

ICT171 Assignment 2 – Cloud Server Project & Documentation

Student Name: J.M. Dilmika Thathsarana

Student Number: 35485605

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Project Title : Real Estate Website

Website URL : <https://djrealestate.online>

Global IP : 170.64.231.247

Project Overview

The design, implementation, and documentation of a cloud-based server that houses a WordPress website for a made-up real estate company are the tasks involved in this project. The server is protected with SSL/TLS encryption, hosted on DigitalOcean, and set up with Infrastructure as a Service (IaaS). This project aims to show off practical expertise in web application deployment, DNS setup, backup scripting, and Linux server administration in a cloud setting.

Technology Stack

- **Cloud Provider:** DigitalOcean
- **Operating System:** Ubuntu 22.04 LTS (64-bit)
- **Web Server:** Apache2
- **Database:** MySQL
- **Scripting Language:** Bash
- **CMS:** WordPress (manual installation)
- **Security:** SSL/TLS with Let's Encrypt
- **Version Control:** GitHub

Infrastructure as a Service(IaaS)

A type of cloud computing known as Infrastructure as a Service (IaaS) offers virtualised computer infrastructure, such as servers, networking, storage, and operating systems, via the internet. IaaS allows users to maintain complete control over the server environment while the provider takes care of the physical hardware underneath.

DigitalOcean served as the IaaS provider for this project. SSH was used to manually provision and access a virtual machine (Droplet). The student showed complete control

of the infrastructure configuration by installing and configuring all necessary software components, including Apache, PHP, MySQL, and WordPress.

Intended Audience

This documentation is meant for students, instructors, and ICT personnel who might want to duplicate the server configuration for educational or real-world deployment purposes. The instructions and structure are written in a straightforward, copy-paste-friendly manner, according to technical documentation best practices. In the event that a complete server rebuild is required, it also acts as a disaster recovery reference.

Server Access Info

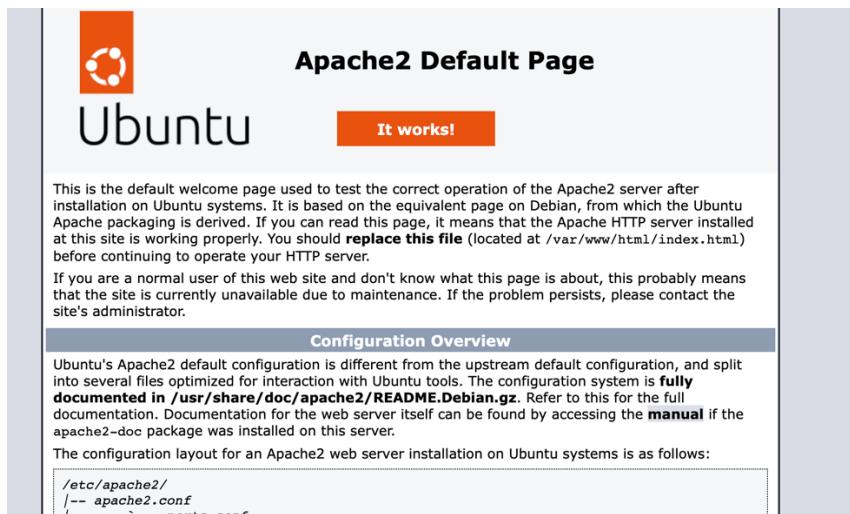
- Global IP Address**: 170.64.231.247
- Domain Name**: <http://djrealestate.online> <https://www.djrealestate.online>
- Platform**: DigitalOcean (IaaS)
- Operating System**: Ubuntu 22.04 (64-bit)

Step-by-Step Server Setup

1. Create Droplet

- Platform: DigitalOcean
- OS: Ubuntu 22.04
- Size: Basic (1GB RAM)
- SSH enabled



