

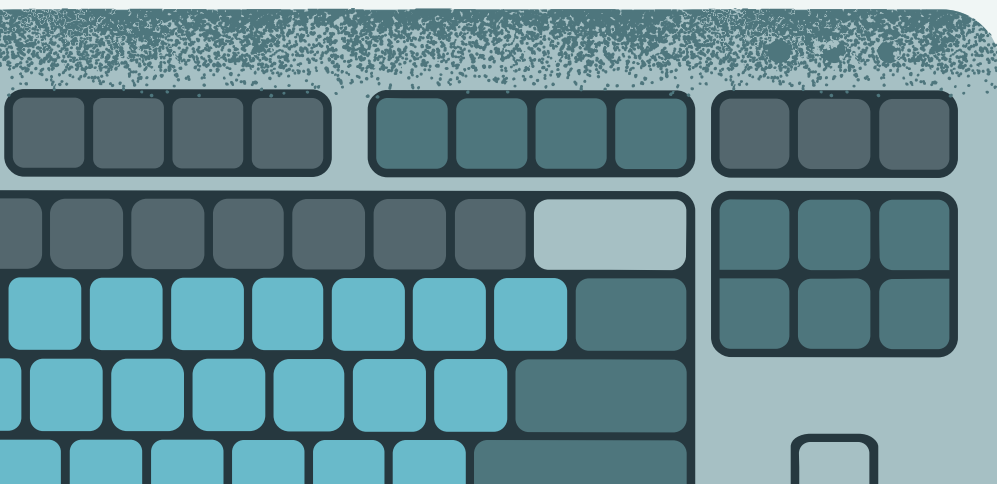
Trabajo Práctico N°4

SISTEMAS OPERATIVOS

DOCUMENTO DE PROCESO

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Docente: Tolaba Miguel Néstor



1. Introducción

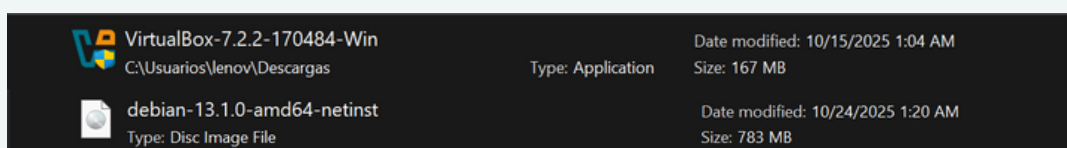
El presente documento describe de forma detallada el proceso de instalación, configuración y publicación de un servidor web bajo entorno LAMP (Linux, Apache, MariaDB y PHP) utilizando el sistema operativo Debian 13 ejecutado dentro de una máquina virtual creada con Oracle VirtualBox en Windows 11.

El objetivo del trabajo práctico fue construir un servidor funcional que permita alojar un sitio web accesible desde la red local y desde Internet, realizar mediciones de rendimiento y registrar evidencias del proceso mediante capturas y resultados de comandos.

2. Preparación del entorno

Desde el sistema operativo anfitrión (Windows 11) se descargaron los recursos necesarios para la instalación:

- ISO de Debian 13.1 oficial: <https://cdimage.debian.org/debian-cd/current/amd64/iso-cd/debian-13.1.0-amd64-netinst.iso>
- Oracle VirtualBox 7.0 (software de virtualización).

