Assignment - Nginx-WebServer

1. What is the advantage of using a “reverse proxy server”?
2. Why and where Nginx is a better choice than apache.
3. What are worker nodes and worker connections? How to calculate the max server capacity using the above two?
4. From what directory will NGINX automatically load server (virtual host) configurations when using the default /etc/nginx/nginx.conf configuration?
5. How to configure different log_format for different “location” block/directive?
6. Host a site ABC.COM
    1. Create an index page and a fail-safe page. If a page for URI is not available, the fail-safe page is served.
    2. proxy pass to a website xyz.com on a particular URI.
    3. redirect to above URI on /redirect/
    4. perform an HTTP to HTTPS redirection including non-www to www redirection.
    5. Allow access to a set of particular IPs on a location block and return 405 to other IPs no matter if the page in that location exists.
    6. Place your images at /var/www/html/images. Only accept jpg/png/jpeg. Discard rest
7. Create a load balancer with 5 backends. Explain different types of load balancing methods.
8. Setup Basic Auth (Popup asking for username and password) in a particular location block. (The Basic Auth should not be asked for TTN IP)

Solution 1:

A reverse proxy is an intermediary proxy service which takes a client request, passes it on to one or more servers, and subsequently delivers the server’s response to the client.

There are a few benefits to setting up an Nginx reverse proxy.

Load Balancing - A reverse proxy can perform load balancing which helps distribute client requests evenly across backend servers. This process greatly helps in avoiding the scenario where a particular server becomes overloaded due to a sudden spike in requests.

Increased Security - A reverse proxy also acts as a line of defense for your backend servers. Configuring a reverse proxy ensures that the identity of your backend servers remains unknown.

Better Performance - Nginx has been known to perform better in delivering static content over Apache.

Easy Logging and Auditing - Since there is only one single point of access when a reverse proxy is implemented, this makes logging and auditing much simpler. Using this method, you can easily monitor what goes in and out through the reverse proxy.

Question 2: Why and where Nginx is a better choice than apache.

Solution 2:

- Nginx is Lightweight
- Nginx is Designed for High Concurrency
- Nginx is Easy to Configure
- Nginx is an Excellent Frontend Proxy
- Nginx is Remarkable for Serving Static Content
- Nginx is an Efficient Load Balancer
- Nginx is Highly Scalable

Question 3: What are worker nodes and worker connections? How to calculate the max server capacity using the above two?

Solution 3:

Worker processes/nodes :

Defines number of worker processes nginx is running. Default value is number of processor in the system.

To check how many processor you have on your server, run the following command

$ grep processor /proc/cpuinfo | wc -l

Worker connections :

Defines maximum number of simultaneous connection.

Default value is 768.

Maximum server Capacity = worker_processes * worker_connections

Question 4: From what directory will NGINX automatically load server (virtual host) configurations when using the default /etc/nginx/nginx.conf configuration?

Directory location: /etc/nginx/site-enabled

Question 5: How to configure different log_format for different “location” block/directive?

Solution 5:

Go to the server conf file (/etc/nginx/site-enabled/wordpress.conf in my case) where you have mentioned the server block and then add the following lines for capturing the logs.

access_log /path/to/file format(Optional)

For Example: access_logs /var/log/nginx/access.log log_format combined

Different types of log formats:

- log_format combined
- '$remote_addr - $remote_user [$time_local]'
- '"$request" $status $body_bytes_sent '
- '"$http_referer" "$http_user_agent"';

Question 6: Host a site ABC.COM

1. Create an index page and a fail-safe page. If a page for URI is not available, the fail-safe page is served.
2. proxy pass to a website xyz.com on a particular URI.
3. redirect to above URI on /redirect/
4. perform an HTTP to HTTPS redirection including non-www to www redirection.
5. Allow access to a set of particular IPs on a location block and return 405 to other IPs no matter if the page in that location exists.
6. Place your images at /var/www/html/images. Only accept jpg/png/jpeg. Discard rest

Solution 6:

Here I am hosting a site aman.com with a wordpress application running on it. So in further solutions I will use aman.com to demonstrate.

