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Allowing remote PostgreSQL connections on a VPS, safely

Remote Access & Code

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Allowing remote PostgreSQL connections on a VPS, safely

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By default PostgreSQL listens only on `127.0.0.1`. Accepting connections from outside takes **three adjustments**: tell it which address to listen on (`listen_addresses`), tell it **who** may come in (`pg_hba.conf`), and open port 5432 **for that address only** in the firewall. This assumes a VPS with root, preferably running Ubuntu 22.04 LTS, and the configuration and security are yours.

> **Before you open anything,**
> ask yourself whether an **SSH tunnel** would not be enough. With a tunnel no port is opened and the database stays invisible to the internet. See **the SSH tunnel**. Follow the steps below only if an application on another server truly has to talk to the database directly.

Step by step

1. **Listen on another address.** Edit `/etc/postgresql/<version>/main/postgresql.conf` and change `listen_addresses = 'localhost'` to `listen_addresses = 'localhost,<VPS-IP>'`. Avoid `'*'` if you can.

2. **Say who may enter.** In `pg_hba.conf` add a line for the application's **exact address** only, with an encrypted password:

   ```
   host database_name user 203.0.113.10/32 scram-sha-256
   ```

   The `/32` means "this address only". 203.0.113.10 is just an example.

3. **Open the port for it alone.** With `ufw`: `ufw allow from 203.0.113.10 to any port 5432 proto tcp`.

4. **Restart.** `systemctl restart postgresql`.

5 **Check.** On the VPS, `ss -ltn | grep 5432` shows the addresses it listens on. From the other server, `psql -h <VPS-IP> -U user -d database_name`.

pg_hba.conf line	Meaning
`host database user IP/32 scram-sha-256`	**Good.** One database, one user, one address, encrypted password.
`host all all 0.0.0.0/0 scram-sha-256`	**Bad.** Anyone in the world can try to get into any database.
`host all all 0.0.0.0/0 trust`	**A disaster.** Anyone gets in without a password.

What usually goes wrong:
Changing `postgresql.conf` and forgetting `pg_hba.conf` (the error is *no pg_hba.conf entry*); opening the port in the server's firewall but not in another firewall in front of it; and leaving a weak password. Bots sweep port 5432 all day. See **ports and firewall on a VPS**.

How to make changes without locking yourself out

Before editing, copy both files (for example, `cp pg_hba.conf pg_hba.conf.before`). Change one thing at a time and test. A useful difference: changes to `pg_hba.conf` apply with `systemctl reload postgresql`, but `listen_addresses` only changes with `systemctl restart postgresql`. In the firewall, **make sure the rule for your SSH port exists first** before you switch it on: switch it on without that and you lose access to the server. If you still lock yourself out, see **the four usual causes**.

Encrypt the connection.
A database reachable over the internet without TLS sends the password and the data in clear. If the application supports it, use SSL on the connection. Alternatively an SSH tunnel gives you encryption without configuring anything in PostgreSQL. See **keeping your VPS secure**.

NEED A HAND?

Lost access to the VPS after changing the firewall? Write to us with the server name and the time of the change.

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