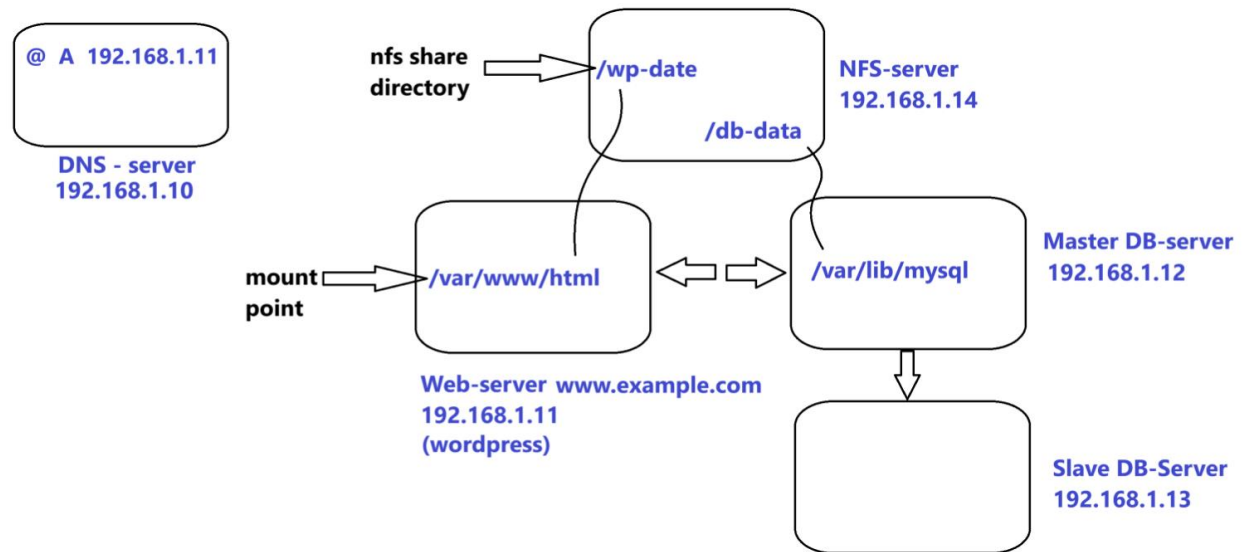


## Project Title: Implementation of a Multi-Server Architecture using DNS, NFS, Web Server, and MariaDB



### Objective:

To design and deploy a multi-server infrastructure that includes a DNS server, an NFS server, a web server hosting WordPress, and a MariaDB database server (Master-Slave setup). This architecture ensures centralized storage, database replication, and seamless web hosting.

### Project Scope:

- **DNS Server:** Resolve domain names to IP addresses.
- **NFS Server:** Provide shared storage for web data and database storage.
- **Web Server:** Host a WordPress website with data stored on the NFS server.
- **Database Server:** Implement a Master-Slave MariaDB setup for data redundancy and high availability.

### Network Topology:

1. **DNS Server:** 192.168.1.10

2. **Web Server:** 192.168.1.11 ([www.example.com](http://www.example.com), WordPress hosted)
3. **Master Database Server:** 192.168.1.12
4. **Slave Database Server:** 192.168.1.13
5. **NFS Server:** 192.168.1.14

## Functional Requirements:

- **DNS Server:**
  - Configure a DNS server to resolve [www.example.com](http://www.example.com) to 192.168.1.11.
  - Ensure proper hostname resolution for all servers.
- **NFS Server:**
  - Create shared directories:
    - /wp-data for WordPress files (mounted on /var/www/html of the Web Server)
    - /db-data for MariaDB data (mounted on /var/lib/mysql of the Master DB Server)
- **Web Server:**
  - Install and configure Apache/Nginx with PHP support.
  - Mount NFS shared directory /wp-data to /var/www/html.
  - Install and set up WordPress with a database connection.
- **Database Server:**
  - Install MariaDB on Master and Slave servers.
  - Set up Master-Slave replication for database consistency.
  - Mount /db-data from the NFS server to store database files.

