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

Administration & Fixes

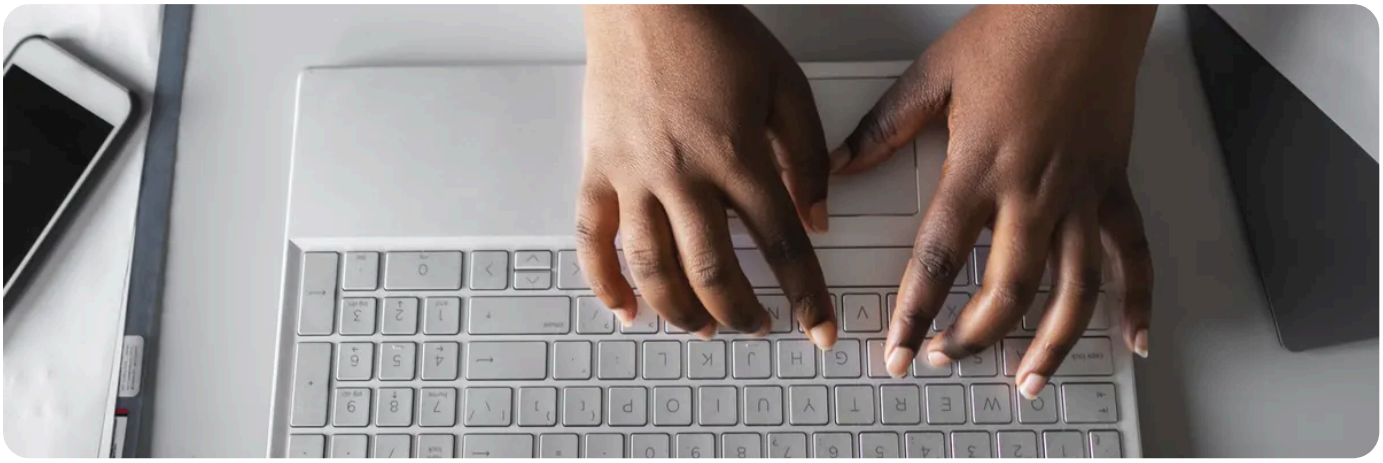
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Linux file permissions on a VPS: chmod, chown and Permission denied

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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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