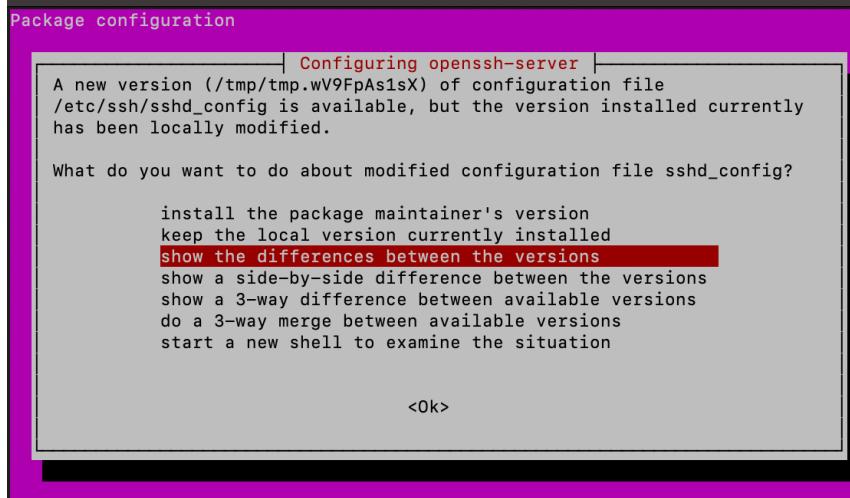


2. SSH Access (commands)

- bash
- ssh root@170.64.231.247

3. Update & Install Packages (commands)

- bash
- apt update && apt upgrade -y
- apt install apache2 mysql-server php libapache2-mod-php php-mysql unzip wget -y



4. Start Services (commands)

- bash
- systemctl start apache2
- systemctl enable apache2

5. Configure Firewall (commands)

- bash
- ufw allow 'Apache'
- ufw allow OpenSSH
- ufw enable

```
systemctl status apache2
Synchronizing state of apache2.service with SysV service script with /usr/lib/sy
stemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable apache2
● apache2.service - The Apache HTTP Server
   Loaded: loaded (/usr/lib/systemd/system/apache2.service; enabled; preset: >
   Active: active (running) since Sun 2025-06-08 13:09:29 UTC; 2min 37s ago
     Docs: https://httpd.apache.org/docs/2.4/
   Main PID: 31948 (apache2)
      Tasks: 6 (limit: 509)
     Memory: 11.0M (peak: 11.4M)
        CPU: 81ms
      CGroup: /system.slice/apache2.service
              ├─31948 /usr/sbin/apache2 -k start
              ├─31951 /usr/sbin/apache2 -k start
              ├─31952 /usr/sbin/apache2 -k start
              ├─31953 /usr/sbin/apache2 -k start
              ├─31954 /usr/sbin/apache2 -k start
              └─31956 /usr/sbin/apache2 -k start

Jun 08 13:09:29 djrealestate-server systemd[1]: Starting apache2.service - The >
Jun 08 13:09:29 djrealestate-server apachectl[31947]: AH00558: apache2: Could n>
Jun 08 13:09:29 djrealestate-server systemd[1]: Started apache2.service - The A>
lines 1-19/19 (END)
```

```
Active: active (running) since Sun 2025-06-08 13:09:29 UTC; 2min 37s ago
  Docs: https://httpd.apache.org/docs/2.4/
 Main PID: 31948 (apache2)
    Tasks: 6 (limit: 509)
   Memory: 11.0M (peak: 11.4M)
      CPU: 81ms
     CGroup: /system.slice/apache2.service
             ├─31948 /usr/sbin/apache2 -k start
             ├─31951 /usr/sbin/apache2 -k start
             ├─31952 /usr/sbin/apache2 -k start
             ├─31953 /usr/sbin/apache2 -k start
             ├─31954 /usr/sbin/apache2 -k start
             └─31956 /usr/sbin/apache2 -k start

Jun 08 13:09:29 djrealestate-server systemd[1]: Starting apache2.service
Jun 08 13:09:29 djrealestate-server apachectl[31947]: AH00558: apache2:
Jun 08 13:09:29 djrealestate-server systemd[1]: Started apache2.service
```

MySQL Configuration (commands)

