

Debian Server Installation Guide

Debian 13 • Apache • PostgreSQL • PHP • PhpPgAdmin

By Alexandre Mascellino

Table of Contents

1) Introduction	2
2) Preparing the installation	2
3) Installing the Virtual Machine.....	3
A. Installation.....	3
B. Moving the disk image	5
C. Verifying the Debian Server.....	5
D. Port forwarding and SSH access	6
4) Installing Apache.....	8
5) Installing & configuring PostgreSQL.....	10
6) Installing PHP	16
7) Installing PhpPgAdmin	17
8) Final verifications	20
9) QEMU Configuration	24
10) Security analysis.....	25
11) External documentations	26

1) Introduction

This guide teaches you how to install a Debian Server on a Virtual Machine from a Linux Station. To be able to follow this guide correctly, you need to use a Linux Station **at IUT2**.

During this installation, some commands must be executed by the root user.
On the Virtual Machine, commands preceded by a **#** **must be executed as root**,
whereas commands preceded by **\$** can be executed by the **default user** (or root).
Commands without any prefix are to be executed on the Linux Station.

In this guide, the username that will be used is mascella, but for your installation, use your UGA Login

2) Preparing the installation

Your goal is to install a *Debian 13 Server*. To start, you normally would need to download the ISO image of the server, but here, at IUT2, the image is already available at

`/usr/local/images-ISO/`

Go to this website and find the file named "SHA512SUM":

<https://cdimage.debian.org/cdimage/release/current/amd64/iso-cd/>

Write down somewhere the first line (the one that starts with "3e02")

⚠ Debian Update!

(The instruction above takes you to the Checksum of the current version of Debian, which is Debian-13.5.0. Since you are installing a Debian-13.4.0, use the following value instead)

3e02de4ed744799350bd4039b137053835238ff9f9f29eee812309cd7eebdb5127b0
f2b54d167b76d324530aa16939b41ae2d2f2d1995a2801e19938acdc927f

Using the following command, verify the integrity of the given Debian ISO:

`sha512sum /usr/local/images-ISO/debian-13.4.0-amd64-netinst.iso`

Compare the result given by the command with the line you wrote down earlier.
If the two results are the same, you are good to go.

3) Installing the Virtual Machine

A. Installation

To start the installation, execute the following command:

S2.03-lance-installation

Once launched, press the enter key to enter the “Graphical install” mode.

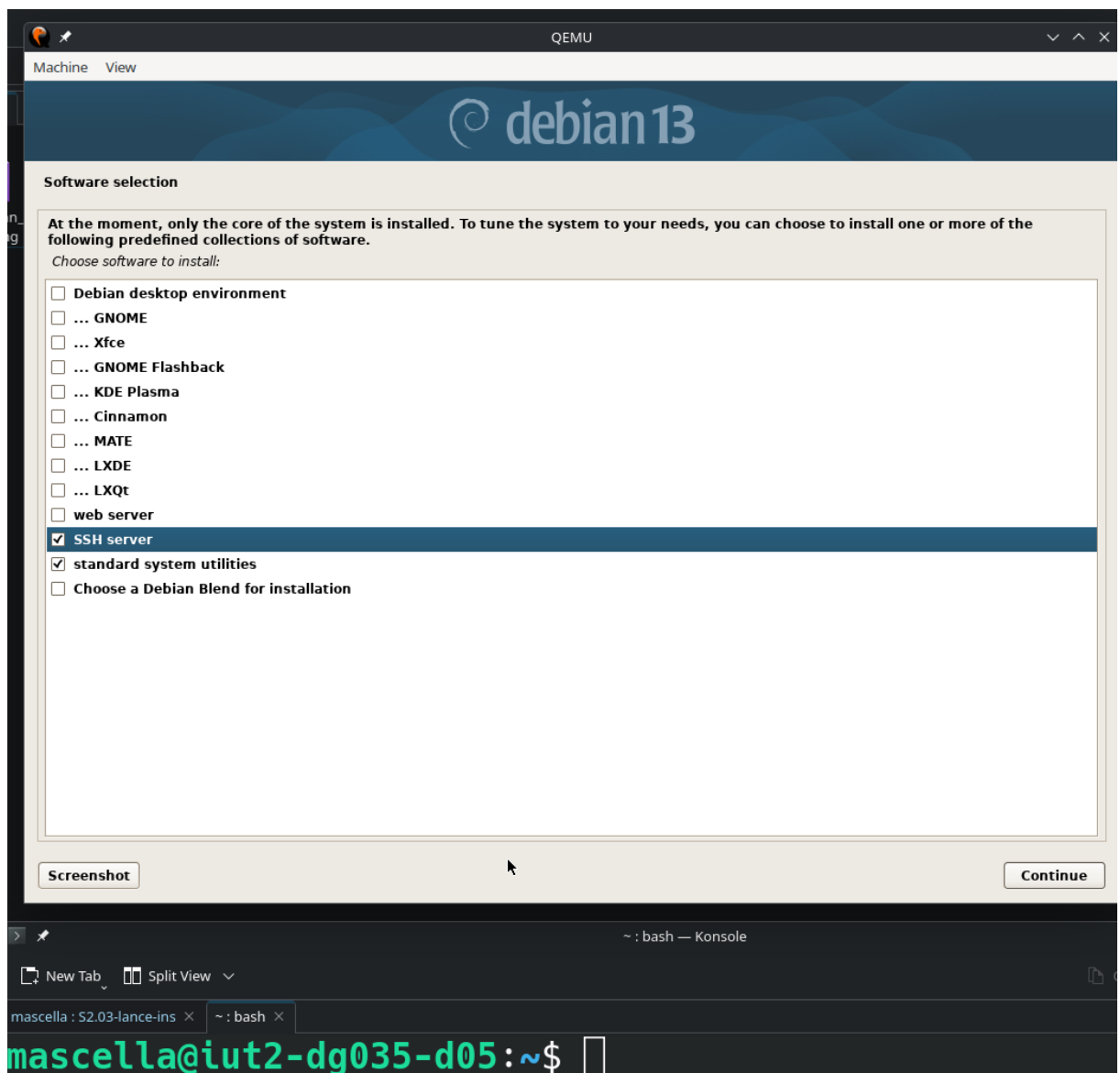
Then, follow the steps one by one with the following specifications.

When nothing is specified, leave the default option and click continue.

- Language: English
- Location: other/Europe/France
- Locales: United States, en_US.UTF-8
- Keyboard: French
- **Hostname: use “server-(YOUR UGA LOGIN)” (here, it’s “server-mascella”)**
- Root password: use a simple password (for example: **root**). *Check the box “Show password” to be sure you didn’t make any mistake.*
- User Account (Full name for the new user): use your full name (here, it’s “Alexandre Mascellino”)
- **Username: use your UGA login (here it’s “mascella”)**



- User password: use a simple password or write it down somewhere. Here it's "etu".
- **Partition disks: Guided – use entire disk**
- **Partition disks: All files in one partition**
- **Partition disks: Finish partitioning and write changes to disk**
- **Partition disks ("Write the changes to disks?"): Yes**
- *(Until the Software Selection page, click on continue or press enter).*
- Software selection: be sure that "Debian desktop" and "... GNOME" are **unchecked** and that "ssh server" and "standard system utilities" are **checked** (cf. screenshot below)



- **Install GRUB: Yes**
- **Device for boot loader: /dev/sda → VERY IMPORTANT**

Once installed, the virtual machine restarts.

