Apache Web Server – Lecture 1/2 – 07/02/2022

- Install:

  $ sudo apt update

  $ sudo apt install apache2

  $ sudo service apache2 status

- Start:

  $ sudo service apache2 start

- Get IP and Port:

  IP: $ ip a

```
       valid_lft forever preferred_lft forever
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP gro
up default qlen 1000
    link/ether 00:0c:29:70:a7:7d brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.187.130/24 brd 192.168.187.255 scope global dynamic noprefixrou
te ens33
```

  Port: $ sudo ss -ltn

```
LISTEN   0         511                      *:80                     *:*
```

- Change Port:

  $ sudo nano /etc/apache2/ports.conf

```
# If you just change the port or add more ports here, you will likely also
# have to change the VirtualHost statement in
# /etc/apache2/sites-enabled/000-default.conf

Listen 80

<IfModule ssl_module>
        Listen 443
</IfModule>

<IfModule mod_gnutls.c>
        Listen 443
</IfModule>

# vim: syntax=apache ts=4 sw=4 sts=4 sr noet
```

  $ sudo service apache2 restart

- Change User and Group:

  Create User: $ sudo useradd -c "Apache2 User" -m -s /usr/sbin/nologin apache2

  Change from Apache environment vars: $ sudo nano /etc/apache2/envvars

```
# envvars - default environment variables for apache2ctl

# this won't be correct after changing uid
unset HOME

# for supporting multiple apache2 instances
if [ "${APACHE_CONFDIR##/etc/apache2-}" != "${APACHE_CONFDIR}" ] ; then
        SUFFIX="-${APACHE_CONFDIR##/etc/apache2-}"
else
        SUFFIX=
fi

# Since there is no sane way to get the parsed apache2 config in scripts, some
# settings are defined via environment variables and then used in apache2ctl,
# /etc/init.d/apache2, /etc/logrotate.d/apache2, etc.
export APACHE_RUN_USER=apache2
export APACHE_RUN_GROUP=apache2
# temporary state file location. This might be changed to /run in Wheezy+1
export APACHE_PID_FILE=/var/run/apache2$SUFFIX/apache2.pid
export APACHE_RUN_DIR=/var/run/apache2$SUFFIX
```

  Restart: $ sudo service apache2 restart

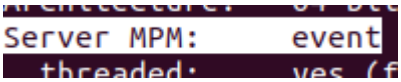
```
fierro98@ubuntu:~$ ps -ef | grep apache2
root        5408       1  0 05:25 ?        00:00:00 /usr/sbin/apache2 -k start
apache2     5409    5408  0 05:25 ?        00:00:00 /usr/sbin/apache2 -k start
apache2     5410    5408  0 05:25 ?        00:00:00 /usr/sbin/apache2 -k start
fierro98    6173    2815  0 06:44 pts/0    00:00:00 grep --color=auto apache2
```

  Note: The new user has read permission on the web application.

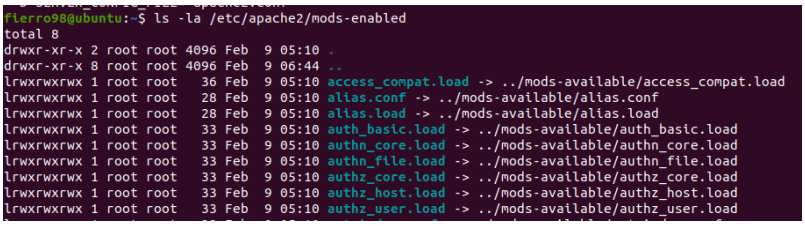
By Mahmoud Mohamed Kamal (MahmoudKamal.ITI@gmail.com – mahmoudfierro@gmail.com)

- Default logs files:
  Access log: /var/log/apache2/access.log
  Error log: /var/log/apache2/error.log

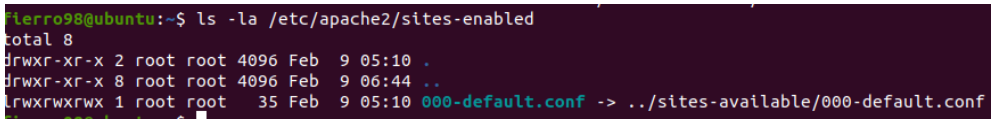
- To print current MPM: apachectl -V



- To disable a module: $ sudo a2dismod <module_name> → $ sudo a2dismod mpm_event
  $ sudo service apache2 restart
- To enable a module: $ sudo a2enmod <module_name> → $ sudo a2enmod mpm_event
  $ sudo service apache2 restart
- All modules available: /etc/apache2/mods-available/
- All enabled modules: /etc/apache2/mods-enabled → link from /etc/apache2/mods-available/



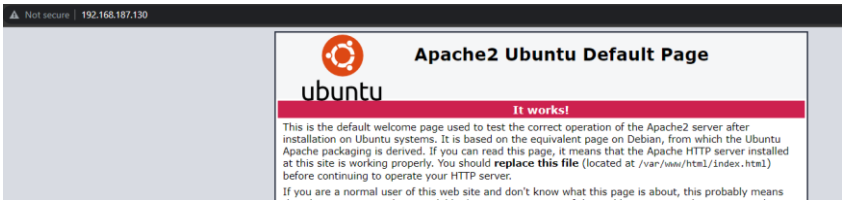
- Web server hosts web application (Website):
  1- Hostname: Site URL
  2- Document Root: Directory contains site web app files
  3- URL+IP+PORT: Virtual Host
  All configured sites: /etc/apache2/sites-available
  All enabled sites (Must be configured 1st) : /etc/apache2/sites-enabled → link from /etc/apache2/sites-available



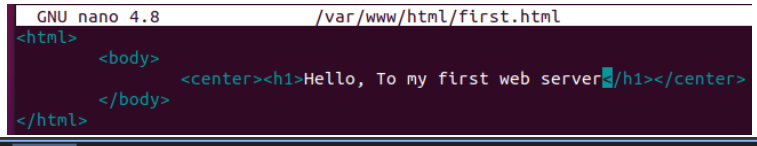
- Example:

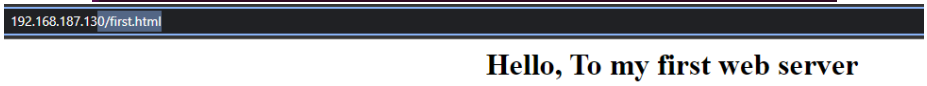
$ sudo nano /etc/apache2/sites-available/000-default.conf

Default virtual host has DocumentRoot: /var/www/html



To add new page: $ sudo nano /var/www/html/first.html





Hello, To my first web server

- Configurations:

Main: /etc/apache2/apache2.conf

- In apache2 there is configuration for directory called directive

<Directory DirectoryName>
</Directory>
$ sudo nano /etc/apache2/apache2.conf

```
<Directory /var/www/>
        Options Indexes FollowSymLinks
        AllowOverride None
        Require all granted
</Directory>
```

To apply certain configuration on any client request to this directory and its child.
If child has different directory directive, then the child config will be applied.

- /var/www/html →have a config
  Any directory under /var/www/html will have the same configuration.
- /var/www/html →have a config1 & /var/www/html/site1 →have a config2
  Any directory under /var/www/html will have the same configuration (config1) but /var/www/html/site1 has a different configuration (config2).

- Can control who has permission to visit the directory content

Require: Specify who ca visit the directory
username/IP
grant/deny

- Example – To deny all users from access g1

1- Create directory g1 in /var/www/html
$ sudo mkdir /var/www/html/g1

2- Create a html page
$ sudo nano /var/www/html/g1/index.html

```
 GNU nano 4.8                  /var/www/html/g1/index.html
<html>
        <center><h1>Hello, From g1</h1></center>
</html>
```

192.168.187.130/g1/index.html

Hello, From g1

3- Add <Directory> in config files
Create /etc/apache2/con-available/deny-g1.conf
$ sudo nano /etc/apache2/confs-available/deny-g1.conf

```
 GNU nano 4.8        /etc/apache2/conf-available/deny-g1.conf
<Directory /var/www/html/g1>
        Require all denied
</Directory>
```

<Directory /var/www/html/g1>
Require all denied
</Directory>

4- Enable configuration
$ sudo a2enconf deny-g1

5- Restart
$ sudo service apache2 restart

6- Error log: to see access denied
$ sudo tail /var/log/apache2/error.log

```
032] [client 192.168.187.1:65395] AH01630: client denied by server configuratio
n: /var/www/html/g1/index.html
```

7- Disable configuration
$ sudo a2disconf deny-g1
$ sudo service apache2 restart

- Summary:
  - Apache conf file may include a variable, the variables are stored in
    1- BASH Shell 2- Apache environment vars: /etc/apache2/envars
  - Different directories under /etc/apache2
    $ ls -la /etc/apache2/

```
-rw-r--r--   1 root root  7224 Jan  5 06:49 apache2.conf
drwxr-xr-x   2 root root  4096 Feb  9 08:57 conf-available
drwxr-xr-x   2 root root  4096 Feb  9 09:02 conf-enabled
-rw-r--r--   1 root root  1780 Feb  9 05:25 envvars
-rw-r--r--   1 root root 31063 Sep 30  2020 magic
drwxr-xr-x   2 root root 12288 Feb  9 05:10 mods-available
drwxr-xr-x   2 root root  4096 Feb  9 05:10 mods-enabled
-rw-r--r--   1 root root   320 Sep 30  2020 ports.conf
drwxr-xr-x   2 root root  4096 Feb  9 07:34 sites-available
drwxr-xr-x   2 root root  4096 Feb  9 05:10 sites-enabled
```

1- conf-available
Existing configuration files, end with .conf
The configuration in this directory may be activated or maybe not.