-- #6.1

```
server {

    listen 80 default_server;

    listen [::]:80 default_server ipv6only=on;

    error_page 404 /custom_404.html;
```

```
        location = /custom_404.html {
                root /usr/share/nginx/html;
                internal;
        }
}
```

```
        error_page 404 /custom_404.html;
        location = /custom_404.html {
                root /usr/share/nginx/html;
                internal;
        }
```

-- #6.2

```
location /feature {
                proxy_pass http://127.0.0.1;
        }
```

```
    location /redirect/ {
                    proxy_pass http://127.0.0.1;
                    #return 301 http://127.0.0.1;
    }
```

-- #6.3

```
location /feature/ {
    rewrite ^/feature/(.*) /wp-login.php permanent;
}
```

```
location /feature/ {
        rewrite ^/feature/(.*)$ /wp-login.php permanent;
}
```

-- #6.4

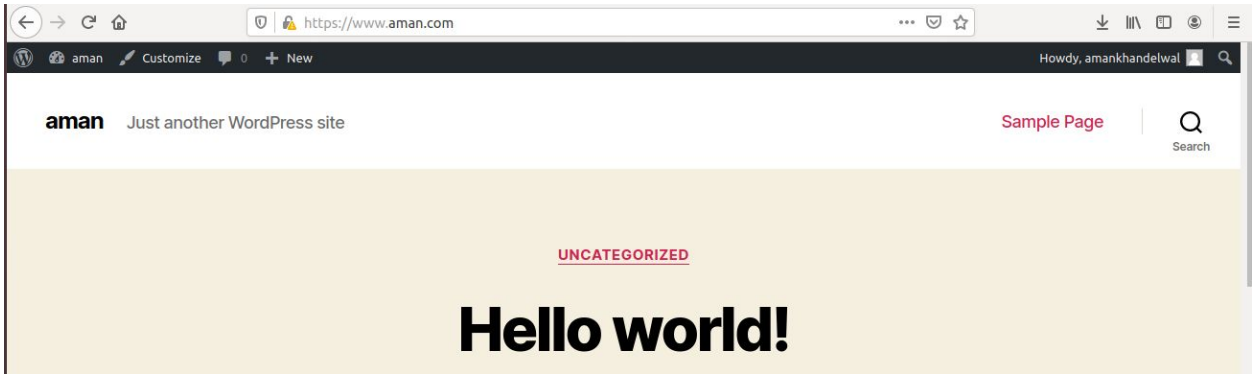
sudo openssl req -x509 -nodes -days 365   -newkey rsa:2048 -keyout /etc/nginx/ssl/private.key -out /etc/nginx/ssl/public.pem

```
aman@Aman-Khandelwal:/etc/nginx$ sudo openssl req -x509 -nodes -days 365   -newkey rsa:2048 -keyout /etc/ng
inx/ssl/private.key -out /etc/nginx/ssl/public.pem
Can't load /home/aman/.rnd into RNG
140044050715072:error:2406F079:random number generator:RAND_load_file:Cannot open file:../crypto/rand/randf
ile.c:88:Filename=/home/aman/.rnd
Generating a RSA private key
.....................................................................+++++
.........................+++++
writing new private key to '/etc/nginx/ssl/private.key'
-----
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) [AU]:
State or Province Name (full name) [Some-State]:
Locality Name (eg, city) []:
Organization Name (eg, company) [Internet Widgits Pty Ltd]:
Organizational Unit Name (eg, section) []:
Common Name (e.g. server FQDN or YOUR name) []:
Email Address []:
```

ssl_certificate /etc/nginx/ssl/public.pem;

ssl_certificate_key /etc/nginx/ssl/private.key;

```
server {
        listen 443 ssl;
        listen [::]:443 ssl;

        #SSL Configuration

        ssl_certificate /etc/nginx/ssl/public.pem;
        ssl_certificate_key /etc/nginx/ssl/private.key;

        server_name www.aman.com;
```



```
server {
        listen 80 default_server;
        listen [::]:80;
        server_name www.aman.com;
        return 301 https://$host$request_uri;
}

server {
        listen 80;
        listen [::]:80;
        server_name aman.com;
        return 301 https://www.aman.com$request_uri;
}

server {
        listen 443 ssl;
        listen [::]:443 ssl;

        #SSL Configuration

        ssl_certificate /etc/nginx/ssl/public.pem;
        ssl_certificate_key /etc/nginx/ssl/private.key;

        server_name www.aman.com;

.
```