Log in with **the root account** (login and password: root) and shut down the Virtual Machine using:

```
# systemctl poweroff
```

⚠ **You must use this command every time you shut down your virtual machine.**

B. [Moving the disk image](#)

Once the installation is finished and the Virtual Machine is shut down, execute the following command:

```
S2.03-déplace-image-disque-sur-erebus
```

C. [Verifying the Debian Server](#)

Now, each time you want to start your Virtual Machine, use the following command in a terminal on your Linux Station:

```
S2.03-lance-machine-virtuelle
```

On your Virtual Machine, log in **as root** and execute the following command:

```
# ip addr
```

You should obtain something that looks like this:

```
root@server-mascella:~#
root@server-mascella:~#
root@server-mascella:~#
root@server-mascella:~# ip addr
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 noprefixroute
        valid_lft forever preferred_lft forever
2: enp0s2: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 52:54:00:12:34:56 brd ff:ff:ff:ff:ff:ff
    altname enx525400123456
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s2
        valid_lft 85539sec preferred_lft 74739sec
    inet6 fec0::952e:607f:437a:d781/64 scope site dynamic mngtmpaddr noprefixroute
        valid_lft 86052sec preferred_lft 14052sec
    inet6 fe80::7a51:eef7:ffd3:ba66/64 scope link
        valid_lft forever preferred_lft forever
root@server-mascella:~# _
```

To verify the Virtual Machine has access to the internet, execute a ping to Google' Servers:

```
# ping 8.8.8.8
```

The ping should be successful.

D. Port forwarding and SSH access

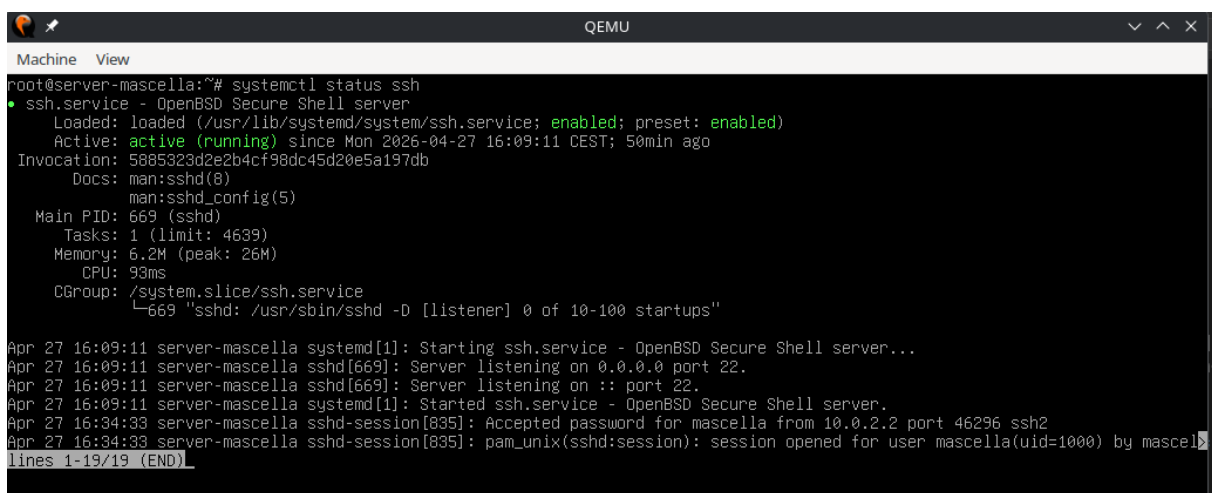
The Virtual Machine launch script automatically configures the port forwarding. Here are the full details:

Network Service	Port on the VM	Port on the Linux Station	Example usage <u>from</u> the Linux Station
SSH	22	2222	<code>ssh yourlogin@localhost -p 2222</code>
HTTP	80	8080	URL: http://localhost:8080/
HTTPS	443	4443	URL: http://localhost:4443/
PostgreSQL	5432	5432	<code>psql -h localhost -U postgres postgres</code>

To verify SSH is started and works correctly, use the following command:

```
# systemctl status ssh
```

You should obtain this:



```

Machine  View
root@server-mascella:~# systemctl status ssh
• ssh.service - OpenBSD Secure Shell server
  Loaded: loaded (/usr/lib/systemd/system/ssh.service; enabled; preset: enabled)
  Active: active (running) since Mon 2026-04-27 16:09:11 CEST; 50min ago
  Invocation: 5885323d2e2b4cf98dc45d20e5a197db
  Docs: man:sshd(8)
       man:sshd_config(5)
  Main PID: 669 (sshd)
  Tasks: 1 (limit: 4639)
  Memory: 6.2M (peak: 26M)
  CPU: 93ms
  CGroup: /system.slice/ssh.service
          └─669 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

Apr 27 16:09:11 server-mascella systemd[1]: Starting ssh.service - OpenBSD Secure Shell server...
Apr 27 16:09:11 server-mascella sshd[669]: Server listening on 0.0.0.0 port 22.
Apr 27 16:09:11 server-mascella sshd[669]: Server listening on :: port 22.
Apr 27 16:09:11 server-mascella systemd[1]: Started ssh.service - OpenBSD Secure Shell server.
Apr 27 16:34:33 server-mascella sshd-session[835]: Accepted password for mascella from 10.0.2.2 port 46296 ssh2
Apr 27 16:34:33 server-mascella sshd-session[835]: pam_unix(sshd:session): session opened for user mascella(uid=1000) by mascel
lines 1-19/19 (END)

```

Access the Virtual Machine using ssh on your Linux Station:

```
ssh yourlogin@localhost -p 2222
```

If you are asked "Are you sure you want to continue connecting (yes/no/[fingerprint])?" type "yes"

Type the password you set up during the installation (here, "etu").

Once connected, switch to the root user using this command (password: root):

```
$ su -
```

Try to install the "micro" Debian package:

```
# apt install micro
```

```
mascella@server-mascella:~$ su -
Password:
root@server-mascella:~# apt install micro
Installing:
  micro

Installing dependencies:
  libice6 libsm6 libxmu6 libxt6t64 x11-common xclip

Summary:
  Upgrading: 0, Installing: 7, Removing: 0, Not Upgrading: 0
  Download size: 4,786 kB
  Space needed: 16.1 MB / 2,099 MB available

Continue? [Y/n]
```

Type "Y" (uppercase) and let the installation continue.