2- conf-enabled → link from conf-available
The activated configuration, which must reside in conf-available.
Enable configuration: a- $ sudo a2enconf <cong-name> [Create link from conf-available]
b- $ sudo service apache2 restart

```
fierro98@ubuntu:~$ sudo a2enconf deny-g1
[sudo] password for fierro98:
Enabling conf deny-g1.
To activate the new configuration, you need to run:
  systemctl reload apache2
fierro98@ubuntu:~$ ls  /etc/apache2/conf-enabled/
charset.conf  localized-error-pages.conf   security.conf
deny-g1.conf  other-vhosts-access-log.conf  serve-cgi-bin.conf
fierro98@ubuntu:~$ ls  -la /etc/apache2/conf-enabled/
total 8
drwxr-xr-x 2 root root 4096 Feb  9 09:27 .
drwxr-xr-x 8 root root 4096 Feb  9 08:43 ..
lrwxrwxrwx 1 root root   30 Feb  9 05:10 charset.conf -> ../conf-available/charset.conf
lrwxrwxrwx 1 root root   30 Feb  9 09:27 deny-g1.conf -> ../conf-available/deny-g1.conf
```

Disable configuration: a- $ sudo a2disconf <cong-name> [Remove link from conf-available]
b- $ sudo service apache2 restart

```
fierro98@ubuntu:~$ sudo a2disconf deny-g1
Conf deny-g1 disabled.
To activate the new configuration, you need to run:
  systemctl reload apache2
fierro98@ubuntu:~$ sudo service apache2 restart
fierro98@ubuntu:~$ ls  -la /etc/apache2/conf-enabled/
total 8
drwxr-xr-x 2 root root 4096 Feb  9 09:29 .
drwxr-xr-x 8 root root 4096 Feb  9 08:43 ..
lrwxrwxrwx 1 root root   30 Feb  9 05:10 charset.conf -> ../conf-available/charset.conf
lrwxrwxrwx 1 root root   44 Feb  9 05:10 localized-error-pages.conf -> ../conf-available/localized-er
r-pages.conf
lrwxrwxrwx 1 root root   46 Feb  9 05:10 other-vhosts-access-log.conf -> ../conf-available/other-vhos
-access-log.conf
lrwxrwxrwx 1 root root   31 Feb  9 05:10 security.conf -> ../conf-available/security.conf
lrwxrwxrwx 1 root root   36 Feb  9 05:10 serve-cgi-bin.conf -> ../conf-available/serve-cgi-bin.conf
```

3- mods-available
Existing installed modules, end with .conf
The modules in this directory may be activated or maybe not.
- MPM (Multi-Processing Modules)

```
fierro98@ubuntu:~$ ls -la /etc/apache2/mods-available/ | grep mpm
-rw-r--r-- 1 root root   668 Sep 30  2020 mpm_event.conf
-rw-r--r-- 1 root root   106 Sep 30  2020 mpm_event.load
-rw-r--r-- 1 root root   571 Sep 30  2020 mpm_prefork.conf
-rw-r--r-- 1 root root   108 Sep 30  2020 mpm_prefork.load
-rw-r--r-- 1 root root   836 Sep 30  2020 mpm_worker.conf
-rw-r--r-- 1 root root   107 Sep 30  2020 mpm_worker.load
```

4- mods-enabled → link from mods-available
The activated Modules, which must reside in mods-available.
Disable a module: a- $ sudo a2dismod <module_name> [Create link from mods-available]
b- $ sudo service apache2 restart
Enable a module: a- $ sudo a2enmod <module_name> [Remove link from mods-available]
b- $ sudo service apache2 restart

5- sites-available
The configured virtual host.
The virtual host may be activated or maybe not.

6- sites-enabled → link from sites -available
The activated virtual hosts which must be in sites -available.
Disable a site: a- $ sudo a2dissite <site_name> [Create link from sites-available]
b- $ sudo service apache2 restart
Enable a site: a- $ sudo a2ensite <site_name> [Remove link from sites-available]
b- $ sudo service apache2 restart

```
fierro98@ubuntu:~$ ls -la /etc/apache2/sites-available/
total 20
drwxr-xr-x 2 root root 4096 Feb  9 07:34 .
drwxr-xr-x 8 root root 4096 Feb  9 08:43 ..
-rw-r--r-- 1 root root 1332 Sep 30  2020 000-default.conf
-rw-r--r-- 1 root root 6338 Sep 30  2020 default-ssl.conf
fierro98@ubuntu:~$ ls -la /etc/apache2/sites-enabled/
total 8
drwxr-xr-x 2 root root 4096 Feb  9 05:10 .
drwxr-xr-x 8 root root 4096 Feb  9 08:43 ..
lrwxrwxrwx 1 root root   35 Feb  9 05:10 000-default.conf -> ../sites-available/000-default.conf
```

- .htaccess:

There is a file called .htaccess, Add the file to the directory include all configuration
.htaccess can be used: [Access list – Authentication – Default pages and modules – Mod rewrite].
$ sudo nano /var/www/html/g1/.htaccess

```
 GNU nano 4.8                          /var/www/html/g1/.htaccess
Require all denied
```

Require all denied

Nothing happens

If a directive from .htaccess conflicts with main server configuration, will return to AllowOverride.
$ sudo nano /etc/apache2/con-available/deny-g1.conf

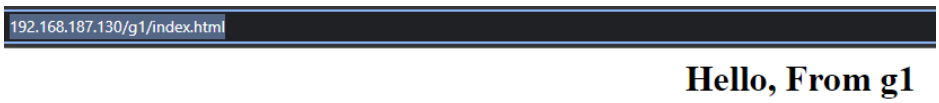
```
/etc/apache2/conf-available/deny-g1.conf
<Directory /var/www/html/g1>
        AllowOverride all
        Require all denied
</Directory>
```

```
/etc/apache2/conf-available/deny-g1.conf
<Directory /var/www/html/g1>
        AllowOverride all

</Directory>
```

<Directory /var/www/html/g1>
    AllowOverride all
    Require all denied // Remove it because it is already on .htaccess
</Directory>

```
fierro98@ubuntu:~$ sudo a2enconf deny-g1
Enabling conf deny-g1.
To activate the new configuration, you need to run:
  systemctl reload apache2
fierro98@ubuntu:~$ sudo service apache2 restart
```


```
fierro98@ubuntu:~$ sudo a2disconf deny-g1
Conf deny-g1 disabled.
To activate the new configuration, you need to run:
  systemctl reload apache2
fierro98@ubuntu:~$ sudo service apache2 restart
```



Apache Web Server – Lecture 2/2 – 09/02/2022

- **Apache authentication:**

$ cd /var/www/html/g1

$ sudo nano .htaccess

```
 GNU nano 4.8          .htaccess
AuthType Basic
AuthName “g1 Area’
AuthUserFile /etc/.htpasswd
Require valid-user
```

AuthType Basic
AuthName "g1 Area"
AuthUserFile /etc/.htpasswd
Require valid-user

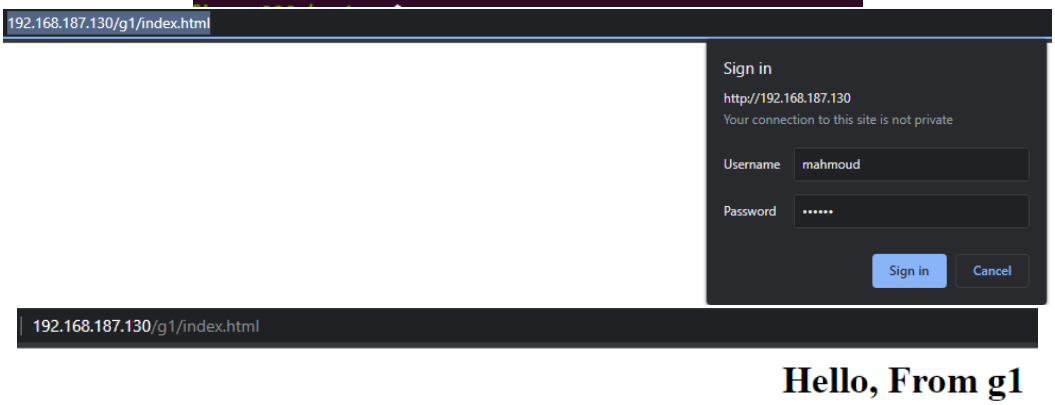
To add a username for the 1st time

$ sudo htpasswd -c /etc/.htpasswd ahmed

To add a username after that

$ sudo htpasswd /etc/.htpasswd mahmoud

```
fierro98@ubuntu:~$ sudo htpasswd  /etc/.htpasswd mahmoud
New password:
Re-type new password:
Adding password for user mahmoud
```



- Open other location with js:

$ sudo nano /var/www/html/g1/index2.html

```
 GNU nano 4.8    /var/www/html/g1/index2.html    Modified
<html>
        <center><h1>Hello, From g1 - Page 2</h1></center>
</html>
```

```
<html>
    <center><h1>Hello, From g1 - Page 2</h1></center>
</html>
```

$ sudo nano /var/www/html/g1/index.html

```
 GNU nano 4.8    /var/www/html/g1/index.html
<script>
        location.href="/g1/index2.html";
</script>
<html>
        <center><h1>Hello, From g1</h1></center>
</html>
```

```
<script>
    location.href="/g1/index2.html";
</script>
<html>
    <center><h1>Hello, From g1</h1></center>
</html>
```

* Remove <script>…..</script> for mod_rewrite

- mod_rewrite
  - RewriteEngine on: turn the engine on, so the rules would take effects
  - RewriteEngine off: turn the engine off, so the rules would not take effects. Can be
  - configured in the .conf files or in .htaccess.
  - RewriteRule: used to perform the URL rewrite operations.

Enable mod_rewrite: $ sudo a2enmod rewrite
$ sudo service apache2 restart

$ sudo nano /var/www/html/g1/.htaccess

```
 GNU nano 4.8     /var/www/html/g1/.htaccess
AuthType Basic
AuthName "g1 Area"
AuthUserFile /etc/.htpasswd
Require valid-user
RewriteEngine on
RewriteRule index.html$ /g1/index2.html
```

RewriteEngine on
RewriteRule index.html$ /g1/index2.html

192.168.187.130/g1/index.html

Hello, From g1 - Page 2

- Uses RegEx. ([NC] no case write it at the end of RewriteRule line for case insensitive]
  → RewriteRule ^data/{0,1}$ /g1/index2.html [NC]

192.168.187.130/g1/Data

Hello, From g1 - Page 2

- RewriteRule /?data$ /get1.html
  → Will rewrite the URL to get the file get1.html if the URL path ends with /data.
- RewriteRule /?data$ /get1.html [NC]
  → Will rewrite the URL to get the file get1.html if the URL path ends with /data with any case.
- RewriteRule ^/?get/([a-zA-Z_]+)/([0-9]+)/?$ get1.php?fname=$1&fage=$2
  → Wil convert the directory-based URL to Query String. To Rewrite (2) -> (1)
  (1)http://www.site/g1/test.html?name=ahmed&age=30
  (2)http://www.site/g1/get/ahmed/30

- RewriteCond: used to construct conditions control the URL rewrite operations.
  RewriteCond %{QUERY_STRING} "noha "
  RewriteRule .? http://%{HTTP_HOST}/noha.html? [R]
  RewriteCond, will test the QUERY_STRING if contains the pattern noha
  If returns true, the next RerwriteRule will be executed.
  RewriteRule will replace all the url with the new string and terminates the URL path with ? To remove the QUERY_STRING.
  To bind them with or, use the flag [OR]

- Virtual Hosts:

The term VirtualHost refers to that run multiple web sites on the same web server.