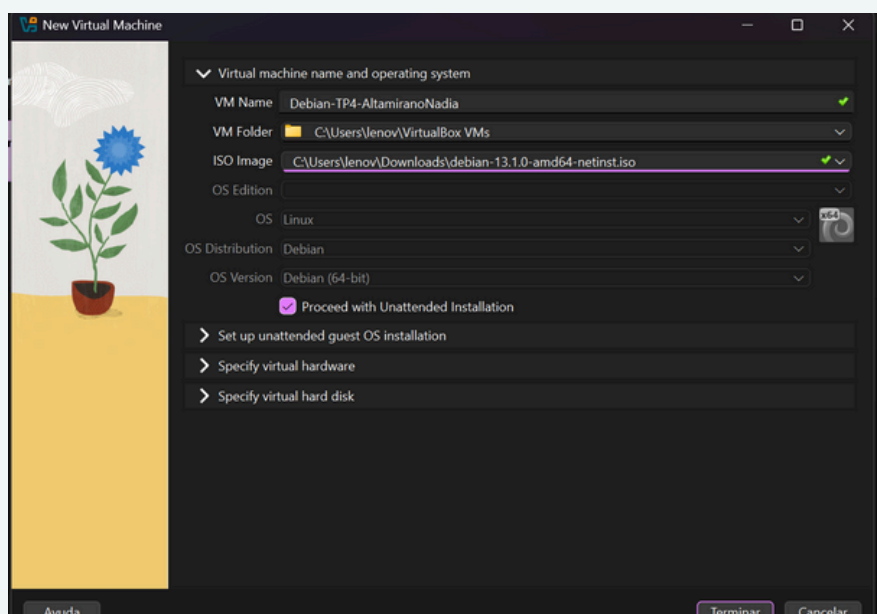


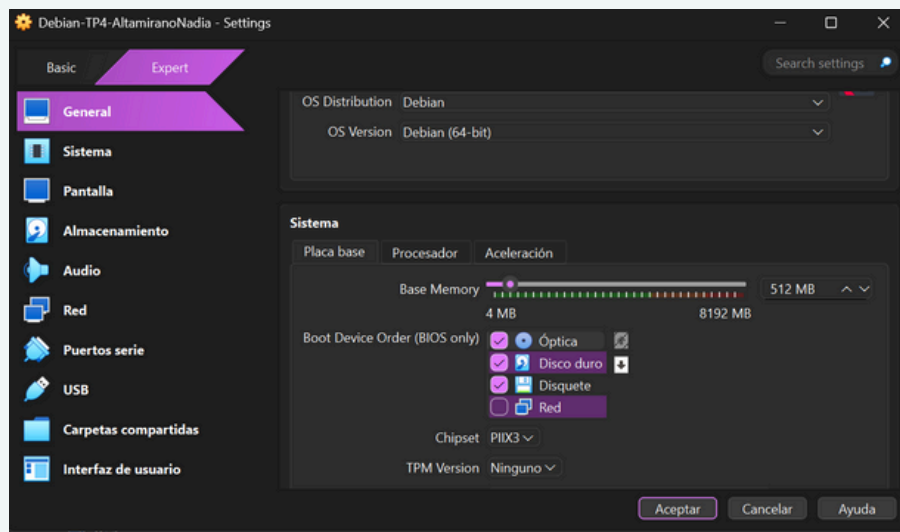
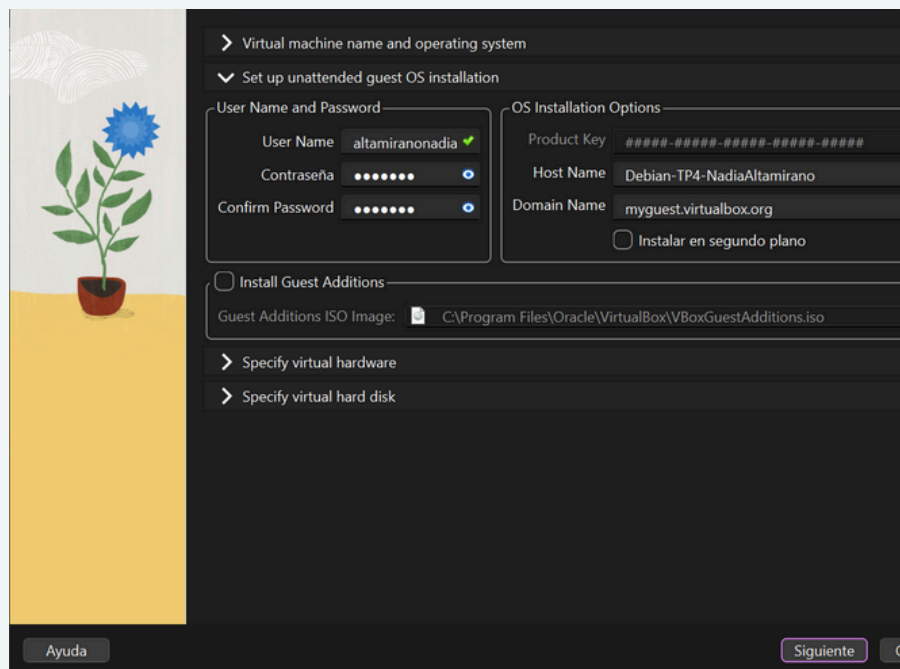
3. Creación de la máquina virtual