Execute the following command:

```
# cat /etc/fstab
```

You should obtain something like this:

```
(mascella) localhost:2222 — Konsole
New Tab Split View
(mascella) localhost:2222 x mascella : S2.03-lance-mac x
root@server-mascella:~# cat /etc/fstab
# /etc/fstab: static file system information.
#
# Use 'blkid' to print the universally unique identifier for a
# device; this may be used with UUID= as a more robust way to name devices
# that works even if disks are added and removed. See fstab(5).
#
# systemd generates mount units based on this file, see systemd.mount(5).
# Please run 'systemctl daemon-reload' after making changes here.
#
# <file system> <mount point> <type> <options> <dump> <pass>
# / was on /dev/sda1 during installation
UUID=5b59e147-8390-4eec-ba48-355798c73949 / ext4 errors=remount-ro 0 1
# swap was on /dev/sda5 during installation
UUID=1e8d6ecb-9a25-4e6f-97c5-ef8fc23fe3fe none swap sw 0 0
/dev/sr0 /media/cdrom0 udf,iso9660 user,noauto 0 0
root@server-mascella:~#
```

4) Installing Apache

(Recommended: From your Virtual Machine)

To install Apache on the server, you first need to be logged in **as root**:

```
$ su - (password: root)
```

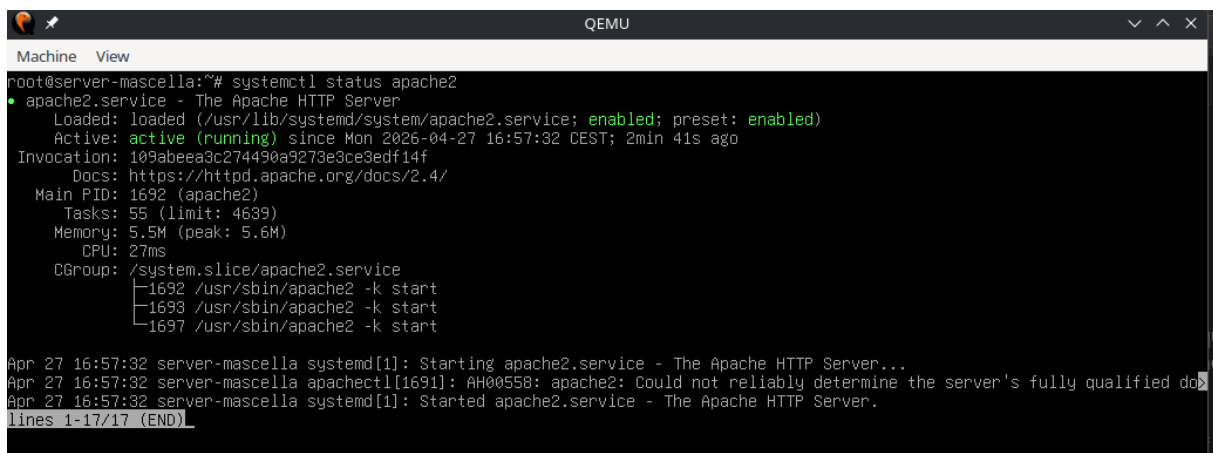
Install Apache2 using the following commands:

```
# apt install apache2 (type "Y")  
# service apache2 start
```

To verify the installation, execute the following command:

```
# systemctl status apache2
```

You should obtain something like this:



```
Machine View  
root@server-mascella:~# systemctl status apache2  
● apache2.service - The Apache HTTP Server  
   Loaded: loaded (/usr/lib/systemd/system/apache2.service; enabled; preset: enabled)  
   Active: active (running) since Mon 2026-04-27 16:57:32 CEST; 2min 41s ago  
  Invocation: 109abeea3c274490a9273e3ce3edf14f  
     Docs: https://httpd.apache.org/docs/2.4/  
   Main PID: 1692 (apache2)  
     Tasks: 55 (limit: 4639)  
    Memory: 5.5M (peak: 5.6M)  
       CPU: 27ms  
   CGroup: /system.slice/apache2.service  
           └─1692 /usr/sbin/apache2 -k start  
             └─1693 /usr/sbin/apache2 -k start  
               └─1697 /usr/sbin/apache2 -k start  
  
Apr 27 16:57:32 server-mascella systemd[1]: Starting apache2.service - The Apache HTTP Server...  
Apr 27 16:57:32 server-mascella apachectl[1691]: AH00558: apache2: Could not reliably determine the server's fully qualified do  
Apr 27 16:57:32 server-mascella systemd[1]: Started apache2.service - The Apache HTTP Server.  
lines 1-17/17 (END)
```

If Apache didn't start, try using this command:

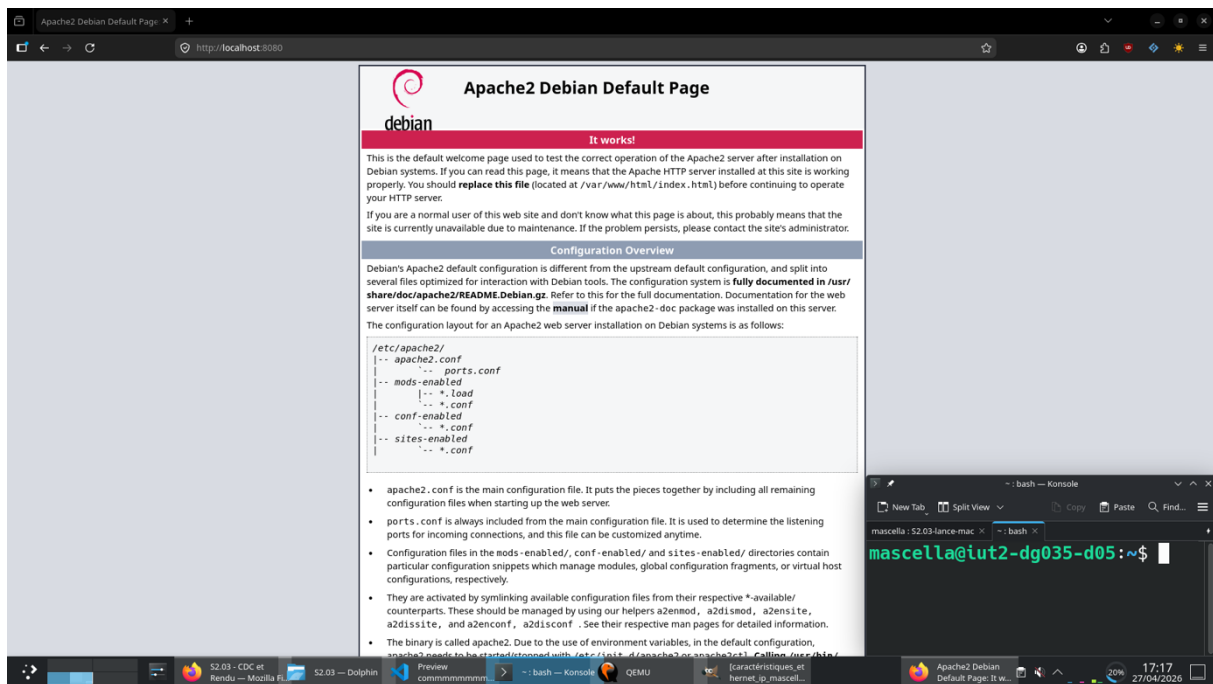
```
# systemctl start apache2
```

Your server doesn't have any graphical interface. Therefore, you cannot display a webpage to test the installation. Use the following commands to test the Apache connection:

- On your Virtual Machine: `$ netcat -zv localhost 80`
- On your Linux Station (*not in SSH*): `netcat -4zv localhost 8080`

To display the default Apache page, you need to open a webpage to localhost on port 80, but port 80 is already used by the Linux Station. The launch script forwards the port 80 of the Virtual Machine to the port 8080.