- For site mahmoudkamal.com
  1- Create a file /etc/apache2/sites-available/mahmoudkamal.com.conf
  $ sudo nano /etc/apache2/sites-available/mahmoudkamal.com.conf

```
.../apache2/sites-available/mahmoudkamal.com.conf
<VirtualHost *:80>
        ServerName mahmoudkamal.com
        ServerAlias www.mahmoudkamal.com
        DocumentRoot /var/ahmed.com
</VirtualHost>

<Directory /var/mahmoudkamal.com >
        AllowOverride all
        Require all granted
</Directory>
```

```
<VirtualHost *:80>
        ServerName mahmoudkamal.com
        ServerAlias www.mahmoudkamal.com
        DocumentRoot /var/websites/mahmoudkamal.com
</VirtualHost>

<Directory /var/websites/mahmoudkamal.com >
        AllowOverride all
        Require all granted
</Directory>
```

  2- Create Directory /var/websites/mahmoudkamal.com
  $ sudo mkdir -p /var/websites/mahmoudkamal.com
  3- Create index.html inside this Directory
  $ sudo nano /var/websites/mahmoudkamal.com/index.html

```
 GNU nano 4.8                        /var/websites/mahmoudkamal.com/index.html
<html>
        <body>
                <center><h1>Welcome to Mahmoud Kamal website</h1></center>
        </body>
</html>
```

```
<html>
    <body>
        <center><h1>Welcome to Mahmoud Kamal website</h1></center>
    </body>
</html>
```

4- Enable site then reload apache2

$ sudo a2ensite mahmoudkamal.com

$ sudo service apache2 reload

```
fierro98@ubuntu:~$ sudo nano /etc/apache2/sites-available/mahmoudkamal.com.conf
fierro98@ubuntu:~$ sudo mkdir -p /var/websites/mahmoudkamal.com
fierro98@ubuntu:~$ sudo nano /var/websites/mahmoudkamal.com/index.html
fierro98@ubuntu:~$ sudo a2ensite mahmoudkamal.com
Enabling site mahmoudkamal.com.
To activate the new configuration, you need to run:
  systemctl reload apache2
fierro98@ubuntu:~$ sudo service apache2 reload
fierro98@ubuntu:~$ ls -la /etc/apache2/sites-enabled/ | grep mahmoudkamal
lrwxrwxrwx 1 root root   40 Feb  9 13:25 mahmoudkamal.com.conf -> ../sites-available/mahmoudkamal.com.conf
```

5- Get IP

$ ip a

```
2: ens33: <BROADCAST,MULTICAST,U
    link/ether 00:0c:29:70:a7:7d
    altname enp2s1
    inet 192.168.187.130/24 brd
```

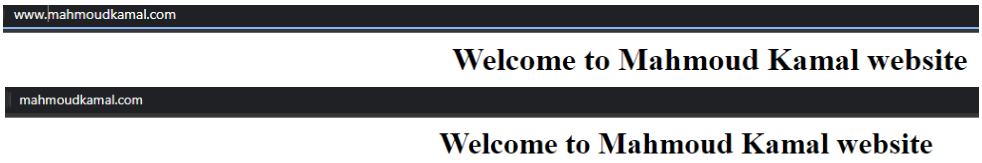
6- Open notepad on Windows as administrator

Open Hosts files → C:\Windows\System32\drivers\etc\hosts

```
192.168.187.130 mahmoudkamal.com
192.168.187.130 www.mahmoudkamal.com
```

192.168.187.130 mahmoudkamal.com

192.168.187.130 www.mahmoudkamal.com



- To configure apache for SSL

1-Generate key pairs (public, private)

- Generate private key
  - $ openssl genrsa -out mykey.priv 2048
- Generate public key
  - $ openssl rsa -in mykey.priv -pubout > mykey.pub
- Secure private key
  - $ chmod o-r mykey.priv

2-Generate CSR

$ openssl req -new -key mykey.priv -out mycsr.csr

```
Country Name (2 letter code) [AU]:EG
State or Province Name (full name) [Some-State]:Alexandria
Locality Name (eg, city) []:Alexandria
Organization Name (eg, company) [Internet Widgits Pty Ltd]:fierro98
Organizational Unit Name (eg, section) []:OS
Common Name (e.g. server FQDN or YOUR name) []:mahmoudkamal
Email Address []:mahmoudkamal.iti@gmail.com

Please enter the following 'extra' attributes
to be sent with your certificate request
A challenge password []:123456
An optional company name []:fierro98
```

3-Pay for the certificate or use self-signed certificate

$ openssl x509 -req -days 365 -in mycsr.csr -signkey mykey.priv -sha256 -out mycert.crt

4-Configure apache2 for SSL

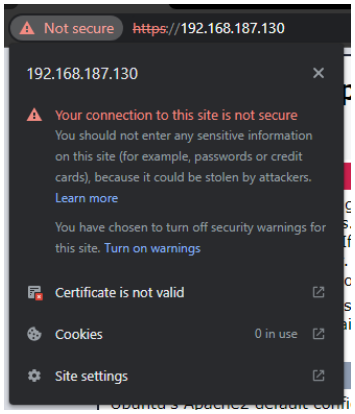
- Enable apache for ssl

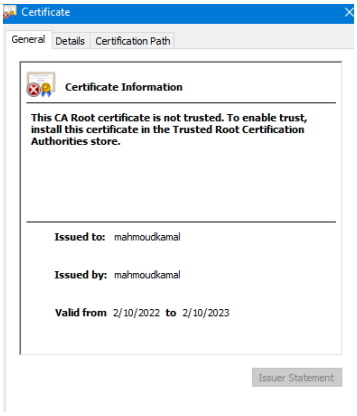
$ sudo a2enmod ssl

- Configure the SSL virtualhost /etc/apache2/sites-available/default-ssl.conf
  Change certifictes paths SSLCertificateFile,SSLCertificateKeyFile
  $ sudo cp mycert.crt /etc/ssl/certs
  $ sudo cp mykey.priv /etc/ssl/private
  $ sudo nano /etc/apache2/sites-available/default-ssl.conf

```
/etc/apache2/sites-available/default-ssl.conf
#   the ssl-cert package. See
#   /usr/share/doc/apache2/README.Debian.gz for more i
#   If both key and certificate are stored in the same
#   SSLCertificateFile directive is needed.
SSLCertificateFile      /etc/ssl/certs/mycert.crt
SSLCertificateKeyFile /etc/ssl/private/mykey.priv
```

- Enable SSL Site
  $ sudo a2ensite default-ssl
- Restart
  $ sudo service apache2 restart

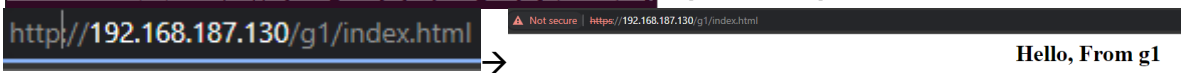




- Rewrite rule to modify url for http connections to https using .htaccess file [Lab1]
  $ sudo nano /var/www/html/g1/.htaccess

```
GNU nano 4.8        /var/www/html/g1/.htaccess
AuthType Basic
AuthName "g1 Area"
AuthUserFile /etc/.htpasswd
Require valid-user
RewriteEngine On
RewriteCond %{HTTPS} !=on
RewriteRule ^(.*)$ https://%{HTTP_HOST}%{REQUEST_URI} [L,R=301,NE]
```

RewriteEngine On
RewriteCond %{HTTPS} !=on
RewriteRule ^(.*)$
https://%{HTTP_HOST}%{REQUEST_URI}
[L,R=301,NE]



- Setup php with apache2

1- PHP as interpreter: Prefork MPM
Web server: fork php interpreter, and pass to it the php requested file

a- Replace mpm_event into mpm_prefork
$ sudo a2dismod mpm_event
$ sudo a2enmod mpm_prefork

b- Install php, php-apache-module, php extensions
$ sudo apt install php7.4 php7.4-mysql

c- Restart apache
$ sudo service apache2 restart

d- Test

create a file "info.php" under document root

$ sudo nano /var/www/html/info.php

/var/www/html/info.php

```
<?php
        phpinfo();
?>
```

e- To remove:

$ sudo service apache2 stop

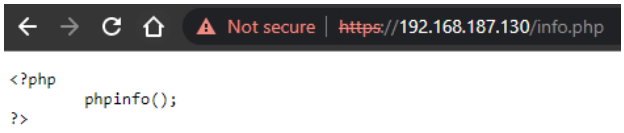
$ sudo apt remove php*

$ sudo apt purge php*

$ sudo a2dismod mpm_prefork

$ sudo a2enmod mpm_event

$ sudo service apache2 restart



2- PHP as fastCGI (Preferred): Event MPM/Worker MPM

Service from php called php-fpm.

Require a config in apache2 to use php-frpm.