En VirtualBox se creó una nueva máquina con la siguiente configuración:

- Nombre: Debian-TP4-AltamiranoNadia
- Tipo: Linux (Debian 64-bit)
- Memoria RAM: 1024 MB
- Procesadores: 1 núcleo
- Disco duro virtual: 20 GB (VDI dinámico)
- Red: Adaptador en modo puente (permite visibilidad desde la red local).
- ISO montada: debian-13.1.0-amd64-netinst.iso.

Esta configuración cumple con los requisitos mínimos recomendados por la cátedra para el trabajo.
Capturas sugeridas:



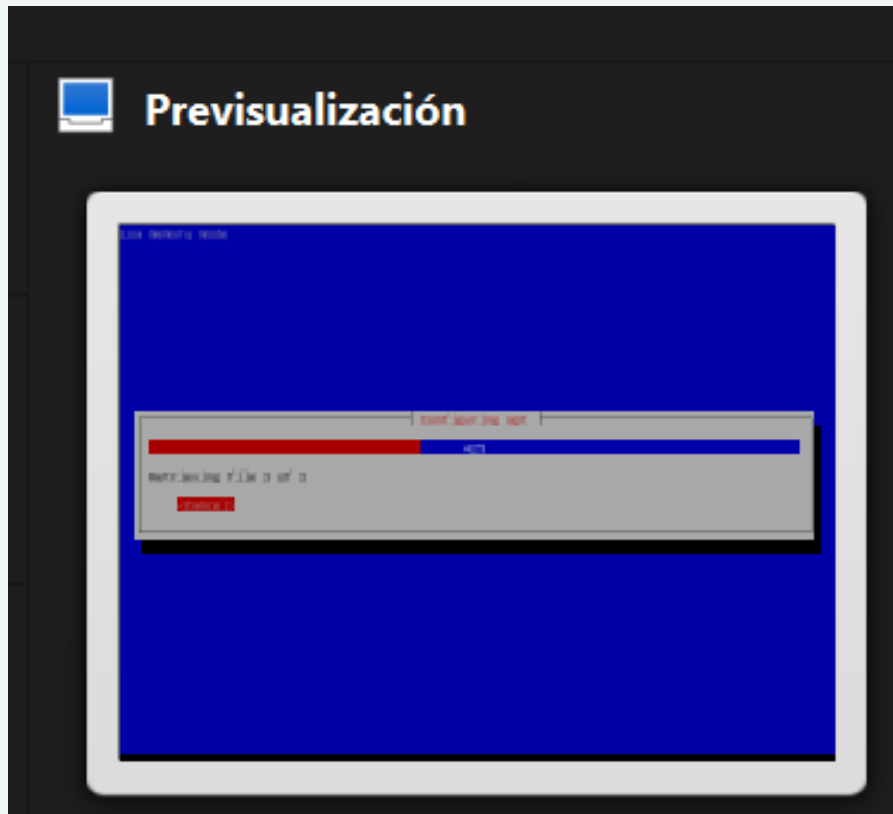


4. Instalación del sistema operativo Debian 13

Durante la instalación se siguieron los siguientes pasos:

1. Selección del idioma y distribución del teclado en español (Latinoamérica).
2. Asignación del nombre de equipo: debian-tp4.
3. Definición del dominio: local.domain.
4. Creación del usuario: nadia y configuración de contraseña.
5. Instalación de software adicional: Servidor SSH y utilidades estándar.
6. Particionado del disco completo mediante el método guiado.
7. Instalación del gestor de arranque GRUB en el disco principal.