- bash
- mysql

- sql
- CREATE DATABASE wpdb;
- CREATE USER 'wpuser'@'localhost' IDENTIFIED BY 'StrongPass123!';

```
- GRANT ALL PRIVILEGES ON wpdb.* TO 'wpuser'@'localhost';
- FLUSH PRIVILEGES;
- EXIT;
```

```
Jun 08 13:56:32 djrealestate-server systemd[1]: Starting mysql.service - MySQL >
Jun 08 13:56:34 djrealestate-server systemd[1]: Started mysql.service - MySQL C]>
root@djrealestate-server:/tmp# mysql
]Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 8
Server version: 8.0.42-0ubuntu0.24.04.1 (Ubuntu)

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owners.

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

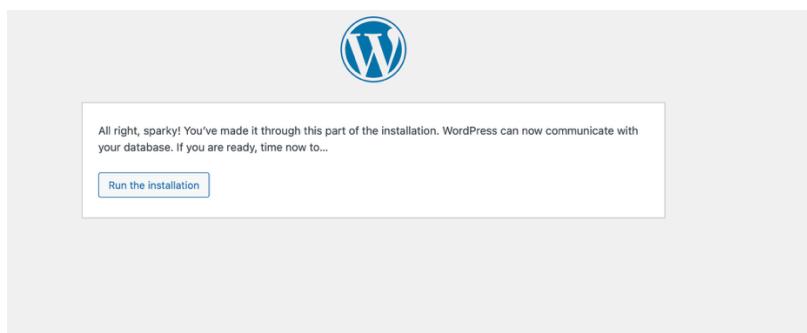
```
~
root@djrealestate-server:~# ufw allow 'Apache'
Rules updated
Rules updated (v6)
root@djrealestate-server:~# ufw enable
Command may disrupt existing ssh connections. Proceed with operation (y|n)? █
```

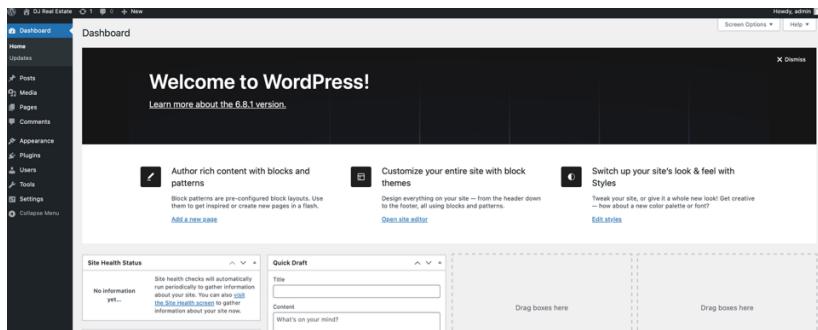
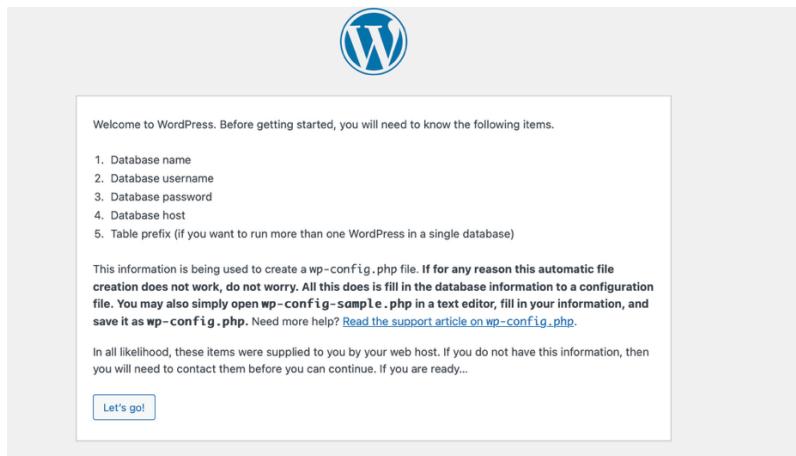
6. Install WordPress (commands)

```
- bash
- cd /tmp
- wget https://wordpress.org/latest.tar.gz
- tar -xvzf latest.tar.gz
- rsync -av wordpress/ /var/www/html/
- chown -R www-data:www-data /var/www/html/
- chmod -R 755 /var/www/html/
- rm /var/www/html/index.html
```

WordPress Setup

→ Visit: <http://djrealestate.online>
→ Setup Wizard: Language, DB credentials, site title, admin user
→ Admin Panel: <http://djrealestate.online/wp-admin>





Domain Name Configuration

- Domain Provider: namecheap.com
- 1st of all I bought a matching domain name for my web page topic
- then I link my ip address of what gave me on digital ocean
- log in to my portal in namecheap
- click advance DNS
- click add new record
- DNS A Record:
 - Host: @
 - Type: A
 - value : 170.64.231.247
- And again another add new record
- Host: www
 - Type: A record
 - value : 170.64.231.247

The screenshot shows the Namecheap dashboard with the 'Domain List' selected. On the right, under 'Domains → Details' for 'djrealestate.online', the 'Advanced DNS' tab is active. It shows two host records: an A Record for '@' pointing to 170.64.231.247 and an A Record for 'www' also pointing to 170.64.231.247. Both records have an 'Automatic' TTL.

→ SSL/TLS Certificate Installation

- Update the Server and Install Certbot

```
sudo apt update
sudo apt install certbot python3-certbot-apache -y
```

- Run Certbot to Obtain the SSL Certificate