* Apache2 must be configured with event_mpm.

a- Install php, php-apache-module, php-fpm, php extensions

$ sudo apt install php7.4 php7.4-mysql php7.4-fpm

b- Configure apache2

$ sudo a2enmod proxy_fcgi setenvif

$ sudo a2enconf php7.4-fpm

c- Change from Apache environment vars:

$ sudo nano /etc/apache2/envvars

/etc/apache2/envvars

```
# /etc/init.d/apache2, /etc/logro
export APACHE_RUN_USER=www-data
export APACHE_RUN_GROUP=www-data
```

export APACHE_RUN_USER=apache2 → export APACHE_RUN_USER=www-data

export APACHE_RUN_GROUP=apache2 → export APACHE_RUN_GROUP= www-data

d- Restart FPM and apache

$ sudo service php7.4-fpm restart

$ sudo service apache2 restart

```
fierro98@ubuntu:~$ sudo service php7.4-fpm restart
fierro98@ubuntu:~$ sudo service apache2 restart
fierro98@ubuntu:~$ sudo service php7.4-fpm status
● php7.4-fpm.service - The PHP 7.4 FastCGI Process Manager
     Loaded: loaded (/lib/systemd/system/php7.4-fpm.servic
     Active: active (running) since Wed 2022-02-09 15:40:0
```

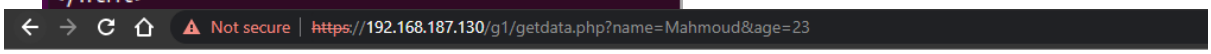
e- Test

create a file "getdata.php" under document root

$ sudo nano /var/www/html/g1/getdata.php

```
    /var/www/html/g1/getdata.php   Modified
<html>
<title>Welcome to my PHP page</title>
<body>
<?php
        echo "<center>Welcome dear</center>";
        $NAME=$_GET["name"];
        $AGE=$_GET["age"];
        echo "Your name is $NAME<br>";
        echo "You age is $AGE<br>";
?>
</body>
</html>
```

```
<html>
<title>Welcome to my PHP page</title>
<body>
<?php
    echo "<center>Welcome dear</center>";
    $NAME=$_GET["name"];
    $AGE=$_GET["age"];
    echo "Your name is $NAME<br>";
    echo "You age is $AGE<br>";
?>
</body>
</html>
```



Welcome dear

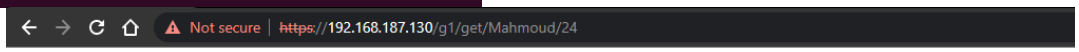
Your name is Mahmoud
You age is 23

f- Write url module that convert from directory URL to querystring.
http://192.168.187.130/g1/getdata.php?name=Mahmoud&age=23 →
http://192.168.187.130/g1/get/Mahmoud/23

$ sudo nano /var/www/html/g1/.htaccess

```
 GNU nano 4.8              /var/www/html/g1/.htaccess
AuthType Basic
AuthName "g1 Area"
AuthUserFile /etc/.htpasswd
Require valid-user
RewriteEngine On
RewriteRule ^get/([a-zA-Z_]+)/([0-9]+)/{0,1}$ /g1/getdata.php?name=$1&age=$2
RewriteCond %{HTTPS} !=on
RewriteRule ^(.*)$ https://%{HTTP_HOST}%{REQUEST_URI} [L,R=301,NE]
```

```
RewriteRule ^get/([a-zA-Z_]+)/([0-9]+)/{0,1}$
/g1/getdata.php?name=$1&age=$2
```



Welcome dear

Your name is Mahmoud
You age is 24

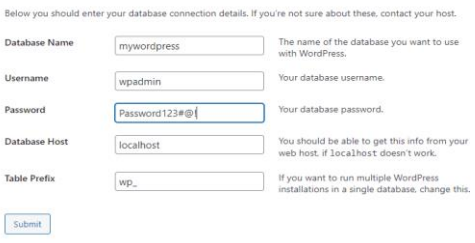
- To setup wordpress:

1- Create a database on mariadb (mysql)
$ sudo mysql -u root -p
mysql> create database mywordpress;
mysql> create user wpadmin@localhost identified by 'Password123#@!';
mysql> grant all privileges on mywordpress.* to wpadmin@localhost;
mysql> flush privileges;
mysql> exit;
   - Name: mywordpress
   - User: wpadmin
   - Password: Password123#@!

2- Download wordpress
$ cd /var/www/html
$ sudo wget https://wordpress.org/latest.tar.gz
$ sudo tar zxf latest.tar.gz

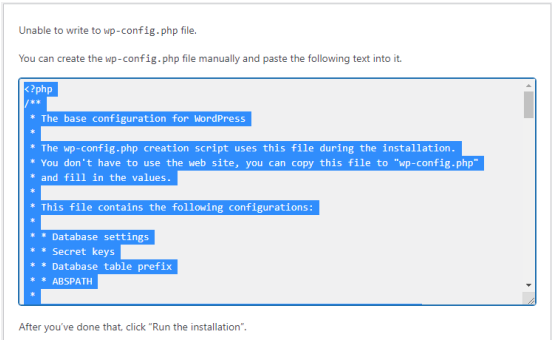
```
fierro98@ubuntu:/var/www/html$ ls
first.html  g1  index.html  info.php  latest.tar.gz  wordpress
```

➔ Ip/wordpress

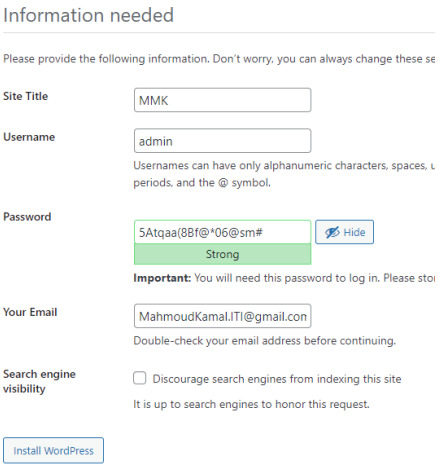


$ cd /var/www/html/wordpress/
$ sudo nano wp-config.php

```
 GNU nano 4.8                    wp-config.php
 */
define( 'WP_DEBUG', false );

/* Add any custom values between this line and the "stop editing" line. */



/* That's all, stop editing! Happy publishing. */

/** Absolute path to the WordPress directory. */
if ( ! defined( 'ABSPATH' ) ) {
        define( 'ABSPATH', __DIR__ . '/' );
}

/** Sets up WordPress vars and included files. */
require_once ABSPATH . 'wp-settings.php';
```

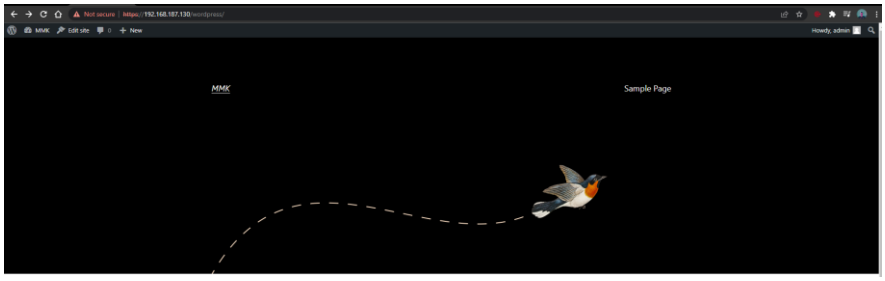


3- Wordpress



Username: admin
Password: 5Atqaa(8Bf@*06@sm#

192.168.187.130/wordpress/wp-admin/



- To setup phpmyadmin
  - You have to install MySQL, apache and php.
    $ sudo apt install phpmyadmin php-mbstring
    $ sudo phpenmod mbstring
    $ sudo service php7.4-fpm restart
    $ sudo service apache2 restart
  - To solve the root login for phpmyadmin
    Connect to mysql with root
    mysql> update user set plugin='' where User='root';
    mysql> flush privileges;

- Web application test:
  - Expected number of users ?. For example: 1000 users
  - Load test: How system behave on max load.
  - Stress test: How system behave on the high extreme. (DoS attack)
  - ASF developed java app called Apache-JMeter. https://jmeter.apache.org/

Apache-JMeter [Windows]:

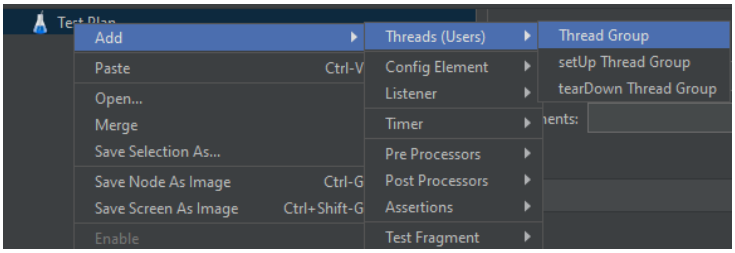
1- Download: https://jmeter.apache.org/download_jmeter.cgi
https://dlcdn.apache.org//jmeter/binaries/apache-jmeter-5.4.3.zip

2- Extract apache-jmeter-5.4.3.zip

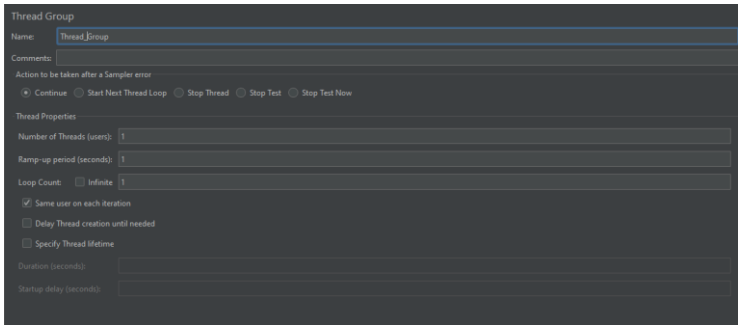
3- CMD: D:\apache-jmeter-5.4.3\bin>jmeter.bat

```
D:\apache-jmeter-5.4.3>cd bin

D:\apache-jmeter-5.4.3\bin>jmeter.bat
================================================================================
Don't use GUI mode for load testing !, only for Test creation and Test debugging.
For load testing, use CLI Mode (was NON GUI):
   jmeter -n -t [jmx file] -l [results file] -e -o [Path to web report folder]
& increase Java Heap to meet your test requirements:
   Modify current env variable HEAP="-Xms1g -Xmx1g -XX:MaxMetaspaceSize=256m" in the jmeter batch file
Check : https://jmeter.apache.org/usermanual/best-practices.html
================================================================================
```

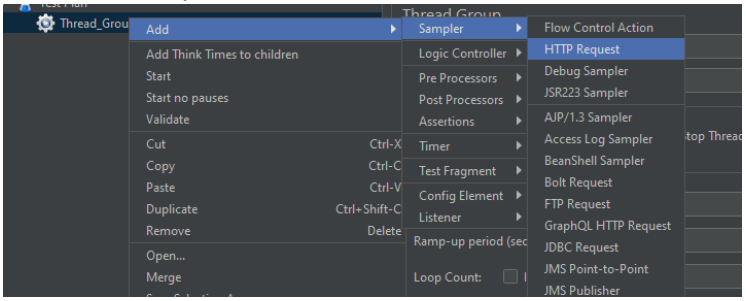
4- Add >> Threads (Users) >> Thread Group



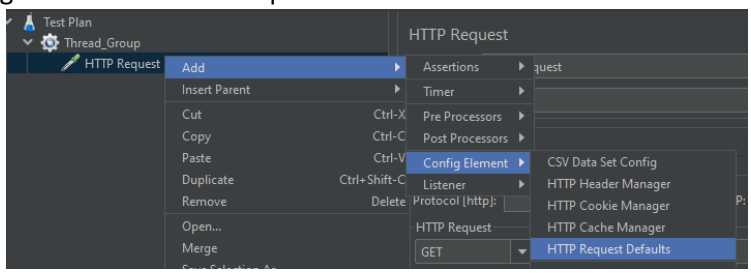
5- Set Thread Group Name, Comments and Thread properties