Al finalizar, el sistema se reinició correctamente y permitió iniciar sesión con el usuario configurado.



```
Debian GNU/Linux 13 Debian-TP4-AltamiranoNadia tty1
Debian-TP4-AltamiranoNadia login: ~[SaltamiranoNadia
Password:
Linux Debian-TP4-AltamiranoNadia 6.12.48+deb13-and64 #1 SMP PREEMPT_DYNAMIC Debian 6.12.48-1 (2025-09-20) x86_64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/*copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
altamiranonadia@Debian-TP4-AltamiranoNadia:~$
altamiranonadia@Debian-TP4-AltamiranoNadia:~$ _
```

5. Verificación de conectividad

Una vez iniciado Debian 13, se verificó la conexión de red ejecutando los siguientes comandos:

```
ip a
ping -c 4 8.8.8.8
ping -c 4 google.com
```

El comando `ip a` permitió obtener la dirección IP local asignada por DHCP, necesaria para acceder al servidor desde el sistema anfitrión. Las pruebas de ping confirmaron la conexión a Internet.

```
Debian GNU/Linux 13 Debian-TP4-AltamiranoNadia tty1
Debian-TP4-AltamiranoNadia login: ~[SaltamiranoNadia
Password:
Linux Debian-TP4-AltamiranoNadia 6.12.48+deb13-and64 #1 SMP PREEMPT_DYNAMIC Debian 6.12.48-1 (2025-09-20) x86_64

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altamiranonadia@Debian-TP4-AltamiranoNadia:~$ ip a
1: lo: <loopback> UP<LOOPUP> mtu 65536 qdisc noop 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: enp0s3: <BRIDGE> MULTICAST<UP> LOWER<UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 98:96:27:1c:15:10 brd ff:ff:ff:ff:ff:ff
    altname enx9896271c1510
    inet 192.168.2.255 scope global dynamic noprefixroute enp0s3
        valid_lft 6554sec preferred_lft 12764sec
    inet6 fe80::9896:271c:1510:1510/64 scope global dynamic mngtaddr proto kernel_r
        valid_lft 66468sec preferred_lft 14668sec
    inet6 fe80::9896:271c:1510:1510/64 scope global dynamic mngtaddr noprefixroute
        valid_lft 66468sec preferred_lft 14668sec
    inet6 fe80::9896:271c:1510:1510/64 scope link
        valid_lft forever preferred_lft forever
altamiranonadia@Debian-TP4-AltamiranoNadia:~$
```