## Expected Outcomes:

- A fully functional multi-server environment.
- Centralized storage management with NFS.
- Scalable and redundant database system using Master-Slave replication.
- Seamless WordPress hosting with persistent storage.

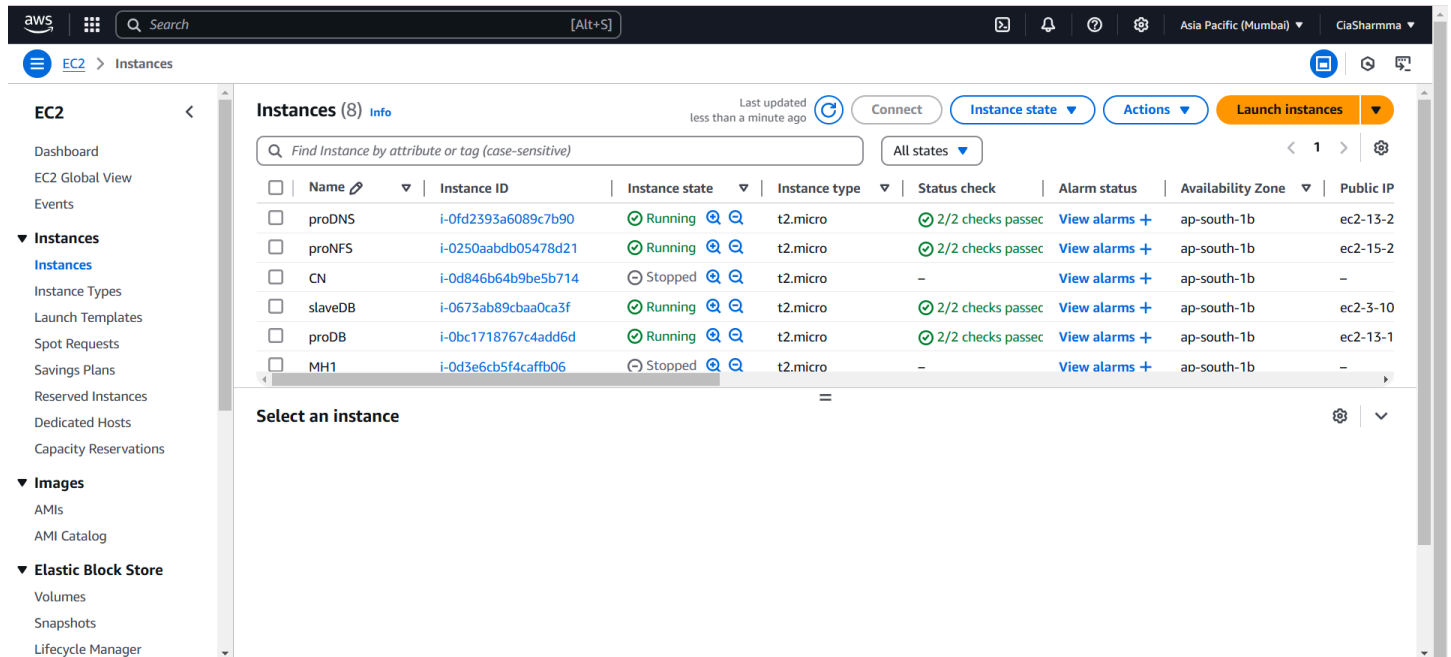
**Note:** Students need to research and implement the configuration steps for each component.



# project 1:

1)creating 4 instances one for DNS configuration ,wordpress and webserver configuration ,one for NFS ,and 2 for replication of database