```
sudo certbot --apache
```

- When prompted, I selected both:

1: djrealestate.online
 2: <https://djrealestate.online>

- Redirect HTTP to HTTPS

Please choose whether or not to redirect HTTP traffic to HTTPS:

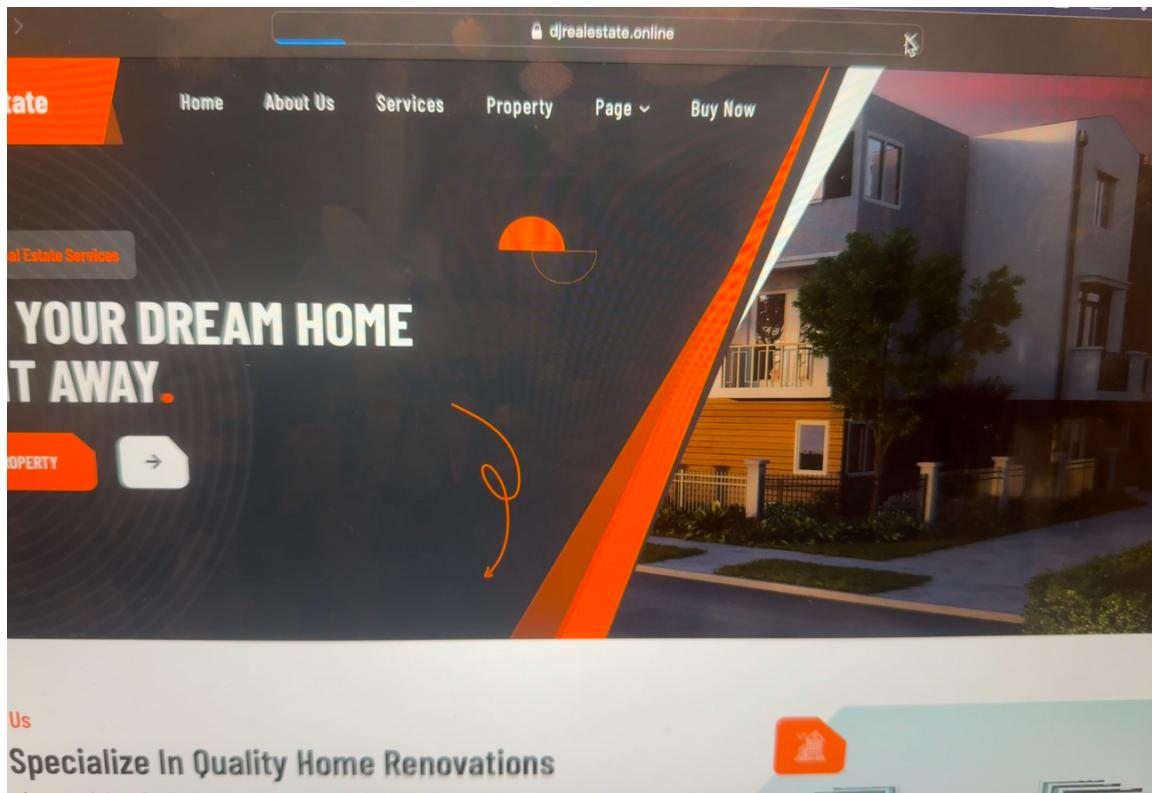
1: No redirect
 2: Redirect - Make all requests go to HTTPS

- Selected

Option 2

- Result Verification

I opened both <https://djrealestate.online> and <https://www.djrealestate.online> in the browser. Both showed a **secure padlock** in the address bar, confirming the SSL certificate is working.



Scripting Component

1. backup.sh – WordPress File Backup Script

Purpose: Creates a compressed .tar.gz archive of the /var/www/html directory (WordPress files) for manual backup.

Location: /root/backup.sh

Usage: sudo /root/backup.sh

Output: /root/wp_backup_YYYY-MM-DD.tar.gz

```
#!/bin/bash
# WordPress backup script
BACKUP_FILE="/root/wp_backup_$(date +%F).tar.gz"
SOURCE_DIR="/var/www/html"
tar -czvf "$BACKUP_FILE" "$SOURCE_DIR"
echo "Backup completed: $BACKUP_FILE"
```

2. update.sh – System Auto-Updater

Purpose: Automatically updates and upgrades the server's package list and security updates.

Location: /root/update.sh

Usage: sudo /root/update.sh

```
#!/bin/bash
# Automatically update and upgrade system packages
echo "Starting system update..."
apt update && apt upgrade -y
echo "System update completed on $(date)"
```