6- Add >> Sampler >> HTTP Request

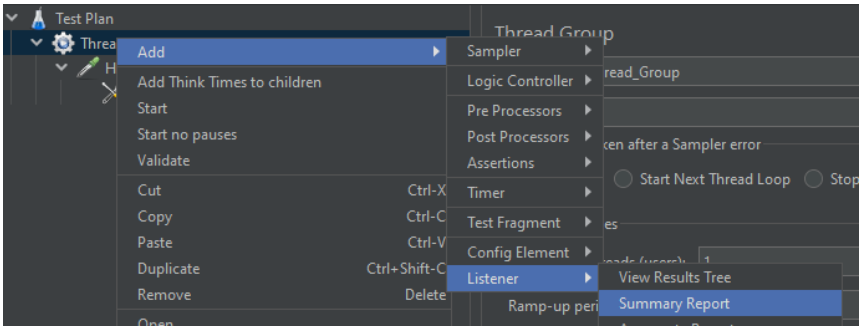


7- Add >> Config Element >> HTTP Request Defaults

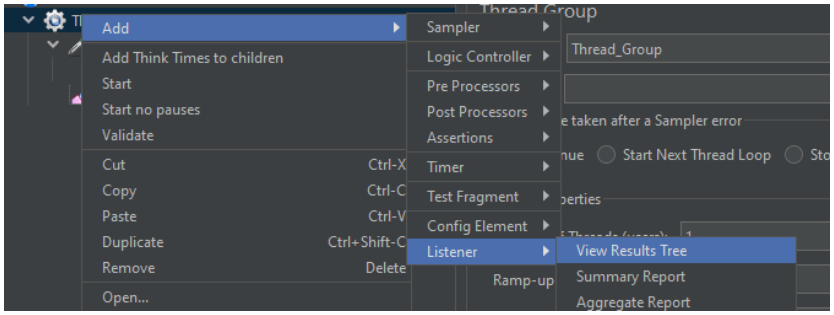


8- Write IP and Path

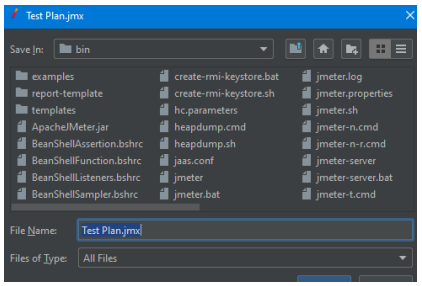
9- Add >> Listener >> Summery Report



10- Add >> Listener >> View Results Tree



11- Save



Recording Tests: https://jmeter.apache.org/usermanual/jmeter_proxy_step_by_step.html

- CMD
  - Don't use GUI mode for load testing! only for Test creation and Test debugging.
  - For load testing, use CLI Mode (was NON GUI):
    jmeter -n -t [jmx file] -l [results file] -e -o [Path to web report folder]
    & increase Java Heap to meet your test requirements:
    Modify current env variable HEAP="-Xms1g -Xmx1g -XX:MaxMetaspaceSize=256m" in the jmeter batch file
  - Check: https://jmeter.apache.org/usermanual/best-practices.html

Apache Web Server – Lab – 09/02/2022

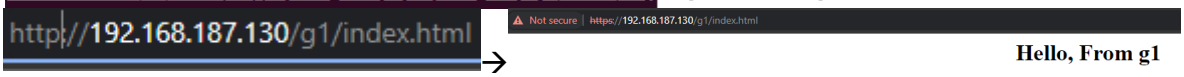
1-Rewrite rule to modify url for http connections to https using .htaccess file

* Page 10 and scroll up for step by step in task 1 [Page 1 – Page 10]

$ sudo nano /var/www/html/g1/.htaccess

```
 GNU nano 4.8        /var/www/html/g1/.htaccess
AuthType Basic
AuthName "g1 Area"
AuthUserFile /etc/.htpasswd
Require valid-user
RewriteEngine On
RewriteCond %{HTTPS} !=on
RewriteRule ^(.*)$ https://%{HTTP_HOST}%{REQUEST_URI} [L,R=301,NE]
```

RewriteEngine On
RewriteCond %{HTTPS} !=on
RewriteRule ^(.*)$
https://%{HTTP_HOST}%{REQUEST_URI}
[L,R=301,NE]



2-Using Virtual host configuration

1-Setup laravel framework (iti.org)

[https://www.hostinger.com/tutorials/how-to-install-laravel-on-ubuntu-18-04-with-apache-and-php/]
[https://www.howtoforge.com/tutorial/install-laravel-on-ubuntu-for-apache/]
[https://laravel.com/docs/8.x/installation]

- For site iti.org without Laravel [This Steps isn't necessary for lab start from next page to setup laravel]

1- Create a file /etc/apache2/sites-available/iti.org.conf
$ sudo nano /etc/apache2/sites-available/iti.org.conf

```
...2/sites-available/iti.org.conf Modified
<VirtualHost *:80>
        ServerName iti.org
        DocumentRoot /var/websites/iti.org
</VirtualHost>

<Directory /var/websites/iti.org >
        AllowOverride all
        Require all granted
</Directory>
```

```
<VirtualHost *:80>
        ServerName iti.org
        DocumentRoot /var/websites/iti.org
</VirtualHost>

<Directory /var/websites/iti.org >
        AllowOverride all
        Require all granted
</Directory>
```

2- Create Directory /var/websites/iti.org
$ sudo mkdir -p /var/websites/iti.org

3- Create index.html inside this Directory
$ sudo nano /var/websites/iti.org/index.html

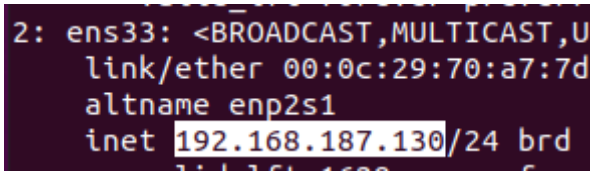
```
 GNU nano 4.8   /var/websites/iti.org/index.html   Modified
<html>
        <body>
                <center><h1>Welcome to ITI.org</h1></center>
        </body>
</html>
```

```
<html>
    <body>
        <center><h1>Welcome to ITI.org</h1></center>
    </body>
</html>
```

4- Enable site then reload apache2
$ sudo a2ensite iti.org
$ sudo service apache2 reload

```
fierro98@ubuntu:~$ sudo nano /etc/apache2/sites-available/mahmoudkamal.com.conf
fierro98@ubuntu:~$ sudo mkdir -p /var/websites/mahmoudkamal.com
fierro98@ubuntu:~$ sudo nano /var/websites/mahmoudkamal.com/index.html
fierro98@ubuntu:~$ sudo a2ensite mahmoudkamal.com
Enabling site mahmoudkamal.com.
To activate the new configuration, you need to run:
  systemctl reload apache2
fierro98@ubuntu:~$ sudo service apache2 reload
fierro98@ubuntu:~$ ls -la /etc/apache2/sites-enabled/ | grep mahmoudkamal
lrwxrwxrwx 1 root root   40 Feb  9 13:25 mahmoudkamal.com.conf -> ../sites-available/mahmoudkamal.com.conf
```

5- Get IP
$ ip a



6- Open notepad on Windows as administrator
Open Hosts files → C:\Windows\System32\drivers\etc\hosts

```
0.0.0.1 mssplus.mcafee.com
192.168.187.130 mahmoudkamal.co
192.168.187.130 www.mahmoudkama
192.168.187.130 wp.iti.org
192.168.187.130 iti.org
```

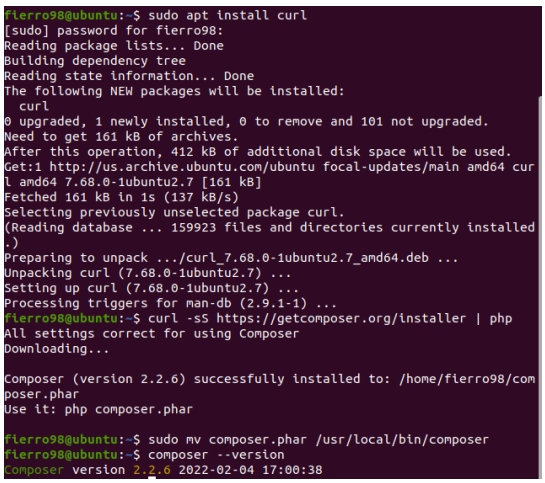
192.168.187.130 iti.org

- To setup laravel:

1- Install Apache Web Server & Install and Configure PHP 7.4
$ sudo apt update
$ sudo apt install apache2
$ sudo apt install libapache2-mod-php php php-common php-xml php-gd php-opcache php-mbstring php-tokenizer php-json php-bcmath php-zip unzip
$ sudo apt install php libapache2-mod-php php-mbstring php-cli php-bcmath php-json php-xml php-zip php-pdo php-common php-tokenizer php-mysql
$ sudo service apache2 restart

2- Create Database for Laravel Application
$ sudo apt install mariadb-server
$ sudo mysql -u root -p
CREATE DATABASE laravelDB;
CREATE USER 'laravelDBadmin'@'localhost' IDENTIFIED BY 'Password123#@!';
GRANT ALL ON laravelDB.* TO 'laravelDBadmin'@'localhost';
FLUSH PRIVILEGES;

3- Install Composer PHP Packages Management
$ sudo apt install curl
$ curl -sS https://getcomposer.org/installer | php
$ sudo mv composer.phar /usr/local/bin/composer
$ sudo chmod +x /usr/local/bin/composer
$ composer --version



4- Install Laravel 8.x on Ubuntu 20.04 [Optional]

* This section will install the Laravel web framework with the non-root.

$ composer global require laravel/installer

$ nano ~/.bashrc

Paste the following configuration to the end of the line.

export PATH="$HOME/.config/composer/vendor/bin:$PATH"

```
export PATH="$HOME/.config/composer/vendor/bin:$PATH"
```

$ source ~/.bashrc

$ echo $PATH

$ laravel new blog

* To make it accessible for the Apache webserver to access your Laravel project directory, change the project directory's group owner to the group 'www-data' and make the 'storage' directory writable.