->logging into all the instance with basic service and packages like vim,wget,bash-completion and firewall



```
Windows PowerShell
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Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\ciash> ssh -i C:\Users\ciash\Downloads\project.pem ec2-user@13.233.255.225
The authenticity of host '13.233.255.225 (13.233.255.225)' can't be established.
ED25519 key fingerprint is SHA256:b0dEb7iw9AgY9wA6GVe6eUHSMHGqd3diX2yEYL5GJo8.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '13.233.255.225' (ED25519) to the list of known hosts.
Register this system with Red Hat Insights: rhc connect

Example:
# rhc connect --activation-key <key> --organization <org>

The rhc client and Red Hat Insights will enable analytics and additional
management capabilities on your system.
View your connected systems at https://console.redhat.com/insights

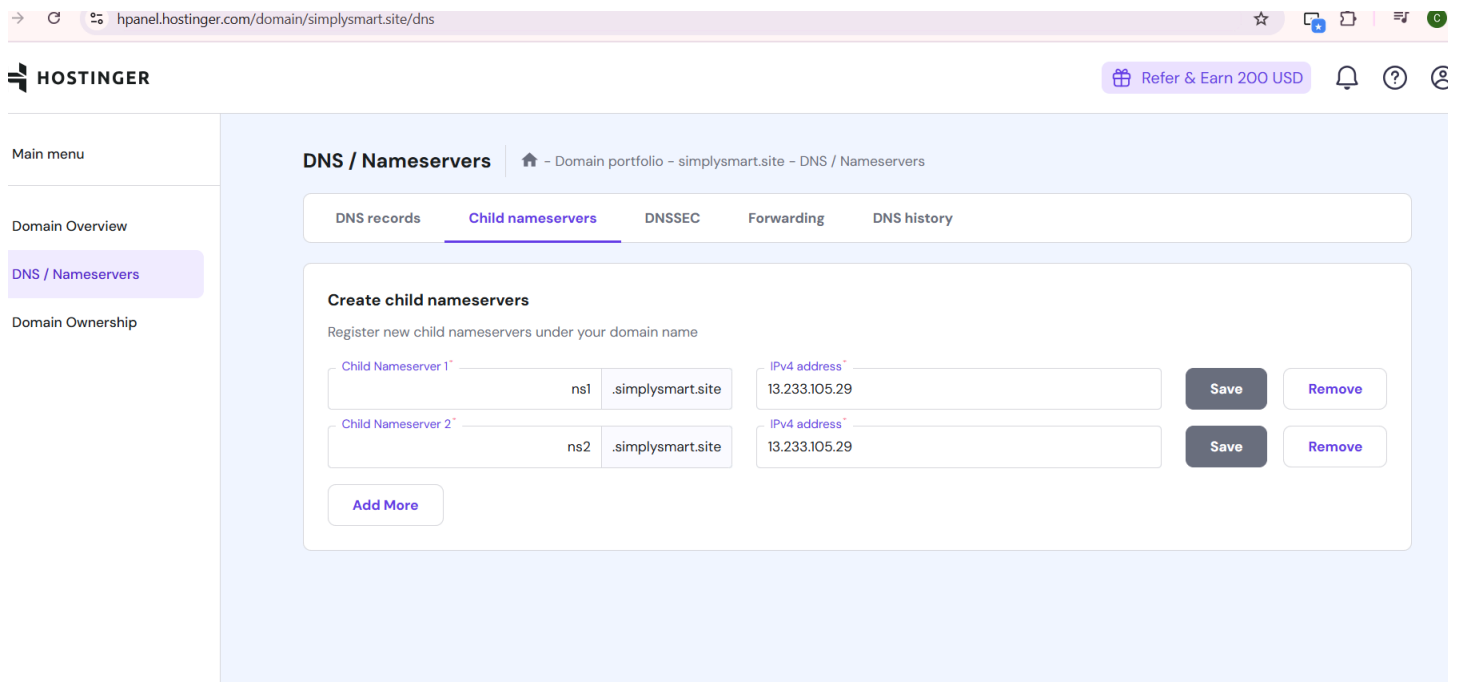
You can learn more about how to register your system
using rhc at https://red.ht/registration
[ec2-user@ip-172-31-4-178 ~]$ sudo -i
[root@ip-172-31-4-178 ~]# hostnamectl hostname DNS
[root@ip-172-31-4-178 ~]# bash
[root@DNS ~]# yum install vim -y
Updating Subscription Management repositories.
Unable to read consumer identity

This system is not registered with an entitlement server. You can use "rhc" or "subscription-manager" to register.

Red Hat Enterprise Linux 9 for x86_64 - AppStream from RHUI (RPMs)          66 MB/s | 50 MB   00:00
Red Hat Enterprise Linux 9 for x86_64 - BaseOS from RHUI (RPMs)         69 MB/s | 46 MB   00:00
Red Hat Enterprise Linux 9 Client Configuration                         34 kB/s | 3.3 kB   00:00
Dependencies resolved.
=====
Package                        Architecture  Version                      Repository                    Size
=====
Installing:
vim-enhanced                   x86_64       2:8.2.2637-21.el9           rhel-9-appstream-rhui-rpms    1.7 M
Installing dependencies:
```