```
#!/bin/bash
# Automatically update and upgrade system packages

echo "Starting system update..."
apt update && apt upgrade -y
echo "System update completed on $(date)"
```

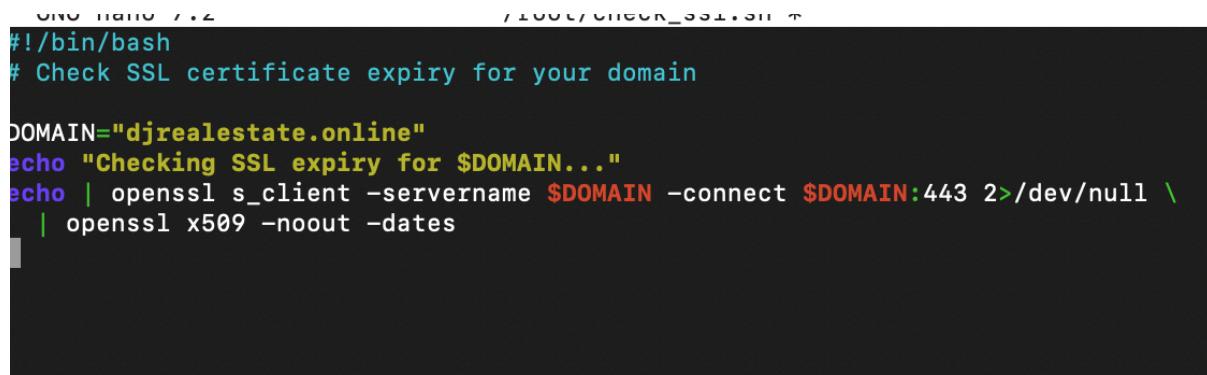
```
Get:14 http://mirrors.digitalocean.com/ubuntu noble-backports/multiverse amd64 Components [212 B]
Get:15 http://security.ubuntu.com/ubuntu noble-security/main amd64 Packages [868 kB]
Get:16 http://security.ubuntu.com/ubuntu noble-security/main amd64 Components [2 1.6 kB]
Get:17 http://security.ubuntu.com/ubuntu noble-security/universe amd64 Components [52.2 kB]
Get:18 http://security.ubuntu.com/ubuntu noble-security/restricted amd64 Components [212 B]
Get:19 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 Components [212 B]
Fetched 3000 kB in 6s (481 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
All packages are up to date.
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
System update completed on Wed Jun 11 17:15:59 UTC 2025
root@djrealestate-server:~#
```

3. check_ssl.sh – SSL Certificate Expiry Checker

Purpose: Checks the expiry date of the SSL certificate for djrealestate.online.

Location: /root/check_ssl.sh
Usage: sudo /root/check_ssl.sh

```
#!/bin/bash
# Check SSL certificate expiry for your domain
DOMAIN="djrealestate.online"
echo "Checking SSL expiry for $DOMAIN..."
echo | openssl s_client -servername $DOMAIN -connect $DOMAIN:443 2>/dev/null \
| openssl x509 -noout -dates
```



A terminal window titled 'check_ssl.sh' showing the execution of the script. The command entered is 'sh /root/check_ssl.sh'. The output shows the script's logic for checking SSL expiry.

4. db_backup.sh – WordPress MySQL Database Backup

Purpose: Creates a .sql backup of the wpdb database into /root/db_backups/

Location: /root/db_backup.sh
Usage: sudo /root/db_backup.sh
Output: /root/db_backups/wpdb_YYYY-MM-DD.sql

```
#!/bin/bash
# Backup WordPress MySQL database
DB_USER="wpuser"
DB_PASS="StrongPass123!"
DB_NAME="wpdb"
BACKUP_PATH="/root/db_backups"
FILENAME="wpdb_$(date +%F).sql"

mkdir -p "$BACKUP_PATH"
mysqldump -u $DB_USER -p$DB_PASS $DB_NAME > "$BACKUP_PATH/$FILENAME"
echo "Database backup completed: $FILENAME"
```

5. db_backup.sh Script (MySQL Backup)

```
GNU nano 7.2                               /root/db_backup.sh *
#!/bin/bash
# Backup WordPress MySQL database

DB_USER="wpuser"
DB_PASS="StrongPass123!"
DB_NAME="wpdb"
BACKUP_PATH="/root/db_backups"
FILENAME="wpdb_$(date +%F).sql"

mkdir -p "$BACKUP_PATH"
mysqldump -u $DB_USER -p$DB_PASS $DB_NAME > "$BACKUP_PATH/$FILENAME"

echo "Database backup completed: $FILENAME"
```

```
root@djrealestate-server:~# nano /root/db_backup.sh
root@djrealestate-server:~# chmod +x /root/db_backup.sh
root@djrealestate-server:~# sudo /root/db_backup.sh
mysqldump: [Warning] Using a password on the command line interface can be insec
ure.
mysqldump: Error: 'Access denied; you need (at least one of) the PROCESS privile
ge(s) for this operation' when trying to dump tablespaces
Database backup completed: wpdb_2025-06-11.sql
root@djrealestate-server:~#
```