Open the webpage <http://localhost:8080/>. You should see this page:



That means the Apache installation is successful.

5) Installing & configuring PostgreSQL

(Recommended: From your Virtual Machine)

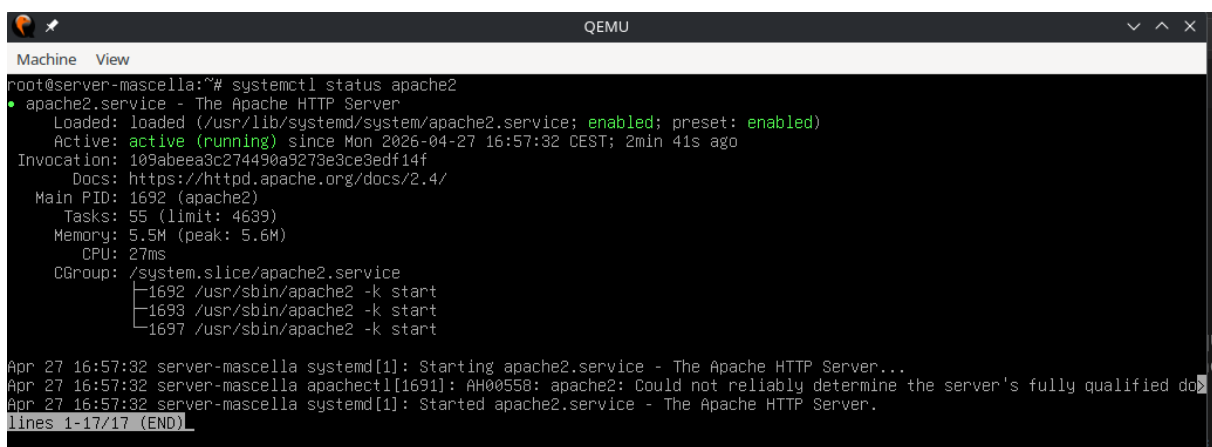
To install PostgreSQL, execute the following command:

```
# apt install postgresql (type "Y")
```

Verify that PostgreSQL is successfully installed with this command:

```
# systemctl status postgresql
```

You should obtain this:



```

Machine View
root@server-mascella:~# systemctl status apache2
• apache2.service - The Apache HTTP Server
   Loaded: loaded (/usr/lib/systemd/system/apache2.service; enabled; preset: enabled)
   Active: active (running) since Mon 2026-04-27 16:57:32 CEST; 2min 41s ago
   Invocation: 109abeea3c274490a9273e3ce3edf14f
   Docs: https://httpd.apache.org/docs/2.4/
   Main PID: 1692 (apache2)
   Tasks: 55 (limit: 4639)
   Memory: 5.5M (peak: 5.6M)
   CPU: 27ms
   CGroup: /system.slice/apache2.service
           └─1692 /usr/sbin/apache2 -k start
             └─1693 /usr/sbin/apache2 -k start
               └─1697 /usr/sbin/apache2 -k start

Apr 27 16:57:32 server-mascella systemd[1]: Starting apache2.service - The Apache HTTP Server...
Apr 27 16:57:32 server-mascella apache2[1691]: AH00558: apache2: Could not reliably determine the server's fully qualified do
Apr 27 16:57:32 server-mascella systemd[1]: Started apache2.service - The Apache HTTP Server.
lines 1-17/17 (END)

```

Once installed, from the root account, connect to the postgres account:

```
# su - postgres
```

Use the following command to display every database:

```
$ psql -l
```

Connect to PostgreSQL:

```
$ psql
```

Create a user with your UGA login (here it's "mascella"):

```
postgres=# CREATE USER yourlogin WITH PASSWORD 'yourlogin';
```

(Here, you can use a password other than your login, but to simplify instructions on this guide, it is suggested that you use your login as the password).

Create a database with the owner being your account:

```
postgres=# CREATE DATABASE base_yourlogin OWNER yourlogin;
```

Exit the database and login to your newly created database **with your new account**:

```
postgres=# exit
$ su - yourlogin
(type your password (here, "etu"))

$ psql base_yourlogin -U yourlogin
```

You should the prefix "base_yourlogin=>"

Create a simple table:

```
CREATE TABLE test_table (
    id int primary key NOT NULL,
    nom text NOT NULL,
    description text
);
```

You should obtain "CREATE TABLE" which confirms the table creation.

Insert a few test lines:

```
INSERT INTO test_table VALUES
(1, 'Michel', 'Ceci est une description'),
(2, 'Damien', null),
(3, 'Zacharie', 'Étudiant');
```

You should obtain "INSERT 0 3" which confirms the lines insert.

Display the table from the Virtual Machine:

```
SELECT * FROM test_table;
```

You should obtain this:

```
base_mascella=> SELECT * FROM test_table;
 id |  nom   | description
-----+-----+-----
  1 | Michel | Ceci est une desc
  2 | Damien |
  3 | Zacharie | Étudiant
(3 rows)

base_mascella=>
```

Your PostgreSQL database is only accessible from the Virtual Machine.

To allow access from the outside (your Linux Station), you need to edit two PostgreSQL configuration files.

The files you need to edit are:

- ```
- /etc/postgresql/17/main/postgresql.conf
- /etc/postgresql/17/main/pg_hba.conf
```

Exit your databse and log in **as root**:

```
base_yourlogin=> exit
```

```
$ su - (password: root)
```

Open and edit the first file with this command:

```
nano /etc/postgresql/17/main/postgresql.conf
```

Once inside, look for this line:

```
➤ # listen_addresses = 'localhost'
```

```
#-----
CONNECTIONS AND AUTHENTICATION
#-----

- Connection Settings -

#listen_addresses = 'localhost' # what IP address(es) to listen on;
 # comma-separated list of addresses;
 # defaults to 'localhost'; use '*' for all
 # (change requires restart)
port = 5432 # (change requires restart)
max_connections = 100 # (change requires restart)
#reserved_connections = 0 # (change requires restart)
#superuser_reserved_connections = 3 # (change requires restart)
unix_socket_directories = '/var/run/postgresql' # comma-separated list of directories
 # (change requires restart)
#unix_socket_group = '' # (change requires restart)
#unix_socket_permissions = 0777 # begin with 0 to use octal notation
 # (change requires restart)
#bonjour = off # advertise server via Bonjour
 # (change requires restart)
#bonjour_name = '' # defaults to the computer name
 # (change requires restart)
```

G Help   W Write Out   F Where Is   K Cut   T Execute   C Location   M-U Undo   M-A Set Mark  
X Exit   R Read File   R Replace   U Paste   J Justify   G Go To Line   M-E Redo   M-G Copy

