also allow the use of DSA
#   ciphers, etc.)
#   Some ECC cipher suites (http://www.ietf.org/rfc/rfc4492.txt)
#   require an ECC certificate which can also be configured in
#   parallel.
SSLCertificateFile /etc/httpd/ssl/server.crt

#   Server Private Key:
#   If the key is not combined with the certificate, use this
#   directive to point at the key file.  Keep in mind that if
#   you've both a RSA and a DSA private key you can configure
#   both in parallel (to also allow the use of DSA ciphers, etc.)
#   ECC keys, when in use, can also be configured in parallel
SSLCertificateKeyFile /etc/httpd/ssl/server.key
```

Save and quit.

Allow HTTPS through the firewall

We need to add HTTPS to the firewall

```
[root@server12 ssl]# firewall-cmd --add-service=https --permanent --zone=nm-shared
success
[root@server12 ssl]#
```

Firewall-cmd –add-service=https –permanent –zone=nm-shared

Testing

On the website, click the link on Task 6. You'll get a warning for security risk. Click Advanced → Accept Risk and Continue. Our certificate works. It's just not "trusted" because it's self-signed