```
root@djrealestate-server:~# ls /root/db_backups/
wpdb_2025-06-11.sql
root@djrealestate-server:~#
```

→ This is my GIT HUB account

The screenshot shows a GitHub repository page for 'ict171-assignment2'. The repository is public and has 1 branch and 0 tags. The README file contains information about the assignment, including the student's name (J.M. Dilmika Thathsarana), student number (35485605), project name (Real Estate Agency Website using WordPress), IP address (170.64.231.247), and domain name (<http://djrealestate.online>). The repository has 1 commit and was created 2 days ago. The 'About' section indicates no description, website, or topics provided. It also shows 0 stars, 0 forks, and 0 watching. There are sections for Releases (no releases published) and Packages (no packages published).

The screenshot shows the GitHub navigation bar. It includes links for Home, Issues, Pull requests, Projects, Discussions, Codespaces, Copilot, Explore, and Marketplace. Below the navigation bar, there is a search bar and a list of repositories under 'Repositories'. The repository 'Dilmik425/ict171-assignment2' is listed. At the bottom, there is copyright information for GitHub, Inc. and links for About, Blog, Terms, Privacy, Security, Status, Do not share my personal information, and Manage Cookies.

→ GitHub Repo & Video

- GitHub Repo: <https://github.com/Dilmik425/ict171-assignment2.git>
- Video Explainer: https://drive.google.com/file/d/1dN7P-ok4lWqWkg4QUI5J5IHS8QxXpyfl/view?usp=share_link

→Screenshots

```
Setting up ubuntu-standard (1.539.2) ...
Setting up liblvm2cmd2.03:amd64 (2.03.16-3ubuntu3.2) ...
Setting up dmeventd (2:1.02.185-3ubuntu3.2) ...
dm-event.service is a disabled or a static unit not running, not starting it.
Setting up python3-distupgrade (1:24.04.26) ...
Setting up lvm2 (2.03.16-3ubuntu3.2) ...
Setting up apport (2.28.1-0ubuntu3.6) ...
apport-autoreport.service is a disabled or a static unit not running, not starting it.
Setting up ubuntu-release-upgrader-core (1:24.04.26) ...
Setting up python3-update-manager (1:24.04.12) ...
Setting up apport-core-dump-handler (2.28.1-0ubuntu3.6) ...
Setting up update-manager-core (1:24.04.12) ...
Setting up update-notifier-common (3.192.68.2) ...
update-notifier-download.service is a disabled or a static unit not running, not starting it.
update-notifier-motd.service is a disabled or a static unit not running, not starting it.
Processing triggers for libc-bin (2.39-0ubuntu8.4) ...
Processing triggers for ufw (0.36.2-6) ...
Processing triggers for systemd (255.4-1ubuntu8.6) ...
Processing triggers for man-db (2.12.0-4build2) ...

[Progress: [ 98%] [#####
#] ]
```

```
ESC-{ LeftArrow * Left one half screen width (or N positions).
ESC-} ^RightArrow Right to last column displayed.
ESC-{ ^LeftArrow Left to first column.
F Forward forever; like "tail -f".
ESC-F Like F but stop when search pattern is found.
r ^R ^L Repaint screen.
R Repaint screen, discarding buffered input.
```

Default "window" is the screen height.

Default "half-window" is half of the screen height.

SEARCHING

```
/pattern * Search forward for (N-th) matching line.
?pattern * Search backward for (N-th) matching line.
n * Repeat previous search (for N-th occurrence).
N * Repeat previous search in reverse direction.
ESC-n * Repeat previous search, spanning files.
ESC-N * Repeat previous search, reverse dir. & spanning files.
ESC-u Undo (toggle) search highlighting.
ESC-U Clear search highlighting.
&pattern * Display only matching lines.
```

A search pattern may begin with one or more of:

```
^N or ! Search for NON-matching lines.
^E or * Search multiple files (pass thru END OF FILE).
^F or @ Start search at FIRST file (for /) or last file (for ?).
^K Highlight matches, but don't move (KEEP position).
^R Don't use REGULAR EXPRESSIONS.
^W WRAP search if no match found.
```

JUMPING