now first configuring the DNS for which zone files needs to be updated as well as named configuration files coming along bind and bind-utils packages and updating DNS server IP's

## at Childservers of hostinger



now trying to check by ping or nslookup or simply seraching at brower where our site is surfing or not ,

Now,coming to NFS server by we need to establish NFS between /wp-data and /var/www/html  
first in NFS we need to install and enable NFS service them make a directory by

```
Windows PowerShell
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Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\ciash> ssh -iC:\Users\ciash\Downloads\project.pem ec2-user@13.127.235.194
Register this system with Red Hat Insights: rhc connect

Example:
# rhc connect --activation-key <key> --organization <org>

The rhc client and Red Hat Insights will enable analytics and additional
management capabilities on your system.
View your connected systems at https://console.redhat.com/insights

You can learn more about how to register your system
using rhc at https://red.ht/registration
Last login: Wed Feb 19 08:34:40 2025 from 103.159.68.38
[ec2-user@NFS ~]$ sudo -i
[root@NFS ~]# yum install nfs* -y
Updating Subscription Management repositories.
Unable to read consumer identity

This system is not registered with an entitlement server. You can use "rhc" or "subscription-manager" to register.

Last metadata expiration check: 0:24:48 ago on Wed 19 Feb 2025 08:15:21 AM UTC.
Dependencies resolved.
=====
Package                                Architecture    Version          Repository        Size
=====
Installing:
nfs-utils                              x86_64          1:2.5.4-27.el9  rhel-9-baseos-rhui-rpms 463 k
nfs-utils-coreos                       x86_64          1:2.5.4-27.el9  rhel-9-appstream-rhui-rpms 196 k
nfs4-acl-tools                         x86_64          0.4.2-3.el9     rhel-9-baseos-rhui-rpms 54 k
nfsv4-client-utils                     x86_64          1:2.5.4-27.el9  rhel-9-appstream-rhui-rpms 161 k
Installing dependencies:
gssproxy                               x86_64          0.8.4-7.el9     rhel-9-baseos-rhui-rpms 114 k
libev                                   x86_64          4.33-5.el9      rhel-9-baseos-rhui-rpms 56 k
libnfsidmap                            x86_64          1:2.5.4-27.el9  rhel-9-baseos-rhui-rpms 65 k
libtirpc                               x86_64          1.3.3-9.el9     rhel-9-baseos-rhui-rpms 97 k
libverto-libev                         x86_64          0.3.2-3.el9     rhel-9-baseos-rhui-rpms 15 k
=====
```

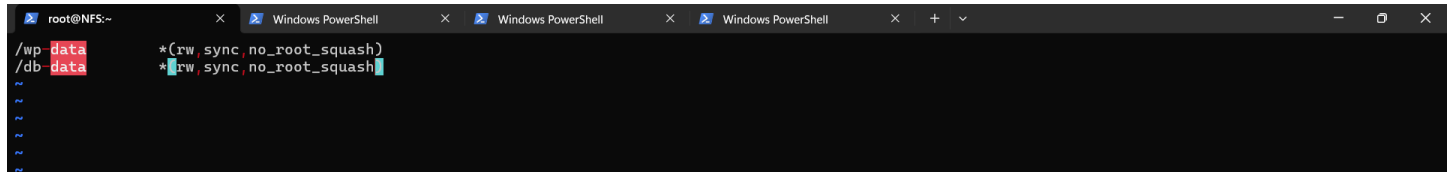
mkdir /wp-data and by changing it's to NFS we use command 'semanage fcontext -a -t nfs\_t /wp-data'