$ sudo chgrp -R www-data /home/$USERNAME/blog

```
fierro98@ubuntu:~$ ls -la /home/fierro98 | grep blog
drwxrwxr-x 11 fierro98 www-data  4096 Feb 10 03:04 blog
```

$ sudo chmod -R 775 /home/$USERNAME/blog/storage

5- Install Laravel Via Composer create-project

$ cd /var/websites/

$ sudo composer create-project --prefer-dist laravel/laravel blog

$ sudo chown -R www-data:www-data /var/websites/blog

$ sudo chmod -R 775 /var/websites/blog/storage

$ cd /var/websites/blog

$ sudo composer install

$ sudo chmod 775 /var/websites/blog/public/favicon.ico

```
fierro98@ubuntu:/var/websites$ ls -la
total 24
drwxr-xr-x  6 root     root     4096 Feb 10 03:15 .
drwxr-xr-x 16 root     root     4096 Feb  9 13:21 ..
drwxr-xr-x 11 www-data www-data 4096 Feb 10 03:15 blog
drwxr-xr-x  2 root     root     4096 Feb 10 00:27 iti.org
drwxr-xr-x  2 root     root     4096 Feb  9 13:24 mahmoudkamal.com
drwxr-xr-x  6 root     root     4096 Feb 10 00:25 wp.iti.org
fierro98@ubuntu:/var/websites$ ls -la blog/
total 96
drwxr-xr-x 11 www-data www-data 4096 Feb 10 03:15 .
drwxr-xr-x  6 root     root     4096 Feb 10 03:15 ..
drwxr-xr-x  7 www-data www-data 4096 Feb  8 06:36 app
-rwxr-xr-x  1 www-data www-data 1686 Feb  8 06:36 artisan
drwxr-xr-x  3 www-data www-data 4096 Feb  8 06:36 bootstrap
-rw-r--r--  1 www-data www-data 1745 Feb  8 06:36 composer.json
drwxr-xr-x  2 www-data www-data 4096 Feb  8 06:36 config
drwxr-xr-x  5 www-data www-data 4096 Feb  8 06:36 database
-rw-r--r--  1 www-data www-data  258 Feb  8 06:36 .editorconfig
-rw-r--r--  1 www-data www-data  899 Feb 10 03:15 .env
-rw-r--r--  1 www-data www-data  899 Feb  8 06:36 .env.example
-rw-r--r--  1 www-data www-data  152 Feb  8 06:36 .gitattributes
-rw-r--r--  1 www-data www-data  207 Feb  8 06:36 .gitignore
-rw-r--r--  1 www-data www-data  473 Feb  8 06:36 package.json
-rw-r--r--  1 www-data www-data 1202 Feb  8 06:36 phpunit.xml
drwxr-xr-x  2 www-data www-data 4096 Feb  8 06:36 public
-rw-r--r--  1 www-data www-data 3958 Feb  8 06:36 README.md
drwxr-xr-x  6 www-data www-data 4096 Feb  8 06:36 resources
drwxr-xr-x  2 www-data www-data 4096 Feb  8 06:36 routes
-rw-r--r--  1 www-data www-data  563 Feb  8 06:36 server.php
drwxrwxr-x  5 www-data www-data 4096 Feb  8 06:36 storage
-rw-r--r--  1 www-data www-data  194 Feb  8 06:36 .styleci.yml
drwxr-xr-x  4 www-data www-data 4096 Feb  8 06:36 tests
-rw-r--r--  1 www-data www-data  559 Feb  8 06:36 webpack.mix.js
```

6- Setup Apache for Laravel Project

$ cd /etc/apache2/sites-available/

$ sudo nano laravel.conf

```
/etc/apache2/sites-available/laravel.conf   Modifie
<VirtualHost *:80>
    ServerName iti2.org
    ServerAlias www.iti2.org
    DocumentRoot /var/websites/blog/public

    <Directory /var/websites/blog/public>
    Options Indexes MultiViews
    AllowOverride all
    Require all granted
    </Directory>

    ErrorLog ${APACHE_LOG_DIR}/error.log
    CustomLog ${APACHE_LOG_DIR}/access.log combined
</VirtualHost>
```

```
 GNU nano 4.8      /etc/apache2/sites-available/laravel.conf
Modified
<VirtualHost *:80>
    ServerName iti2.org
    ServerAlias www.iti2.org
    DocumentRoot /var/websites/blog/public

    <Directory /var/websites/blog/public>
    Options Indexes MultiViews
    AllowOverride all
    Require all granted
    </Directory>

    ErrorLog ${APACHE_LOG_DIR}/error.log
    CustomLog ${APACHE_LOG_DIR}/access.log combined
</VirtualHost>
```

$ sudo a2enmod rewrite

$ sudo a2dissite iti.org.conf

$ sudo a2ensite laravel.conf

$ sudo service apache2 restart

$ sudo service apache2 reload

7- Open notepad on Windows as administrator

Open Hosts files → C:\Windows\System32\drivers\etc\hosts

```
192.168.187.130 iti.org
192.168.187.130 www.iti.org
192.168.187.130 www.iti2.org
192.168.187.130 iti2.org
```

192.168.187.130 www.iti2.org

192.168.187.130 iti2.org

2-Using Virtual host configuration

2-Setup wordpress (wp.iti.org)

- For site wp.iti.org

1- Create a file /etc/apache2/sites-available/wp.iti.org.conf

$ sudo nano /etc/apache2/sites-available/wp.iti.org.conf

```
...ache2/sites-available/wp.iti.org.conf Modified
<VirtualHost *:80>
        ServerName wp.iti.org
         DocumentRoot /var/websites/wp.iti.org
</VirtualHost>

<Directory /var/websites/wp.iti.org >
        AllowOverride all
        Require all granted
</Directory>
```

```
<VirtualHost *:80>
      ServerName wp.iti.org
       DocumentRoot /var/websites/wp.iti.org
</VirtualHost>

<Directory /var/websites/wp.iti.org >
       AllowOverride all
      Require all granted
</Directory>
```

2- Create Directory /var/websites/wp.iti.org

$ sudo mkdir -p /var/websites/wp.iti.org

3- Create index.html inside this Directory

$ sudo nano /var/websites/wp.iti.org/index.html

```
        /var/websites/wp.iti.org/index.html        Modified
<html>
        <body>
                <center><h1>Welcome to Wp ITI</h1></center>
        </body>
</html>
```

```
<html>
    <body>
        <center><h1>Welcome to Wp ITI</h1></center>
    </body>
</html>
```

4- Enable site then reload apache2

$ sudo a2ensite wp.iti.org

$ sudo service apache2 reload

```
fierro98@ubuntu:~$ sudo nano /etc/apache2/sites-available/mahmoudkamal.com.conf
fierro98@ubuntu:~$ sudo mkdir -p /var/websites/mahmoudkamal.com
fierro98@ubuntu:~$ sudo nano /var/websites/mahmoudkamal.com/index.html
fierro98@ubuntu:~$ sudo a2ensite mahmoudkamal.com
Enabling site mahmoudkamal.com.
To activate the new configuration, you need to run:
  systemctl reload apache2
fierro98@ubuntu:~$ sudo service apache2 reload
fierro98@ubuntu:~$ ls -la /etc/apache2/sites-enabled/ | grep mahmoudkamal
lrwxrwxrwx 1 root root   40 Feb  9 13:25 mahmoudkamal.com.conf -> ../sites-available/mahmoudkamal.com.conf
```

5- Get IP

$ ip a

```
2: ens33: <BROADCAST,MULTICAST,U
    link/ether 00:0c:29:70:a7:7d
    altname enp2s1
    inet 192.168.187.130/24 brd
```

6- Open notepad on Windows as administrator

Open Hosts files → C:\Windows\System32\drivers\etc\hosts

192.168.187.131 wp.iti.org

```
0.0.0.1 mssplus.mcafee.com

192.168.187.130 mahmoudkamal.com
192.168.187.130 www.mahmoudkamal.com
192.168.187.130 wp.iti.org
```

Welcome to Wp ITI

- To setup wordpress:

1- Create a database on mariadb (mysql)

$ sudo mysql -u root -p

mysql> create database mywordpress;

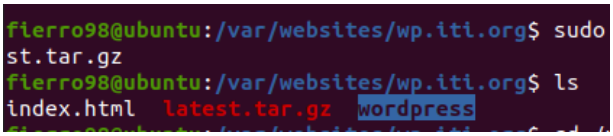
mysql> create user wpadmin@localhost identified by 'Password123#@!';

mysql> grant all privileges on mywordpress.* to wpadmin@localhost;
mysql> flush privileges;
mysql> exit;

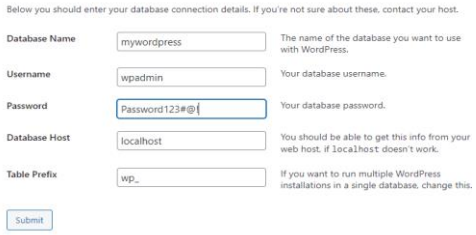
- Name: mywordpress
- User: wpadmin
- Password: Password123#@!

2- Download wordpress

$ cd /var/websites/wp.iti.org
$ sudo wget https://wordpress.org/latest.tar.gz
$ sudo tar zxf latest.tar.gz