~: bash — Konsole

New Tab   Split View   Copy   Paste   Find...   ≡

mascella: S2.03-lance-mac × (mascella) localhost:2222 × ~: bash × ~: bash ×

mascella@lut2-dg035-d05:~\$

Change it to this (remove the # and change 'localhost' to '\*'):

➤ `listen_addresses = '*'`

```
#-----
CONNECTIONS AND AUTHENTICATION
#-----
- Connection Settings -
listen_addresses = '*' # what IP address(es) to listen on;
 # comma-separated list of addresses;
 # defaults to 'localhost'; use '*' for all
 # (change requires restart)
port = 5432 # (change requires restart)
max_connections = 100 # (change requires restart)
#reserved_connections = 0 # (change requires restart)
#superuser_reserved_connections = 3 # (change requires restart)
unix_socket_directories = '/var/run/postgresql' # comma-separated list of directories
 # (change requires restart)
#unix_socket_group = '' # (change requires restart)
#unix_socket_permissions = 0777 # begin with 0 to use octal notation
 # (change requires restart)
#bonjour = off # advertise server via Bonjour
 # (change requires restart)
#bonjour_name = '' # defaults to the computer name
 # (change requires restart)
```

Press CTRL + S to save the file and then CTRL + X to exit the file.

Open and edit the second file with this command:

```
nano /etc/postgresql/17/main/pg_hba.conf
```

Once inside, at the very end of the file, add the following lines:

```
#IPv4 remote connections:
host all all 0.0.0.0/0 scram-sha-256
```

```
DO NOT DISABLE!
If you change this first entry you will need to make sure that the
database superuser can access the database using some other method.
Noninteractive access to all databases is required during automatic
maintenance (custom daily cronjobs, replication, and similar tasks).
#
Database administrative login by Unix domain socket
local all postgres peer
TYPE DATABASE USER ADDRESS METHOD
"local" is for Unix domain socket connections only
local all all peer
IPv4 local connections:
host all all 127.0.0.1/32 scram-sha-256
IPv6 local connections:
host all all ::1/128 scram-sha-256
Allow replication connections from localhost, by a user with the
replication privilege.
local replication all peer
host replication all 127.0.0.1/32 scram-sha-256
host replication all ::1/128 scram-sha-256
#IPv4 remote connections:
host all all 0.0.0.0/0 scram-sha-256
```

Press CTRL + S to save the file and then CTRL + X to exit the file.

Now, restart PostgreSQL with this command:

```
systemctl restart postgresql.service
```

Connect from the Linux Station using the following command:

```
psql -h localhost base_yourlogin -U yourlogin
```

(Enter the password you set when you created the user with the SQL request.

Here, it's "mascella")

You now have access to PostgreSQL from your Linux Station.

Display your table from the Linux Station:

```
SELECT * FROM test_table;
```

```
mascella@iut2-dg025-d01:~$ psql -h localhost base_mascella -U mascella
Password for user mascella:
psql (17.9 (Debian 17.9-0+deb13u1))
SSL connection (protocol: TLSv1.3, cipher: TLS_AES_256_GCM_SHA384, compression: off, ALPN: postgresql)
Type "help" for help.

mascella@base_mascella=> SELECT * FROM test_table;
 id | nom | description
----+-----+-----
 1 | Michel | Ceci est une description
 2 | Damien |
 3 | Zacharie | Étudiant
(3 rows)

mascella@base_mascella=> █
```

On your Virtual Machine, log back in as the postgres user

```
su - postgres
```

Display every database and their owner with this command:

```
$ psql -l
```

```
postgres@server-mascella:~$ psql -l
List of databases

```

| Name          | Owner    | Encoding | Locale Provider | Collate     | Ctype       | Locale | ICU Rules | Access privileges     |
|---------------|----------|----------|-----------------|-------------|-------------|--------|-----------|-----------------------|
| base_mascella | mascella | UTF8     | libc            | en_US.UTF-8 | en_US.UTF-8 |        |           |                       |
| postgres      | postgres | UTF8     | libc            | en_US.UTF-8 | en_US.UTF-8 |        |           |                       |
| template0     | postgres | UTF8     | libc            | en_US.UTF-8 | en_US.UTF-8 |        |           | =c/postgres           |
| template1     | postgres | UTF8     | libc            | en_US.UTF-8 | en_US.UTF-8 |        |           | postgres=Ctc/postgres |

```
(4 rows)

postgres@server-mascella:~$ █
```

Connect to the postgres database:

```
$ psql
```

And display the table pg\_shadow containing the hashed passwords:

```
SELECT * FROM pg_shadow;
```

```
mascellino@server-mascella:~$ su -
Password:
root@server-mascella:~# su - postgres
postgres@server-mascella:~$ psql
psql (17.9 (Debian 17.9-0-deb13ui))
Type "help" for help.

postgres=# SELECT * FROM pg_shadow;
postgres=# SELECT * FROM pg_shadow LIMIT 5;
 username | usesysid | usecreatedb | usesuper | use repl | usebypassrls | passwd | valuntil | useconfig

 postgres | 10 | t | t | t | t | SCRAM-SHA-256$4096:LL3IKDAUDxHuhDFLXIXg==xQpLjx040neu8X/6GCh4t0q8m7oewAond+9R9pk88::+4+sPFWErcZ9L/vNmoI05MhDhRENF8040lwLZjV938= | |
 mascella | 16388 | f | f | f | f | | |
(2 rows)

postgres=#
```

To exit PostgreSQL, use the exit command.

e.g.: postgres=# exit

## 6) Installing PHP

To install PHP, execute the following command **as root**:

```
apt install php-common libapache2-mod-php php-cli
```

Next, restart apache2 using theses commands:

```
/etc/init.d/apache2 stop
/etc/init.d/apache2 start
```

Now, to test the installation, create a file named `info.php`:

```
nano /var/www/html/info.php
```

And write the following code:

```
<?php
 phpinfo();
 phpinfo(INFO_MODULES);
?>
```

Press CTRL + S to save the file and then CTRL + X to exit the file.