then restorecon -R /wp-data/

```
ls -ldZ /wp-data/
```

```
systemctl restart nfs-server.service
```

```
Last Login: Wed Feb 26 14:38:42 2025 from 157.38.79.10
[ec2-user@NFS ~]$ sudo -i
[root@NFS ~]# ls -ldZ /wp-data
drwxr-xr-x. 5 48 48 unconfined_u:object_r:nfs_t:s0 4096 Feb 26 15:33 /wp-data
[root@NFS ~]#
```



```
vim /etc/exports
```

now on your DNS/webserver server update /etc/fstab with the ip of NFS server and give the mount point of webserver as /var/www/html

now system daemon reload and 'mount -a', hence NFS is established doing the same for DATABASE as well

```
create db-data
```

```
mkdir /db-data
```

```
semanage fcontext -a -t nfs_t /db-data
```

```
restorecon -R /db-data/
```

```
ls -ldZ /db-data/
```

```
systemctl restart nfs-server.service
```

```
Windows PowerShell x root@NFS:~ Windows PowerShell x root@masterDB:~ + v
[root@NFS db-data]# ls
[root@NFS db-data]# client_loop: send disconnect: Connection reset
PS C:\Users\ciash> ^C
PS C:\Users\ciash> ssh -i C:\Users\ciash\Downloads\project.pem ec2-user@3.111.40.199
Register this system with Red Hat Insights: rhc connect

Example:
# rhc connect --activation-key <key> --organization <org>

The rhc client and Red Hat Insights will enable analytics and additional
management capabilities on your system.
View your connected systems at https://console.redhat.com/insights

You can learn more about how to register your system
using rhc at https://red.ht/registration
Last login: Mon Feb 24 04:45:14 2025 from 157.38.207.188
[ec2-user@NFS ~]$ sudo -i
[root@NFS ~]# ls /
afs bin boot db-data dev efi etc home lib lib64 media mnt opt proc root run sbin srv sys tmp usr var wp-data
[root@NFS ~]# ls db-data
ls: cannot access 'db-data': No such file or directory
[root@NFS ~]# ls /db-data
[root@NFS ~]# ip a s
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 9001 qdisc fq_codel state UP group default qlen 1000
    link/ether 0a:a4:de:f1:9e:67 brd ff:ff:ff:ff:ff:ff
    altname enX0
    inet 172.31.2.141/20 brd 172.31.15.255 scope global dynamic noprefixroute eth0
        valid_lft 3482sec preferred_lft 3482sec
    inet6 fe80::8a4:deff:fef1:9e67/64 scope link
        valid_lft forever preferred_lft forever
[root@NFS ~]# rm -rf /db-data/
[root@NFS ~]# mkdir /db-data/
[root@NFS ~]# cd /db-data/
[root@NFS db-data]# ls
[root@NFS db-data]# touch cia.txt
```

proof that both the files as Sycn with NFS by creating a file EX cia.txt on any one server displays on another

