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# Linux file permissions on a VPS: chmod, chown and Permission denied

VPS & Servers

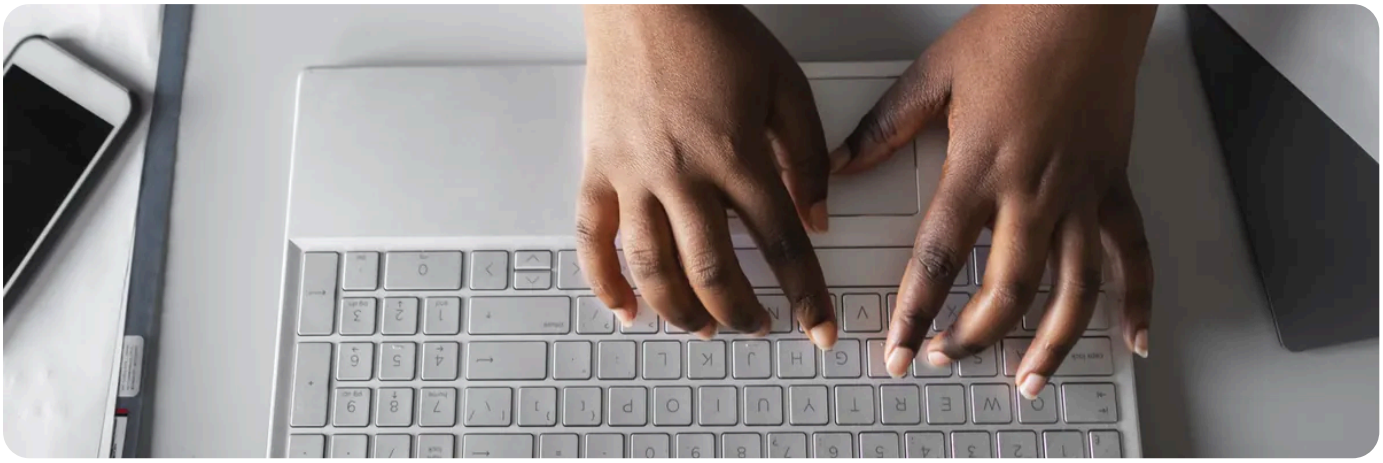
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RLX Holdings (Pty) Ltd. · Group RLX Holdings
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# Linux file permissions on a VPS: chmod, chown and Permission denied

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A “Permission denied”, or a 403 on a website, is almost always one of two things: the file’s **owner** is not who the service runs as, or a **permission** is missing on the file or on one of the folders in its path. See with `ls -l` who owns it and what is allowed, and with `namei -l /full/path` the first folder in the path that blocks. You fix it with `chown` (change the owner) and `chmod` (change the permissions). On an unmanaged VPS this is yours to do.

## Reading what ls -l says

A line like `-rw-r--r-- 1 deploy www-data 1200 Oct 10 site.php` has three parts. The first ten characters are the type and permissions ( `-` file, `d` folder; then three groups of three: **owner**, **group**, **others**, each with *r* read, *w* write, *x* execute). Then come the owner ( `deploy` ) and the group ( `www-data` ).

| Number | Meaning | When to use it |
|---|---|---|
| `644` | Owner reads and writes; group and others only read | A site’s files |
| `755` | Owner reads, writes, executes; others read and execute | Folders, and programs |
| `600` | Only the owner reads and writes | Secrets: keys, files with passwords |
| `700` | Only the owner gets in | Private folders, like `~/.ssh` |
| `777` | Everybody does everything | **Never.** It cures the symptom and opens the door to whoever gets in through any other site. |

## Step by step for a site giving 403 or “Permission denied”

1. **Find out who the service is.** `ps aux | grep -E "nginx|apache|httpd|php-fpm" | head`. On Debian and Ubuntu it is usually `www-data`; on AlmaLinux and Rocky, `nginx` or `apache`.

2. **Look at the whole path.** `namei -l /var/www/yourdomain.tld/public/index.php` shows the permissions of each folder down to the file. The server must be able to **traverse** (x permission) every folder in the path, not just read the file. A closed home folder (`/home/user` at `700`) blocks everything inside it.

3. **Set the owner right.** If the site is managed by a user of yours and served by another, give the right group: `sudo chown -R deploy:www-data /var/www/yourdomain.tld`. Or let the service own only the folders it must write to (uploads, caches).

4. **Set the permissions** to sensible values: `sudo find /var/www/yourdomain.tld -type d -exec chmod 755 {} \;` and `sudo find /var/www/yourdomain.tld -type f -exec chmod 644 {} \;`.

5. **Give write access only where needed.** An uploads folder needs write for the service (for example `chmod 775` with the service’s group); the rest of the site does not.

6. **Test again and read the error log.** If it is still denied once everything is right, it may be SELinux or AppArmor: **when they block a service**.

**Mind the `-R` in the wrong place.**
`Chown -R` or `chmod -R` on a folder higher up than you meant (the root `/`, `/etc`, `/home`) can break the whole system: SSH stops accepting keys with loose permissions, and system programs need their owners. Read the path twice before pressing Enter.

**Do not make root the owner of the site.**
If a root task writes into the folder, the files end up root’s and the site cannot change them. Run that task as the right user: **cron that does not run**.

**Secrets want 600:**
A `.env` file with passwords is read only by its owner (**environment variables and secrets**). And a systemd service runs as whichever user you give it: **running your own program as a service**.

NEED A HAND?

Locked yourself out by touching system permissions? The panel console gets you in without the network: tell us what you did.

Open a support ticket →

SEE ALSO

- SELinux or AppArmor blocking a service →
- Running your own program as a systemd service →
- Environment variables and secrets →
- Keeping your VPS secure →

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|---|---|
| TAX NO. (SARS) | 943 907 6234 |
| REGISTRATION NO. (CIPC) | 2025/667953/07 |
| REGISTERED OFFICE | 1111 Olive Street<br>Saint Louis 63101, Missouri, United States |
| CONTACT | info@mozout.com · +27 78 823 3325 · www.mozout.com |
| OPENING HOURS | Monday to Friday - 08 AM to 04 PM<br>Saturday & Sunday - Closed |

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