```
g < ESC-< * Go to first line in file (or line N).
G > ESC-> * Go to last line in file (or line N).
p % * Go to beginning of file (or N percent into file).
t * Go to the (N-th) next tag.
T * Go to the (N-th) previous tag.
{ [ * Find close bracket } ) ].
} ) [ * Find open bracket { ( [ .
ESC-^F <c1> <c2> * Find close bracket <c2>.
ESC-^B <c1> <c2> * Find open bracket <c1>.
```

Each "find close bracket" command goes forward to the close bracket
matching the (N-th) open bracket in the top line.

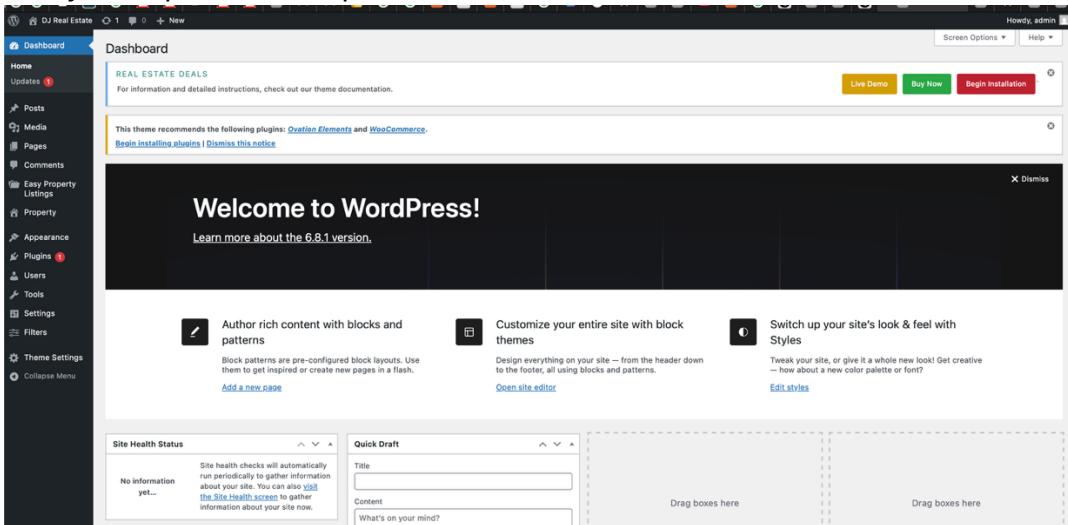
Each "find open bracket" command goes backward to the open bracket

HELP -- Press RETURN for more, or q when done

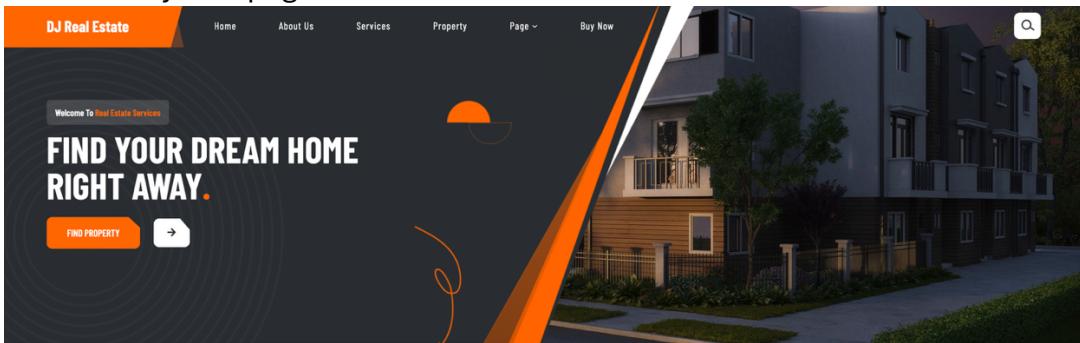
```
wp-includes/sodium_compat/src/Core32/Curve25519/Ge/Precomp.php
wp-includes/sodium_compat/src/Core32/Poly1305/
wp-includes/sodium_compat/src/Core32/Poly1305/State.php
wp-includes/sodium_compat/src/Core32/SecretStream/
wp-includes/sodium_compat/src/Core32/SecretStream/State.php
wp-includes/sodium_compat/src/PHP52/
wp-includes/sodium_compat/src/PHP52/SplFixedArray.php
wp-includes/style-engine/
wp-includes/style-engine/class-wp-style-engine-css-declarations.php
wp-includes/style-engine/class-wp-style-engine-css-rule.php
wp-includes/style-engine/class-wp-style-engine-css-rules-store.php
wp-includes/style-engine/class-wp-style-engine-processor.php
wp-includes/style-engine/class-wp-style-engine.php
wp-includes/theme-compat/
wp-includes/theme-compat/comments.php
wp-includes/theme-compat/embed-404.php
wp-includes/theme-compat/embed-content.php
wp-includes/theme-compat/embed.php
wp-includes/theme-compat/footer-embed.php
wp-includes/theme-compat/footer.php
wp-includes/theme-compat/header-embed.php
wp-includes/theme-compat/header.php
wp-includes/theme-compat/sidebar.php
wp-includes/widgets/
wp-includes/widgets/class-wp-nav-menu-widget.php
wp-includes/widgets/class-wp-widget-archives.php
wp-includes/widgets/class-wp-widget-block.php
wp-includes/widgets/class-wp-widget-calendar.php
wp-includes/widgets/class-wp-widget-categories.php
wp-includes/widgets/class-wp-widget-custom-html.php
wp-includes/widgets/class-wp-widget-links.php
wp-includes/widgets/class-wp-widget-media-audio.php
wp-includes/widgets/class-wp-widget-media-gallery.php
wp-includes/widgets/class-wp-widget-media-image.php
wp-includes/widgets/class-wp-widget-media-video.php
wp-includes/widgets/class-wp-widget-media.php
wp-includes/widgets/class-wp-widget-meta.php
wp-includes/widgets/class-wp-widget-pages.php
wp-includes/widgets/class-wp-widget-recent-comments.php
wp-includes/widgets/class-wp-widget-recent-posts.php
wp-includes/widgets/class-wp-widget-rss.php
wp-includes/widgets/class-wp-widget-search.php
wp-includes/widgets/class-wp-widget-tag-cloud.php
wp-includes/widgets/class-wp-widget-text.php