Now, Creating a master slave or replication database first log in into both master and slave data base install basic packages + mariadb\*

```
Windows PowerShell x Windows PowerShell x root@DB:~ + v
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\ciash> ssh -i C:\Users\ciash\Downloads\project.pem ec2-user@13.235.68.90
Register this system with Red Hat Insights: rhc connect

Example:
# rhc connect --activation-key <key> --organization <org>

The rhc client and Red Hat Insights will enable analytics and additional
management capabilities on your system.
View your connected systems at https://console.redhat.com/insights

You can learn more about how to register your system
using rhc at https://red.ht/registration
Last login: Wed Feb 19 09:15:08 2025 from 103.159.68.38
[ec2-user@DB ~]$ sudo -i
[root@DB ~]# yum install mariadb* -y
Updating Subscription Management repositories.
Unable to read consumer identity

This system is not registered with an entitlement server. You can use "rhc" or "subscription-manager" to register.

Last metadata expiration check: 1:03:57 ago on Wed 19 Feb 2025 08:24:42 AM UTC.
Dependencies resolved.
=====
Package                                Architecture Version                                Repository                               Size
=====
Installing:
mariadb                                x86_64      3:10.5.27-1.el9_5                      rhel-9-appstream-rhui-rpms             1.6 M
mariadb-backup                          x86_64      3:10.5.27-1.el9_5                      rhel-9-appstream-rhui-rpms             6.5 M
mariadb-common                          x86_64      3:10.5.27-1.el9_5                      rhel-9-appstream-rhui-rpms             34 k
mariadb-connector-c                     x86_64      3.2.6-1.el9_0                          rhel-9-appstream-rhui-rpms            203 k
mariadb-connector-c-config               noarch      3.2.6-1.el9_0                          rhel-9-appstream-rhui-rpms             11 k
mariadb-connector-c-devel                x86_64      3.2.6-1.el9_0                          rhel-9-appstream-rhui-rpms             62 k
mariadb-connector-odbc                   x86_64      3.1.12-3.el9                           rhel-9-appstream-rhui-rpms            115 k
mariadb-embedded                         x86_64      3:10.5.27-1.el9_5                      rhel-9-appstream-rhui-rpms            5.4 M
mariadb-errmsg                           x86_64      3:10.5.27-1.el9_5                      rhel-9-appstream-rhui-rpms            223 k
mariadb-gssapi-server                   x86_64      3:10.5.27-1.el9_5                      rhel-9-appstream-rhui-rpms             16 k
=====
```

now log in into the master server and create a Database as wp\_DB and a usr named as replicator have given all privileges on master data base

\*Here i've created a DB as wp\_DB and 'create user 'replicator'@'%' identified by 'c';

then Flush privileges;

and show master status;

MariaDB [(none)]> show master status;

```
+-----+-----+-----+-----+
| File           | Position | Binlog_Do_DB | Binlog_Ignore_DB |
+-----+-----+-----+-----+
| mysql-bin.000001 | 328 | mydatabase | |
+-----+-----+-----+-----+
```

```
Bye
[root@masterDB ~]# mysql -u root -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 20
Server version: 10.5.27-MariaDB-Log MariaDB Server

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

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

MariaDB [(none)]> create user 'replicator'@'%' identified by 'c';
Query OK, 0 rows affected (0.003 sec)

MariaDB [(none)]> grant replication slave on *.* to 'replicator'@'%;
Query OK, 0 rows affected (0.003 sec)

MariaDB [(none)]> flush privileges;
Query OK, 0 rows affected (0.001 sec)

MariaDB [(none)]> show master status;
+-----+-----+-----+-----+
| File           | Position | Binlog_Do_DB | Binlog_Ignore_DB |
+-----+-----+-----+-----+
| mysql-bin.000001 | 328 | mydatabase | |
+-----+-----+-----+-----+
1 row in set (0.000 sec)

MariaDB [(none)]> |
```

once the work is done in master server come to slave server enable here the mariadb service and log into mariadb via authorized name and master server's private IP