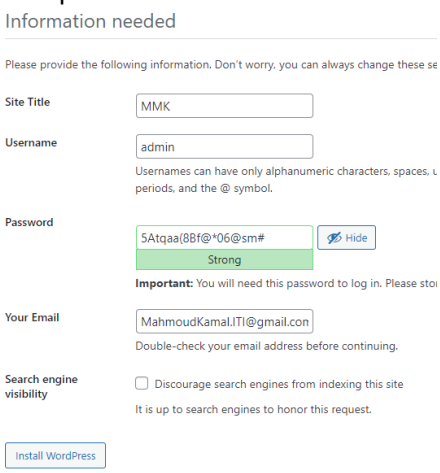


➔ Ip/wordpress



$ cd /var/websites/wp.iti.org/wordpress/
$ sudo nano wp-config.php

3- Wordpress



Username: admin
Password: 5Atqaa(8Bf@*06@sm#

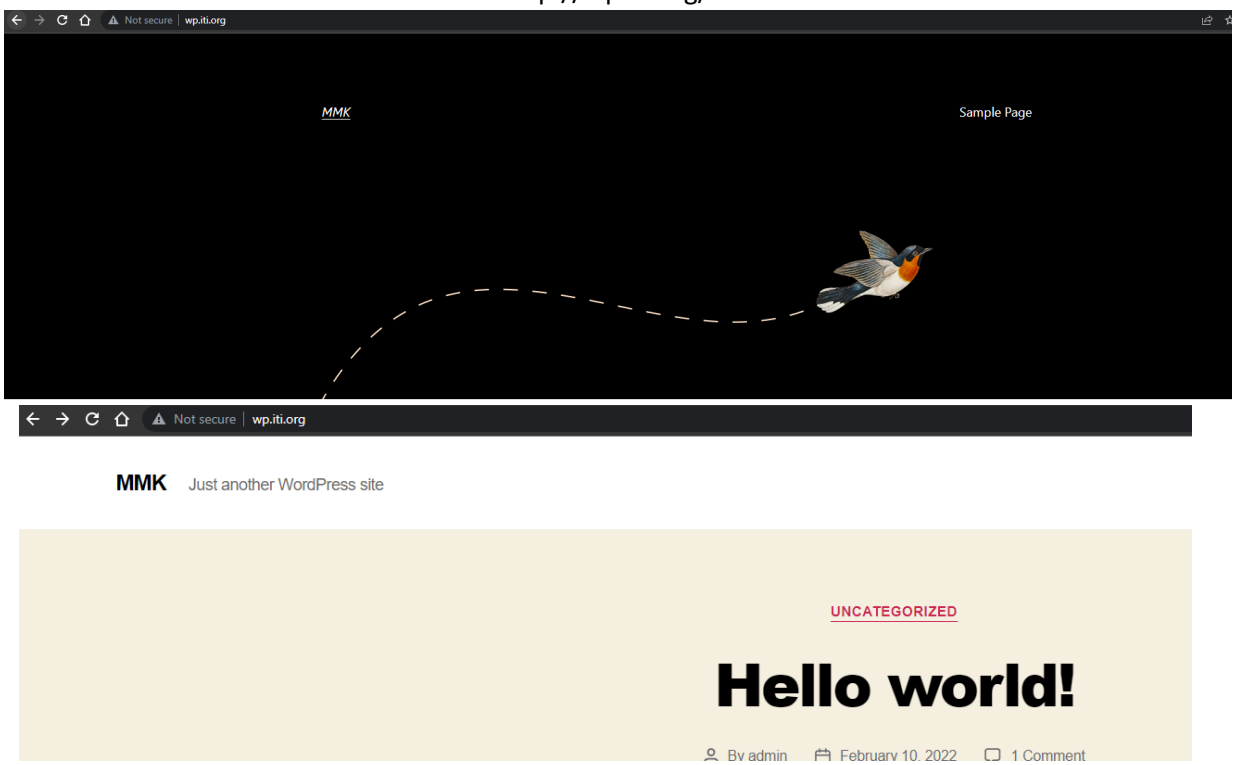
192.168.187.130/wordpress/wp-admin/

- Copy wordpress files and directories to /var/websites/wb.iti.org & delete index.html
  $ cd /var/websites/wp.iti.org/wordpress/

$ sudo cp -r * ../
$ cd ..
$ sudo rm index.htm
* Delete wordpress Directory inside /var/websites/wb.iti.org
$ sudo rm -r wordpress

```
fierro98@ubuntu:/var/websites/wp.iti.org$ ls
index.php           wp-comments-post.php  wp-login.php
latest.tar.gz       wp-config.php         wp-mail.php
license.txt         wp-config-sample.php  wp-settings.php
readme.html         wp-content            wp-signup.php
wordpress           wp-cron.php           wp-trackback.php
wp-activate.php     wp-includes           xmlrpc.php
wp-admin            wp-links-opml.php
wp-blog-header.php  wp-load.php
fierro98@ubuntu:/var/websites/wp.iti.org$ ls wordpress/
index.php             wp-cron.php
license.txt           wp-includes
readme.html           wp-links-opml.php
wp-activate.php       wp-load.php
wp-admin              wp-login.php
wp-blog-header.php    wp-mail.php
wp-comments-post.php  wp-settings.php
wp-config.php         wp-signup.php
wp-config-sample.php  wp-trackback.php
wp-content            xmlrpc.php
```

http://wp.iti.org/



3-Using jmeter, create a recorded plan for your wordpress site.

- Update the site with form for test

$ cd /var/websites/wp.iti.org/

$ sudo nano index.html

```
 GNU nano 4.8                                    index.html
<html>
        <head>
                <title>Applicatio to demo JMeter</title>
        </head>
        <body>
                <table width=100%>
                        <tr>
                                <center><h1>To demo the operation of Apache-JMeter from - ASF -</h1></center>
                        </tr>
                        <tr>
                                <form name="loginform" action="mainmenu.php" method="post">
                                        <table width=100%>
                                                <tr>
                                                        <td width=30%>Username</td>
                                                        <td width=70%><input name="username"></td>
                                                </tr>
                                                <tr>
                                                        <td width=30%>Password</td>
                                                        <td width=70%><input name="password" type= password></td>
                                                </tr>
                                                <tr>
                                                        <td width=30%><input type=submit></td>
                                                        <td width=70%><input type=reset></td>
                                                </tr>
                                        </table>
                                </form>
                        </tr>
                </table>
        </body>
</html>
```

```
<html>
        <head>
                <title>Applicatio to demo JMeter</title>
        </head>
        <body>
                <table width=100%>
                        <tr>
                                <center><h1>To demo the operation of Apache-JMeter from - ASF -</h1></center>
                        </tr>
                        <tr>
                                <form name="loginform" action="mainmenu.php" method="post">
                                        <table width=100%>
                                                <tr>
                                                        <td width=30%>Username</td>
                                                        <td width=70%><input
        name="username"></td>
                                                </tr>
                                                <tr>
                                                        <td width=30%>Password</td>
                                                        <td width=70%><input name="password"
type= password></td>
                                                </tr>
                                                <tr>
                                                        <td width=30%><input type=submit></td>
                                                        <td width=70%><input type=reset></td>
                                                </tr>
                                        </table>
                                </form>
                        </tr>
                </table>
        </body>
</html>
```

$ sudo nano mainmenu.php

```
  GNU nano 4.8                mainmenu.php                Modified
<html>
        <title>Main Menu</title>
        <body>
        <?php
                $USER=$_POST["username"];
                $PASS=$_POST["password"];
                If($USER ==  "fierro" && $PASS == "password") {
                        echo "$USER is authenticated";
                } else {
                        echo "$USER is access denied";
                }
        ?>
        <br>
        <a href="index.html">Back to login</a>
        </body>
</html>
```

```
<html>
        <title>Main Menu</title>
        <body>
        <?php
                $USER=$_POST["username"];
                $PASS=$_POST["password"];
                If($USER ==  "fierro" && $PASS == "password")
{
                        echo "$USER is authenticated";
                } else {
                        echo "$USER is access denied";
                }
        ?>
        <br>
        <a href="index.html">Back to login</a>
        </body>
</html>
```

- Apache-JMeter [Windows]:

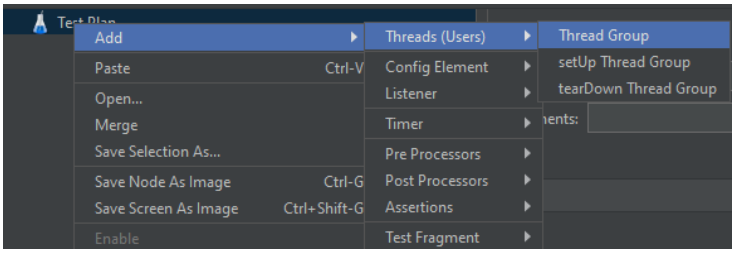
1- Download: https://jmeter.apache.org/download_jmeter.cgi
https://dlcdn.apache.org//jmeter/binaries/apache-jmeter-5.4.3.zip

2- Extract apache-jmeter-5.4.3.zip

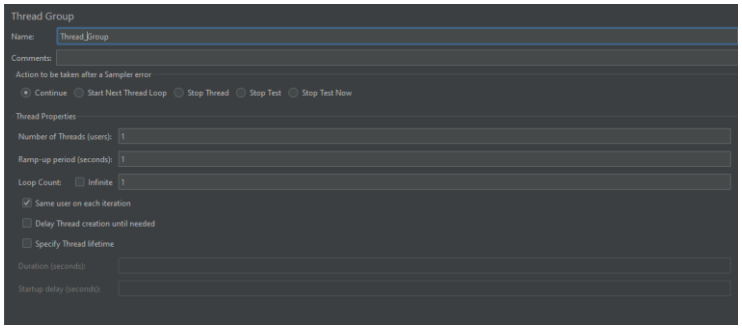
3- CMD: D:\apache-jmeter-5.4.3\bin>jmeter.bat

```
D:\apache-jmeter-5.4.3>cd bin

D:\apache-jmeter-5.4.3\bin>jmeter.bat
================================================================================
Don't use GUI mode for load testing !, only for Test creation and Test debugging.
For load testing, use CLI Mode (was NON GUI):
   jmeter -n -t [jmx file] -l [results file] -e -o [Path to web report folder]
& increase Java Heap to meet your test requirements:
   Modify current env variable HEAP="-Xms1g -Xmx1g -XX:MaxMetaspaceSize=256m" in the jmeter batch file
Check : https://jmeter.apache.org/usermanual/best-practices.html
================================================================================
```

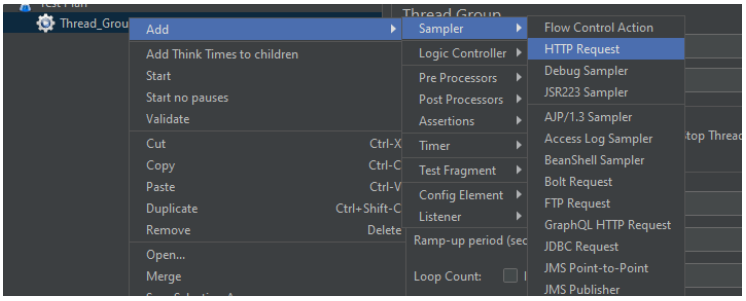
4- Add >> Threads (Users) >> Thread Group



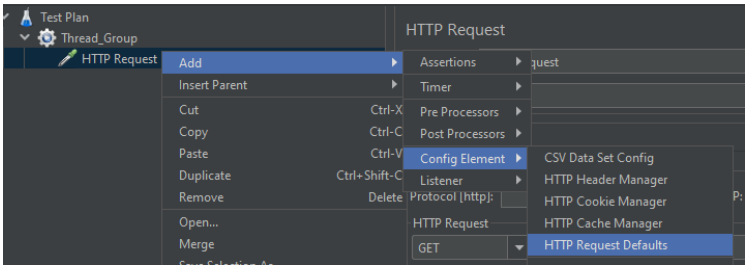
5- Set Thread Group Name, Comments and Thread properties