-- #6.5

```
listen 443 ssl;
listen [::]:443 ssl;

#SSL Configuration

ssl_certificate /etc/nginx/ssl/public.pem;
ssl_certificate_key /etc/nginx/ssl/private.key;

server_name www.aman.com;

# rule for allow and deny IP
allow 10.1.0.0/16;
allow 127.0.0.1;
deny all;
```

```
# return 405 error on
error_page 403 /custom_405.html;
location = /custom_405.html{
        return 405 "<h1>405 error</h1>";
}
```

405 error

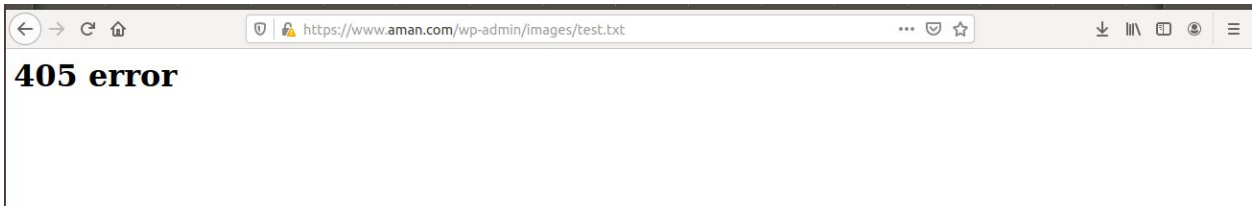
-- #6.6

```
# only accept jpg/png/jpeg and Discard rest
location ~* ^.+\.(jpeg|png|jpg)$ {
        allow all;

}

location /wp-admin/images/ {
        deny all;
}

location = /wp-login.php {
```

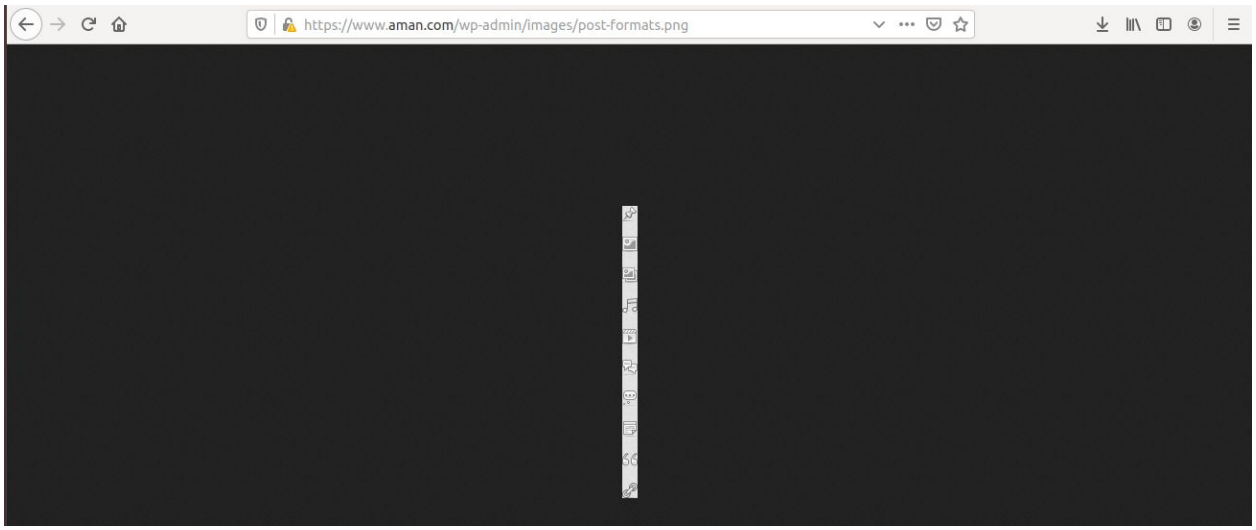
In the image directory of wordpress I have added a .txt file and now I will try to find it.

```
aman@Aman-Khandelwal:/var/www/html/wordpress/public_html/wp-admin/images$ ls
align-center-2x.png         imgedit-icons-2x.png    resize.gif
align-center.png            imgedit-icons.png       resize-rtl-2x.gif
align-left-2x.png           list-2x.png             resize-rtl.gif
align-left.png              list.png                se.png
align-none-2x.png           loading.gif             sort-2x.gif
align-none.png              marker.png              sort.gif
align-right-2x.png          mask.png                spinner-2x.gif
align-right.png             media-button-2x.png     spinner.gif
arrows-2x.png               media-button-image.gif  stars-2x.png
arrows.png                  media-button-music.gif  stars.png
browser.png                 media-button-other.gif  test.txt
browser-rtl.png             media-button.png        wheel.png
```