Now, you can access the file from this URL on your Linux Station:

<http://localhost:8080/info.php>

You should obtain this page:

The screenshot shows a web browser displaying the PHP Version 8.4.16 information page. The page includes a table with system details, configuration files, and loaded modules. A terminal window is open in the foreground, showing the command prompt.

| System                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Build Date                              | Dec 18 2025 21:19:25                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Build System                            | Linux                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Build Provider                          | Debian                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Server API                              | Apache 2 Handler                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Virtual Directory Support               | disabled                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Configuration File (php.ini) Path       | /etc/php/8.4/apache2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Loaded Configuration File               | /etc/php/8.4/apache2/php.ini                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Scan this dir for additional .ini files | /etc/php/8.4/apache2/conf.d                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Additional .ini files parsed            | /etc/php/8.4/apache2/conf.d/10-opcache.ini, /etc/php/8.4/apache2/conf.d/10-pdo.ini, /etc/php/8.4/apache2/conf.d/20-calendar.ini, /etc/php/8.4/apache2/conf.d/20-ctype.ini, /etc/php/8.4/apache2/conf.d/20-exif.ini, /etc/php/8.4/apache2/conf.d/20-fileinfo.ini, /etc/php/8.4/apache2/conf.d/20-filter.ini, /etc/php/8.4/apache2/conf.d/20-ftp.ini, /etc/php/8.4/apache2/conf.d/20-gd.ini, /etc/php/8.4/apache2/conf.d/20-gettext.ini, /etc/php/8.4/apache2/conf.d/20-iconv.ini, /etc/php/8.4/apache2/conf.d/20-imagick.ini, /etc/php/8.4/apache2/conf.d/20-ldap.ini, /etc/php/8.4/apache2/conf.d/20-mbstring.ini, /etc/php/8.4/apache2/conf.d/20-mcrypt.ini, /etc/php/8.4/apache2/conf.d/20-mysqlnd.ini, /etc/php/8.4/apache2/conf.d/20-openssl.ini, /etc/php/8.4/apache2/conf.d/20-pdo_mysql.ini, /etc/php/8.4/apache2/conf.d/20-posix.ini, /etc/php/8.4/apache2/conf.d/20-readline.ini, /etc/php/8.4/apache2/conf.d/20-shmop.ini, /etc/php/8.4/apache2/conf.d/20-sockets.ini, /etc/php/8.4/apache2/conf.d/20-sysvmsg.ini, /etc/php/8.4/apache2/conf.d/20-sysvsem.ini, /etc/php/8.4/apache2/conf.d/20-sysvshm.ini, /etc/php/8.4/apache2/conf.d/20-tokenizer.ini |
| PHP API                                 | 20240924                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| PHP Extension                           | 20240924                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Zend Extension                          | 420240924                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Zend Extension Build                    | API420240924.NTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| PHP Extension Build                     | API20240924.NTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| PHP Integer Size                        | 64 bits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Debug Build                             | no                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Thread Safety                           | disabled                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Zend Signal Handling                    | enabled                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Zend Memory Manager                     | enabled                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Zend Multibyte Support                  | disabled                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Zend Max Execution Timers               | disabled                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| IPv6 Support                            | enabled                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| DTrace Support                          | disabled                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Registered PHP Streams                  | https, ftps, compress.zlib, php, file, glob, data, http, ftp, phar                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Registered Stream Socket Transports     | tcp, udp, unix, udg, ssl, tls, tlsv1.0, tlsv1.1, tlsv1.2, tlsv1.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Registered Stream Filters               | zlib.*, string.rot13, string.toupper, string.tolower, convert.*, consumed, dech                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

Any webpage file (.html, .php, ...) you place in the `/var/www/html` directory can be accessed with [http://localhost:8080/yourfilename.\(html/php/...\)](http://localhost:8080/yourfilename.(html/php/...))

## 7) Installing PhpPgAdmin

With PHP installed, it is now possible to install PhpPgAdmin, which enables control over PostgreSQL through a webpage.

Install PhpPgAdmin using this command **as root** on your Virtual Machine:

```
apt-get install phppgadmin
```

Once installed, you can access this webpage on your Linux Station:

<http://localhost:8080/phppgadmin>

You will stumble across a **Forbidden** page and this is normal. By default, PhpPgAdmin is accessible only from the host (your Virtual Machine). To change this behavior, you need to edit this file:

```
nano /etc/apache2/conf-available/phppgadmin.conf
```

Search for the line "Require local", change it to "Require **all granted**".

Press CTRL + S to save the file and then CTRL + X to exit the file.

Make sure the syntax is correct:

```
apache2ctl -t
```

You should see a "Syntax OK"

Make sure the config file is enabled:

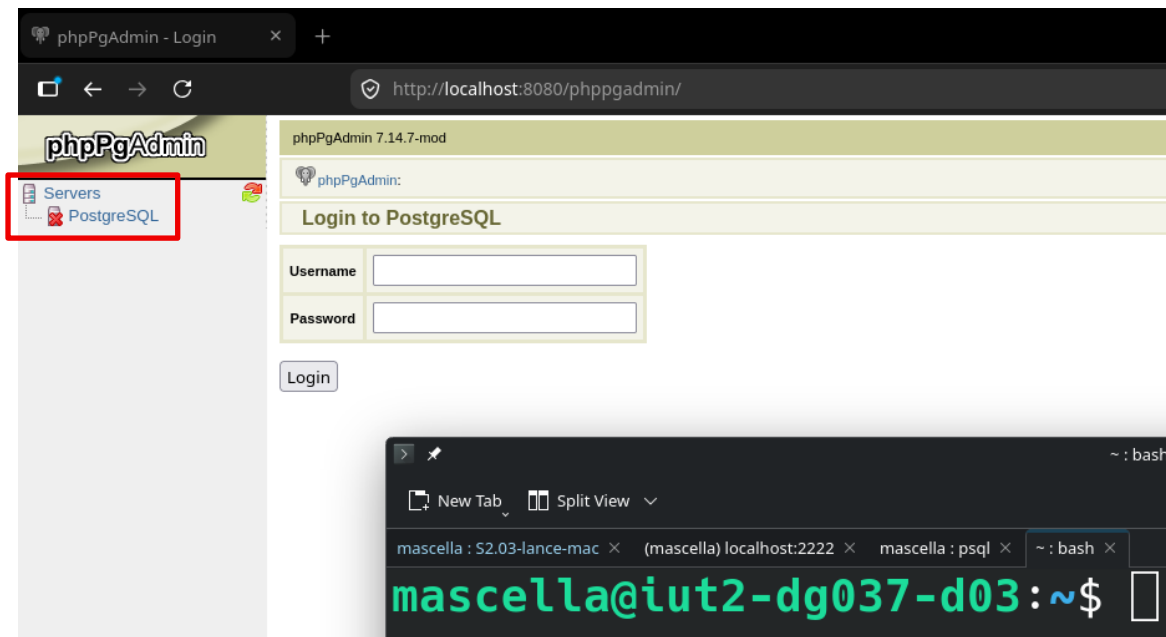
```
a2enconf phppgadmin
```

Restart apache2:

```
systemctl restart apache2
```

Now, you should be able to access <http://localhost:8080/phppgadmin>.