sent 75,177,435 bytes  received 63,510 bytes  150,481,890.00 bytes/sec
total size is 74,915,090  speedup is 1.00
root@direalestate-server:/tmp#
```

→ My wordpress admin portal



→ This is my web page.

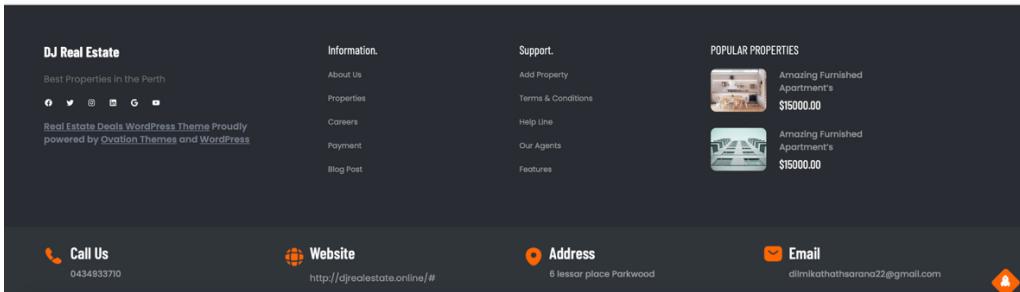


About Us

We Specialize In Quality Home Renovations

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.

- Outstanding property
- Professional and experienced human resources
- Provide the services for users



→ SSL Report

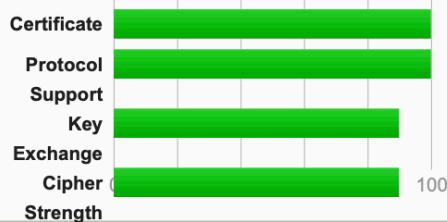
SSL Report: djrealestate.online (170.64.231.247)

Assessed on: Wed, 11 Jun 2025 03:20:04 UTC | [Hide](#) | [Clear cache](#)

[Scan Another »](#)

Summary

Overall Rating



Visit our [documentation page](#) for more information, configuration guides, and books. Known issues are documented [here](#).

This server supports TLS 1.3. [MORE INFO »](#)

Certificate #1: EC 256 bits (SHA384withECDSA)



Server Key and Certificate #1

| | |
|--------------------------|---|
| Subject | djrealestate.online Fingerprint SHA256: fbc0091b18da06d7892518a9ca8b2b-f6a142e9420ae6bb607b500b5176a8335c Pin SHA256: dwZ/PNsv/jWJjc4J0JbjkqeE+AE9BK+dy0k1I9eUEI= |
| Common names | djrealestate.online |
| Alternative names | djrealestate.online www.djrealestate.online |
| Serial Number | 052f101ff90371e9e410a9e7bde07e3d4cd6 |
| Valid from | Wed, 11 Jun 2025 01:37:21 UTC |
| Valid until | Tue, 09 Sep 2025 01:37:20 UTC (expires in 2 months and 28 days) |
| Key | EC 256 bits |
| Weak key (Debian) | No |
| Issuer | E6 AIA: http://e6.i.lencr.org/ |
| Signature algorithm | SHA384withECDSA |
| Extended Validation | No |
| Certificate Transparency | Yes (certificate) |
| OCSP Must Staple | No |
| Revocation information | CRL CRL: http://e6.c.lencr.org/87.crl |
| Revocation status | Good (not revoked) |

→ Reflection

- This project helped demonstrate practical skills in Linux server administration, manual application deployment, scripting, and using Infrastructure as a Service. I also gained experience linking domains and understanding firewall and backup automation.

References

- DigitalOcean. (n.d.). *Getting Started with Droplets*. Retrieved from <https://docs.digitalocean.com/products/droplets/>
- WordPress.org. (n.d.). *Installing WordPress on Ubuntu*. Retrieved from <https://wordpress.org/support/article/how-to-install-wordpress/>
- Certbot. (n.d.). *Enable HTTPS on Your Server with Certbot*. Electronic Frontier Foundation. Retrieved from <https://certbot.eff.org/instructions>
- Ubuntu. (2023). *The Ubuntu Server Guide: Apache2, MySQL, and PHP Installation*. Retrieved from <https://ubuntu.com/server/docs>
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