6- Add >> Sampler >> HTTP Request

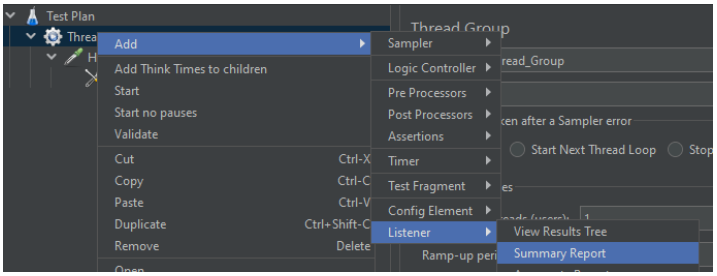


7- Add >> Config Element >> HTTP Request Defaults

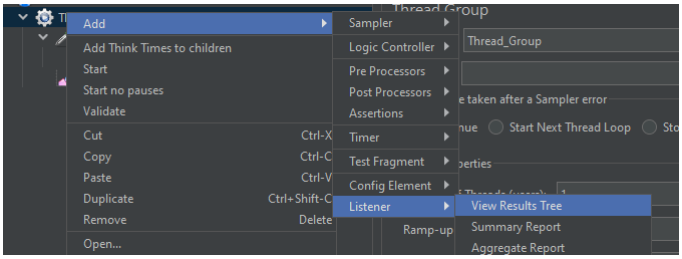


8- Write IP and Path

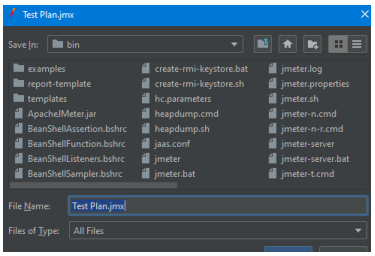
9- Add >> Listener >> Summery Report



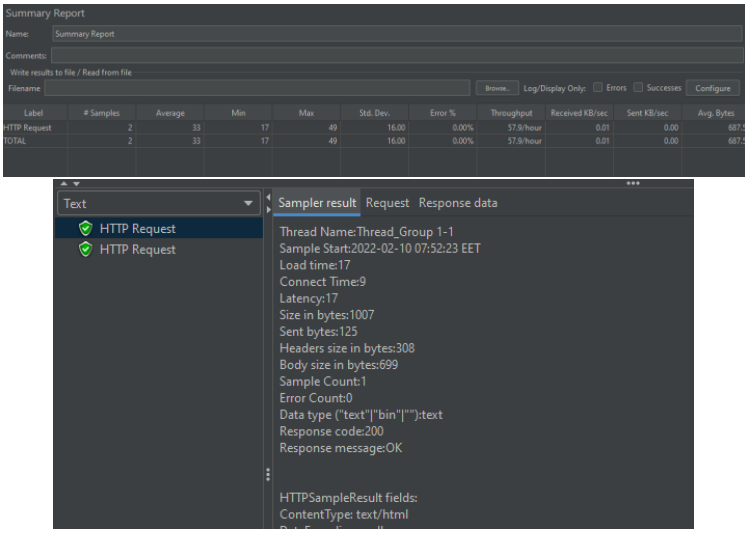
10- Add >> Listener >> View Results Tree



11- Save

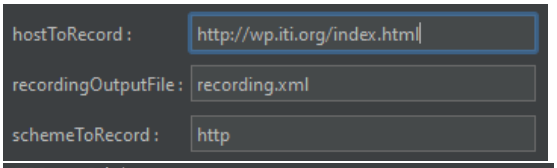


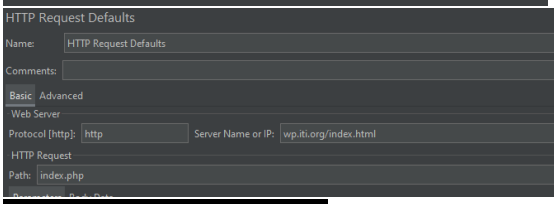
12- Results

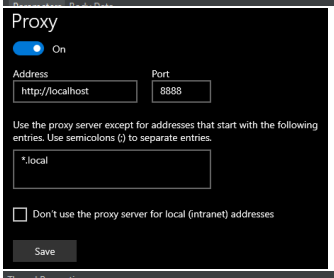


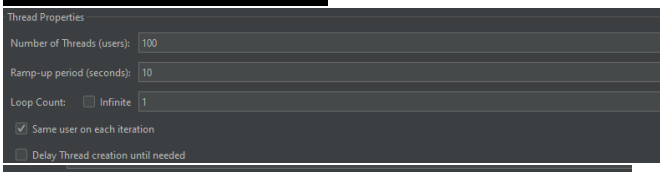
- Recording test

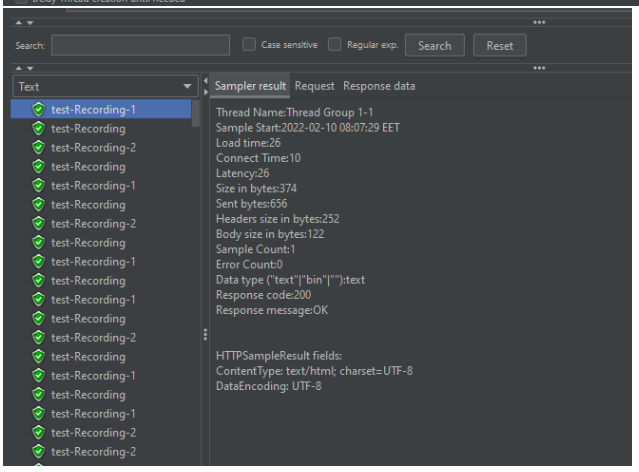
Recording Tests: https://jmeter.apache.org/usermanual/jmeter_proxy_step_by_step.html

1- 

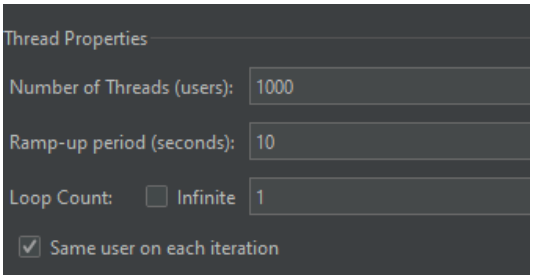
2- 

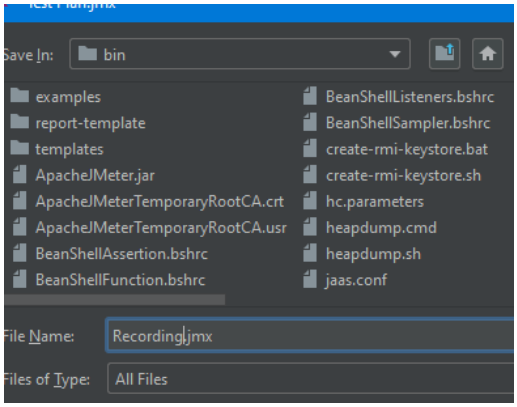
3- 

4- 

5- 

6- Save

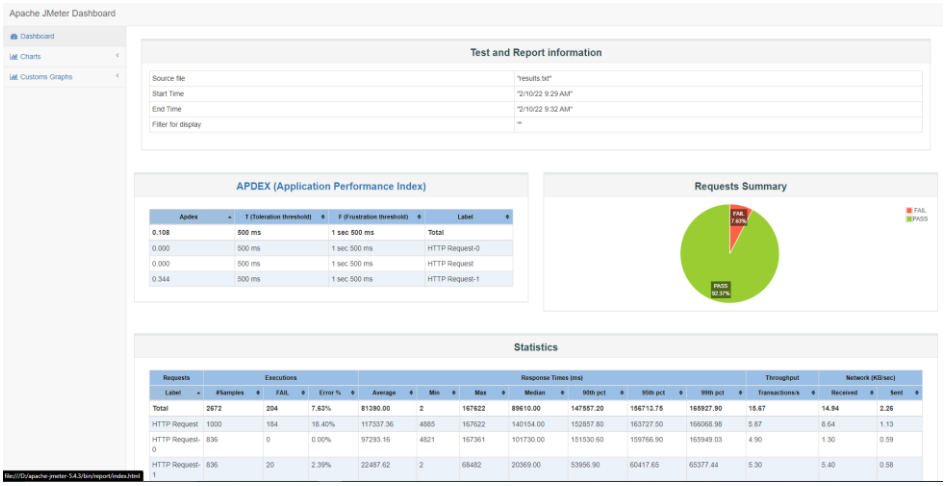




- CMD

  CMD: D:\apache-jmeter-5.4.3\bin> jmeter -n -t Recording.jmx -l results.txt -e -o report

```
D:\apache-jmeter-5.4.3\bin> jmeter -n -t Recording.jmx -l results.txt -e -o report
Creating summariser <summary>
Created the tree successfully using Recording.jmx
Starting standalone test @ Thu Feb 10 09:29:34 EET 2022 (1644478174044)
Waiting for possible Shutdown/StopTestNow/HeapDump/ThreadDump message on port 4445
summary +     33 in 00:00:24 =    1.4/s Avg: 10761 Min:  4885 Max: 18947 Err:    13 (39.39%) Active: 968 Started: 1000 F
inished: 32
summary +    102 in 00:00:30 =    3.4/s Avg: 29968 Min: 13211 Max: 42310 Err:    14 (13.73%) Active: 866 Started: 1000 F
inished: 134
summary =    135 in 00:00:54 =    2.5/s Avg: 25273 Min:  4885 Max: 42310 Err:    27 (20.00%)
summary +    249 in 00:01:30 =    2.8/s Avg: 97750 Min: 42385 Max: 137827 Err:   131 (52.61%) Active: 617 Started: 1000
Finished: 383
summary =    384 in 00:02:24 =    2.7/s Avg: 72270 Min:  4885 Max: 137827 Err:   158 (41.15%)
summary +    608 in 00:00:30 =   20.2/s Avg: 145158 Min: 132883 Max: 167622 Err:    26 (4.28%) Active: 9 Started: 1000 F
inished: 991
summary =    992 in 00:02:54 =    5.7/s Avg: 116943 Min:  4885 Max: 167622 Err:   184 (18.55%)
summary +      8 in 00:00:01 =   11.3/s Avg: 166175 Min: 165868 Max: 166545 Err:     0 (0.00%) Active: 0 Started: 1000 F
inished: 1000
summary =   1000 in 00:02:55 =    5.7/s Avg: 117337 Min:  4885 Max: 167622 Err:   184 (18.40%)
Tidying up ...    @ Thu Feb 10 09:32:30 EET 2022 (1644478350955)
... end of run

D:\apache-jmeter-5.4.3\bin>
```



*bin folder uploaded on GitHub
https://github.com/MahmoudFierro98/ITI_OpenSourceApplicationDevelopment/tree/main/Apache_Web_Server