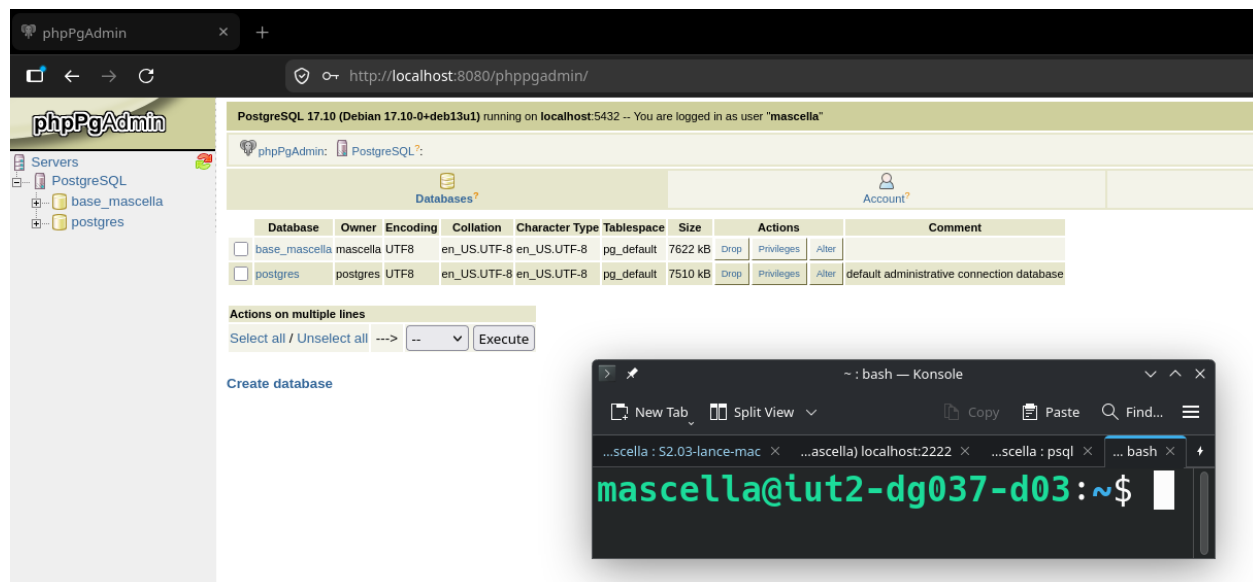
Below the phpPgAdmin logo, under "Server" click on "PostgreSQL".



You will be asked to log in. Since the postgres account doesn't have a password and is reserved only for the host itself, connect using the account you created earlier. Here it's

- Username: mascella
- Password: mascella

You now have access to your PostgreSQL server from a web interface.



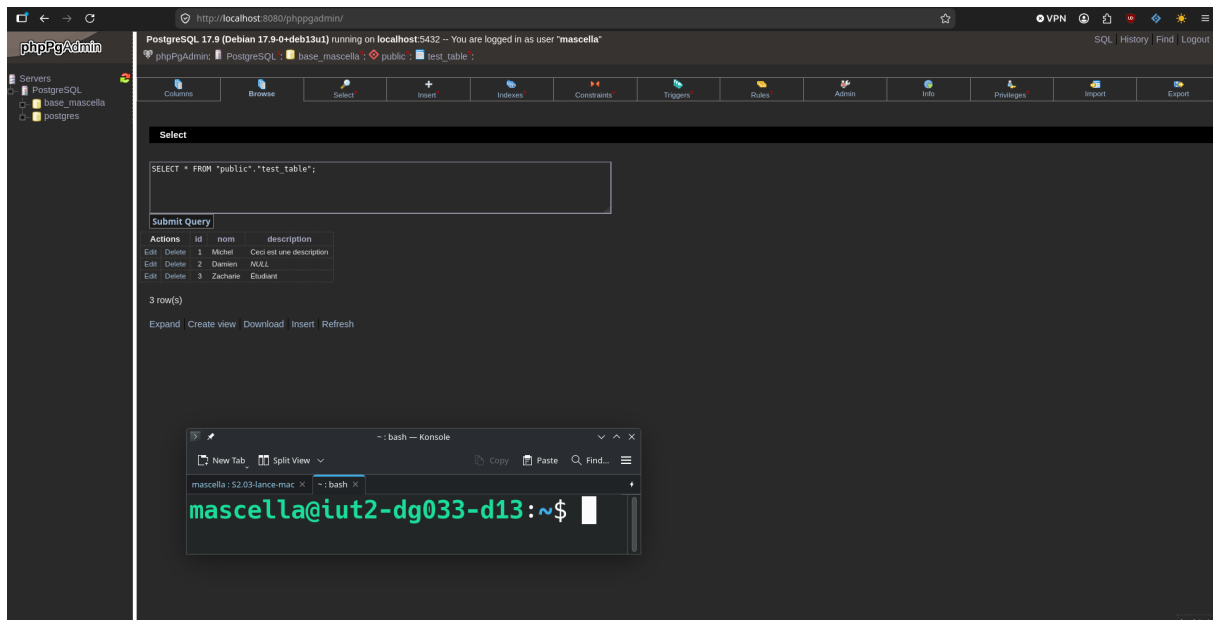
Click on "base\_yourlogin" → "public" → "test\_table".

You can now see the properties of your table.

Just above the columns name, you can see that you are in the "Columns" tab.

Click on the icon on the right: "Browse".

From here, you can execute SQL requests. Click on submit to execute your request.

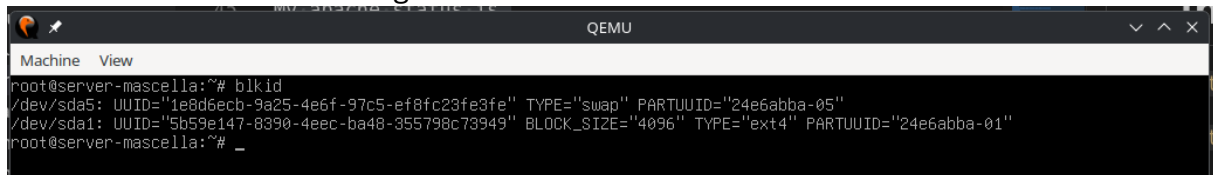


## 8) Final verifications

On your Virtual Machine, as **the root user**, execute this command:

```
blkid
```

You should obtain something like this:

A screenshot of a terminal window titled 'QEMU' with a 'Machine View' tab. The terminal shows the command 'blkid' being executed. The output lists two disk partitions: '/dev/sda5' with UUID '1e8d6ecb-9a25-4e6f-97c5-ef8fc23fe3fe', TYPE 'swap', and PARTUUID '24e6abba-05'; and '/dev/sda1' with UUID '5b59e147-8390-4eec-ba48-355798c73949', BLOCK\_SIZE '4096', TYPE 'ext4', and PARTUUID '24e6abba-01'. The prompt returns to 'root@server-mascella:~# \_'.

You need to copy an IUT2 file to your Apache Server. For this, two methods can be used: by [using SSH](#) or by [using the scp command](#).

### A. Using SSH

On your Linux Station, open this file:

```
/users/info/www/intranet/enseignements/S2.03/page_sae_S2.03.php
```

Copy its content.

Connect via SSH to your Server:

```
ssh yourlogin@localhost -p 2222
```

Once connected, log in **as root**:

```
$ su -
```

Execute this command to create a new file on your Apache Server:

```
nano /var/www/html/page_sae_S2.03.php
```

Once inside, paste the content of the file you've copied earlier  
(CTRL + Shift + V or Right Click → Paste)

Press CTRL + S to save the file and then CTRL + X to exit the file.