Now if I am searching for the path of .txt file then it is giving error.



But for any image it will open the images file.



Question 7 :- Create a load balancer with 5 backends. Explain different types of load balancing methods.

Solution 7:- Configuration for load balancers

```
upstream load_server {

        server aman1.com;
        server aman2.com;
        server aman3.com;
        server aman4.com;

}

server {
        listen 80;
        listen [::]:80 default_server;
        server_name amankhandelwal.com;
        location / {
                proxy_pass http://load_server;
        }
}
```

Setup the configuration of aman1.com

```
server {
        listen 127.0.0.2;

        root /var/www/html/loadbalancer/aman1;

        index index.php index.html index.htm index.nginx-debian.html;

        server_name aman1.com;

        location / {
                try_files $uri $uri/ =404;
        }
        location ~ \.php$ {

                include snippets/fastcgi-php.conf;
                fastcgi_pass unix:/var/run/php/php7.2-fpm.sock;

        }
}
```

Setup configuration of aman2.com

```
server {
        listen 127.0.0.3;

        root /var/www/html/loadbalancer/aman2;

        index index.php index.html index.htm index.nginx-debian.html;

        server_name aman2.com;

        location / {
                try_files $uri $uri/ =404;
        }
        location ~ \.php$ {

                include snippets/fastcgi-php.conf;
                fastcgi_pass unix:/var/run/php/php7.2-fpm.sock;

        }
}
```

Setup configuration of aman3.com

```
server {
        listen 127.0.0.4;

        root /var/www/html/loadbalancer/aman3;

        index index.php index.html index.htm index.nginx-debian.html;

        server_name aman3.com;

        location / {
                try_files $uri $uri/ =404;
        }
        location ~ \.php$ {
```

Setup configuration of aman4.com

```
server {
        listen 127.0.0.5;

        root /var/www/html/loadbalancer/aman4;

        index index.php index.html index.htm index.nginx-debian.html;

        server_name aman4.com;

        location / {
                try_files $uri $uri/ =404;
        }
        location ~ \.php$ {

                include snippets/fastcgi-php.conf;
                fastcgi_pass unix:/var/run/php/php7.2-fpm.sock;

        }
```

Now configure /etc/hosts file to resolve the local DNS name.

```
127.0.0.1       localhost
127.0.1.1       Aman-Khandelwal
127.0.0.1      aman.com www.aman.com
# The following lines are desirable for IPv6 capable hosts
::1     ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters

127.0.0.1       amankhandelwal.com
127.0.0.2       aman1.com
127.0.0.3       aman2.com
127.0.0.4       aman3.com
127.0.0.5       aman4.com
```