mysql -u replicaotor -h (IP) -p

password - c

then give all required details in the maria





```
Windows PowerShell x Windows PowerShell x root@masterDB:~ x root@DNS:/var/www/html x + v
Verifying : php-opcache-8.0.30-1.el9_2.x86_64 12/23
Verifying : php-xml-8.0.30-1.el9_2.x86_64 13/23
Verifying : libwebp-1.2.0-8.el9_3.x86_64 14/23
Verifying : libX11-1.7.0-9.el9.x86_64 15/23
Verifying : libX11-common-1.7.0-9.el9.noarch 16/23
Verifying : libXpm-3.5.13-10.el9.x86_64 17/23
Verifying : libjpeg-turbo-2.0.90-7.el9.x86_64 18/23
Verifying : libtiff-4.4.0-13.el9.x86_64 19/23
Verifying : graphite2-1.3.14-9.el9.x86_64 20/23
Verifying : libpng-2.1.6.37-12.el9.x86_64 21/23
Verifying : freetype-2.10.4-9.el9.x86_64 22/23
Verifying : harfbuzz-2.7.4-10.el9.x86_64 23/23
Installed products updated.

Installed:
fontconfig-2.14.0-2.el9_1.x86_64 freetype-2.10.4-9.el9.x86_64
gd-2.3.2-3.el9.x86_64 graphite2-1.3.14-9.el9.x86_64
harfbuzz-2.7.4-10.el9.x86_64 jbigkit-libs-2.1-23.el9.x86_64
libX11-1.7.0-9.el9.x86_64 libX11-common-1.7.0-9.el9.noarch
libXau-1.0.9-8.el9.x86_64 libXpm-3.5.13-10.el9.x86_64
libjpeg-turbo-2.0.90-7.el9.x86_64 libpng-2.1.6.37-12.el9.x86_64
libtiff-4.4.0-13.el9.x86_64 libwebp-1.2.0-8.el9_3.x86_64
libxcb-1.13.1-9.el9.x86_64 libxslt-1.1.34-9.el9.x86_64
php-8.0.30-1.el9_2.x86_64 php-cli-8.0.30-1.el9_2.x86_64
php-gd-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_64 php-xml-8.0.30-1.el9_2.x86_64
xml-common-0.6.3-58.el9.noarch

Complete!
[root@DNS ~]# sudo systemctl start httpd
sudo systemctl enable httpd
[root@DNS ~]# cd /var/www/html
[root@DNS html]# ls
index.php wp-activate.php wp-comments-post.php wp-content
license.txt wp-admin wp-config.php wp-cron.php
readme.html wp-blog-header.php wp-config-sample.php wp-includes
[root@DNS html]# vim /var/www/html/wp-config.php
[root@DNS html]# vim /var/www/html/wp-config.php
[root@DNS html]# systemctl restart https
```

once done make modify wp-sample-config.php file to wp-config.php and open it

```
* * Database settings
* * Secret keys
* * Database table prefix
* * ABSPATH
*
* @Link https://developer.wordpress.org/advanced-administration/wordpress/wp-config/
*
* @package WordPress
*/

// ** Database settings - You can get this info from your web host ** //
/** The name of the database for WordPress */
define( 'DB_NAME', 'project' );

/** Database username */
define( 'DB_USER', 'proj' );

/** Database password */
define( 'DB_PASSWORD', 'c' );

/** Database hostname */
define( 'DB_HOST', 'localhost' );

/** Database charset to use in creating database tables. */
define( 'DB_CHARSET', 'utf8' );

/** The database collate type. Don't change this if in doubt. */
define( 'DB_COLLATE', '' );

/**#@+
```

make all the required entries and then restart the service and check ip on google or ‘simplysmart.site ‘

Welcome

Welcome to the famous five-minute WordPress installation process! Just fill in the information below and you'll be on your way to using the most extendable and powerful personal publishing platform in the world.

Information needed

Please provide the following information. Do not worry, you can always change these settings later.

Site Title: simplysmart

Username: cia  
Usernames can have only alphanumeric characters, spaces, underscores, hyphens, periods, and the @ symbol.

Password: Syon@3090 (Medium)  
**Important:** You will need this password to log in. Please store it in a secure location.

Your Email: ciasharmma9@gmail.com  
Double-check your email address before continuing.

Search engine visibility: ☐ Discourage search engines from indexing this site  
It is up to search engines to honor this request.

Install WordPress

fill in the details and then the wordpress server is done

Dashboard - simplysmart

Howdy, cia

# Welcome to WordPress!

[Learn more about the 6.7.2 version.](#)

**Author rich content with blocks and patterns**

Block patterns are pre-configured block layouts. Use them to get inspired or create new pages in a flash.

[Add a new page](#)

**Customize your entire site with block themes**

Design everything on your site — from the header down to the footer, all using blocks and patterns.

[Open site editor](#)

**Switch up your site's look & feel with Styles**

Tweak your site, or give it a whole new look! Get creative — how about a new color palette or font?

[Edit styles](#)

**Site Health Status**

Site health checks will automatically run periodically to gather information about your site. You can also [visit the Site Health screen](#) to gather information about your site now.

No information yet...

**Quick Draft**

Title:

Content:

What's on your mind?

**At a Glance**

Thus,

All the functionality is working properly & we get a centralized storage management along with replication as well as NFS feature