## B. Using scp

The scp command is structured this way:

```
scp login@hostname:/path/to/source/file /path/to/destination/
```

|                       |                                                                     |
|-----------------------|---------------------------------------------------------------------|
| login                 | Your UGA login (here, "mascella")                                   |
| hostname              | The hostname of your Linux Station<br>(for example: iut2-dg033-d13) |
| /path/to/source/file  | The path to the source file (e.g.: /users/info/(...)/file.txt)      |
| /path/to/destination/ | The path to the destination directory (e.g.: /var/www/html)         |

The command below is an example of what you need to execute:

```
scp mascella@iut2-dg033-d13.u-ga.fr:/users/info/www/intranet/enseignements/S2.03/page_sae_S2.03.php /var/www/html/
```

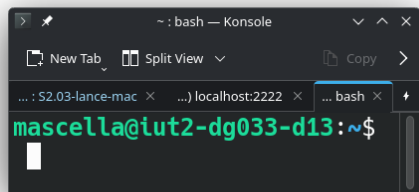
*(Replace "mascella" with your login. You will need to enter your real IUT2 password)*

**⚠ This command must be executed FROM the Virtual Machine**

The file has now been copied from the Linux Station to /var/www/html/ on the Virtual Machine.

Access the file at [http://localhost:8080/page\\_sae\\_S2.03.php](http://localhost:8080/page_sae_S2.03.php).

You should see this page (next page):



Finally, execute this command **as root** on your Virtual Machine:

```
df -h
```



The screenshot shows a terminal window titled 'QEMU' with a 'Machine View' tab. The terminal output of the 'df -h' command is as follows:

| Filesystem | Size | Used | Avail | Use% | Mounted on                                |
|------------|------|------|-------|------|-------------------------------------------|
| udev       | 1.9G | 0    | 1.9G  | 0%   | /dev                                      |
| tmpfs      | 393M | 504K | 392M  | 1%   | /run                                      |
| /dev/sda1  | 3.4G | 1.6G | 1.6G  | 49%  | /                                         |
| tmpfs      | 2.0G | 1.1M | 2.0G  | 1%   | /dev/shm                                  |
| tmpfs      | 5.0M | 0    | 5.0M  | 0%   | /run/lock                                 |
| tmpfs      | 1.0M | 0    | 1.0M  | 0%   | /run/credentials/systemd-journald.service |
| tmpfs      | 2.0G | 0    | 2.0G  | 0%   | /tmp                                      |
| tmpfs      | 1.0M | 0    | 1.0M  | 0%   | /run/credentials/getty@tty1.service       |
| tmpfs      | 393M | 8.0K | 393M  | 1%   | /run/user/0                               |
| tmpfs      | 393M | 8.0K | 393M  | 1%   | /run/user/1000                            |

This shows the storage details of your Server. Here, on disk `/dev/sda1`, on 3.4G, 1.6 are used and 1.6 are still available.

🎉 **You successfully created and set up a Debian Server with basic Network services (PostgreSQL, Apache2, Php, ...).** 🎉

To add some security, please refer to this section: [Security analysis](#)

## 9) QEMU Configuration

If you look at the script S2.03-commun, at the end, you will see this long command:

```
qemu-system-x86_64 \
 -machine q35 \
 -cpu host \
 -m 4G \
 -enable-kvm \
 -device VGA,xres=1024,yres=768 \
 -display gtk,zoom-to-fit=off \
 -drive $drive \
 -device e1000,netdev=net0 \
 -netdev user,id=net0,hostfwd=tcp::2222-:22,hostfwd=tcp::4443-:443,hostfwd=tcp::8080-:80,hostfwd=tcp::5432-:5432
```

Here is an explanation of this command's arguments:

| Argument                  | Explanation                                                                                                                                                                                                      |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| -machine q35              | Emulates an Intel Q35 Chipset machine                                                                                                                                                                            |
| -cpu host                 | Uses the host's CPU to the VM                                                                                                                                                                                    |
| -m 4G                     | Allocates 4GB of RAM to the VM                                                                                                                                                                                   |
| -enable-kvm               | Enables Kernel-based Virtual Machine hardware acceleration. Improves performance.                                                                                                                                |
| -device VGA,...           | Creates a virtual VGA display with a custom resolution (1024x768)                                                                                                                                                |
| -displat gtk,...          | Opens a GTK window to show the VM screen.                                                                                                                                                                        |
| -drive \$drive            | \$drive is defined in the script S2.03-commun. It indicates which disk image to use.<br>After installing the VM with the graphical install, it created a .qcow2 image file moved to erebus earlier in the guide. |
| -device e1000,netdev=net0 | Emulates an Intel e1000 network card. Linked to a network named "net0"                                                                                                                                           |
| -netdev user,id=net0      | Creates a network named "net0". The VM gets internet access.                                                                                                                                                     |
| hostfwd=tcp::2222-:22     | Forwards SSH port. Port 22 is on the VM and port 2222 is on the Linux Station.                                                                                                                                   |
| hostfwd=tcp::8080-:80     | Forwards HTTP port. Port 80 is on the VM and port 8080 is on the Linux Station. (Used for Apache2)                                                                                                               |
| hostfwd=tcp::4443-:443    | Forwards HTTPS port. Port 443 is on the VM and port 4443 is on the Linux Station.                                                                                                                                |
| hostfwd=tcp::5432-:5432   | Forwards PostgreSQL port. Port 5432 is on both the VM and the Linux Station. (Since no PostgreSQL Server is running on the Linux Station, it can use the port 5432).                                             |

## 10) Security analysis

During the whole installation, not a lot of security measures were taken.  
For example, the root password being `root` and "`etu`" for the user account.

To secure your Server, change the root password:

- 1- If not already, connect as root: `$ su -`
- 2- Execute the command: `# passwd`
- 3- Enter a new password and type it again to confirm.

To change the user password:

- 1- Login as this user: `$ su - yourlogin`
- 2- Execute the command `$ passwd`
- 3- Follow the instructions (Enter the current password, enter a new password and enter it again to confirm)

The info files you set up (`info.php`, `page_sae_S2.03.php`, ...) contain sensitive information, **it is heavily recommended to delete these files.**

The general command to delete a file is this one:

```
rm <filename>
```

Here, log in **as root** and execute these commands:

```
rm /var/www/html/info.php
rm /var/www/html/page_sae_S2.03.php
```

That way, confidential information are no longer available.

Speaking of passwords, in PostgreSQL, the user 'postgres' is a super user, it is not recommended to use it for general use.

Create different users for different usages and give privileges to table only to user which are meant to use this table.

To change a user's password in PostgreSQL, use these commands:

- 1- Connect as postgres from **root**: `# su - postgres`
- 2- Connect to the database: `postgres=# psql`
- 3- Execute this SQL request: **`ALTER USER yourlogin WITH PASSWORD 'newpassword';`**

## 11) External documentations

PostgreSQL:

- 1- Official Website (EN): <https://www.postgresql.org/>
- 2- PostgreSQL 17 (the one installed) documentation (EN):  
<https://www.postgresql.org/docs/17/index.html>
- 3- PostgreSQL 17 French documentation: <https://docs.postgresql.fr/17/>

Apache2 documentation:

- <https://httpd.apache.org/docs/2.4/> (EN)
- <https://httpd.apache.org/docs/2.4/fr/> (FR)

Linux commands Cheat Sheet:

- <https://linux-commands.labex.io/>