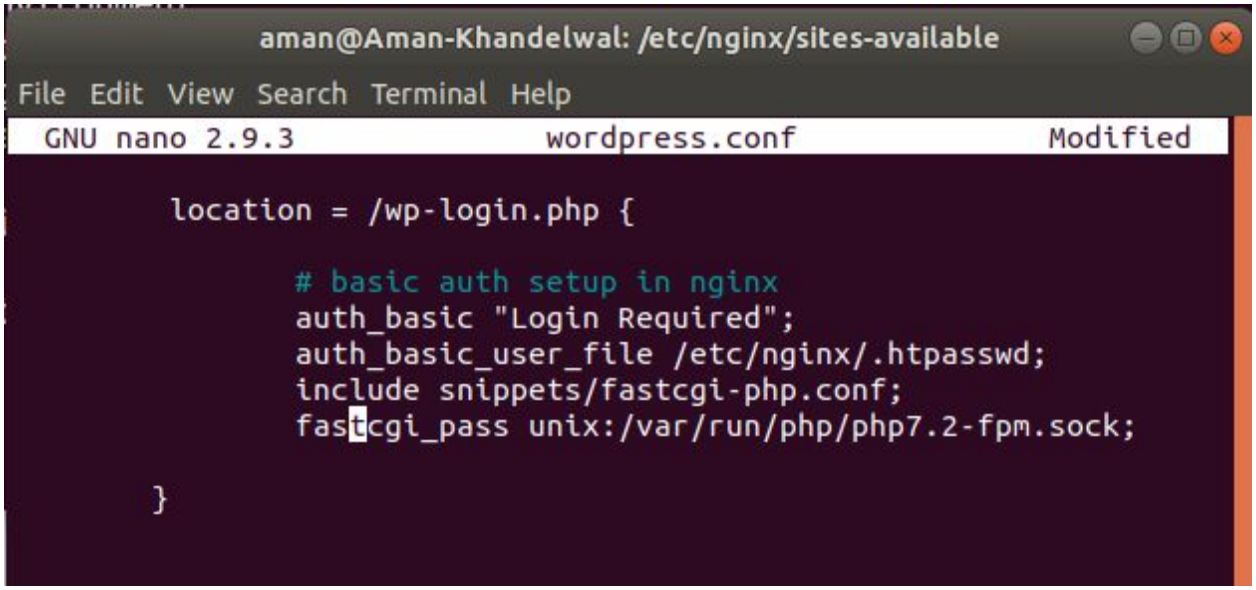
```
aman@Aman-Khandelwal:/etc/nginx/sites-available$ curl amankhandelwal.com
hello this is aman here...

aman@Aman-Khandelwal:/etc/nginx/sites-available$ curl amankhandelwal.com
hello this is aman2 here....
aman@Aman-Khandelwal:/etc/nginx/sites-available$ curl amankhandelwal.com
hello, this is aman3 here....
aman@Aman-Khandelwal:/etc/nginx/sites-available$ curl amankhandelwal.com
hello, this is aman4 here.....
aman@Aman-Khandelwal:/etc/nginx/sites-available$ curl amankhandelwal.com
hello this is aman here...
```

Question 8: - Setup Basic Auth (Popup asking for username and password) in a particular location block. (The Basic Auth should not be asked for TTN IP)

Solution 8: -

```
aman@Aman-Khandelwal:/etc/nginx/sites-available$ sudo apt-get install apache2-utils
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libapr1 libaprutil1
The following NEW packages will be installed:
```

```
aman@Aman-Khandelwal:/etc/nginx/sites-available$ sudo htpasswd -c /etc/nginx/.htpasswd admin
New password:
Re-type new password:
Adding password for user admin
aman@Aman-Khandelwal:/etc/nginx/sites-available$ sudo nano wordpress.conf
```



For using auth for every IP location except ttn IP location use following Configuration

```
geo $geo {
        #ttn connection
        10.1.0.0/21 "off";
        #except ttn connection
        0.0.0.0 "on";
}
```

```
location = /wp-login.php {

        # basic auth setup in nginx
        #auth_basic "Login Required";
        #auth_basic_user_file /etc/nginx/.htpasswd;
        # auth on every IP location except ttn IP
        auth_basic $geo;
        auth_basic_user_file /etc/nginx/.htpasswd;
        include snippets/fastcgi-php.conf;
        fastcgi_pass unix:/var/run/php/php7.2-fpm.sock;

}
```