- UIPv4: 10.0.2.15
- Interfaz: enp0s3

Esa es la IP de red interna (NAT) que usa VirtualBox para conectar la VM con la PC

```

Debian-TP4-AltamiranoNadia login: "="[SaltamiranoNadia
Password:
Linux Debian-TP4-AltamiranoNadia 6.12.48+deb13-amd64 #1 SMP PREEMPT_DYNAMIC Debian 6.12.48-1 (2025-09-20) x86_64

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permitted by applicable law.
altamiranonadia@Debian-TP4-AltamiranoNadia:~$
altamiranonadia@Debian-TP4-AltamiranoNadia:~$ ip a
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: ens0s3: <BRIDGE,MTU_DYNAMIC,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 00:0c:27:1c:15:1d brd ff:ff:ff:ff:ff:ff
    altname enx000c271c151d
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute ens0s3
        valid_lft 83564sec preferred_lft 72764sec
    inet6 fd17:a25c:f037:2:a00:27ff:fe1c:151d/64 scope global dynamic mngtmapaddr proto kernel_r
        valid_lft 86068sec preferred_lft 14068sec
    inet6 fd17:a25c:f037:2:a00:27ff:fe1c:151d/64 scope global dynamic mngtmapaddr noprefixroute
        valid_lft 86068sec preferred_lft 14068sec
    inet6 fd00:a2f0:ca0c:1ff:2500:64 scope link
        valid_lft forever preferred_lft forever
altamiranonadia@Debian-TP4-AltamiranoNadia:~$ ping -c 4 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data:
64 bytes from 8.8.8.8: icmp_seq=1 ttl=255 time=49.9 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=255 time=33.0 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=255 time=33.9 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=255 time=30.4 ms

--- 8.8.8.8 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3004ms
rtt min/avg/max/mdev = 32.907/30.811/49.915/6.727 ms
altamiranonadia@Debian-TP4-AltamiranoNadia:~$ ping -c 4 google.com
PING google.com (172.217.28.238) 56(84) bytes of data:
64 bytes from lce2ea-aj-in-f14.1e100.net (172.217.28.238): icmp_seq=1 ttl=255 time=30.8 ms
64 bytes from lce2ea-aj-in-f14.1e100.net (172.217.28.238): icmp_seq=2 ttl=255 time=28.9 ms
64 bytes from lce2ea-aj-in-f14.1e100.net (172.217.28.238): icmp_seq=3 ttl=255 time=20.2 ms
64 bytes from lce2ea-aj-in-f14.1e100.net (172.217.28.238): icmp_seq=4 ttl=255 time=28.5 ms

--- google.com ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3004ms
rtt min/avg/max/mdev = 20.171/29.005/30.779/1.000 ms
altamiranonadia@Debian-TP4-AltamiranoNadia:~$

```

6. Actualización del sistema

Se actualizó el sistema operativo para asegurar la instalación de los paquetes más recientes:

`sudo apt update && sudo apt upgrade -y`

Este paso garantiza la estabilidad del entorno antes de la instalación del stack LAMP.

```

altamiranonadia@Debian-TP4-AltamiranoNadia:~$ sudo apt update && sudo apt upgrade -y
-bash: sudo: command not found
altamiranonadia@Debian-TP4-AltamiranoNadia:~$

```

- Instalación del paquete sudo:

Como el sistema no incluía sudo, se accedió como root y se ejecutó:

`apt update`

`apt install sudo -y`

`usermod -aG sudo altamiranonadia`

Luego se cerró sesión y se reingresó con el usuario normal.

```

Debian GNU/Linux 13 Debian-TP4-AltamiranoNadia tty1

Debian-TP4-AltamiranoNadia login: root
Password:
Linux Debian-TP4-AltamiranoNadia 6.12.48+deb13-amd64 #1 SMP PREEMPT_DYNAMIC Debian 6.12.48-1 (2025-09-20) x86_64

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permitted by applicable law.
root@Debian-TP4-AltamiranoNadia:~# usermod -aG sudo altamiranonadia
-bash: usermod: command not found
root@Debian-TP4-AltamiranoNadia:~# apt update
Hit:1 http://deb.debian.org/debian trixie InRelease
Hit:2 http://deb.debian.org/debian trixie-updates InRelease
Get:3 http://security.debian.org/debian-security trixie-security InRelease [43.4 kB]
Fetched 43.4 kB in 0s (141 kB/s)
All packages are up to date.
root@Debian-TP4-AltamiranoNadia:~# apt install sudo -y
Installing:
  sudo

Summary:
  Upgrading: 0, Installing: 1, Removing: 0, Not Upgrading: 0
  Download size: 2,087 kB
  Space needed: 6,865 kB / 18.1 GB available

Get:1 http://deb.debian.org/debian trixie/main amd64 sudo amd64 1.9.16p2-3 [2,087 kB]
Fetched 2,087 kB in 1s (3,082 kB/s)
Selecting previously unselected package sudo.
(Reading database ... 36097 files and directories currently installed.)
Preparing to unpack .../sudo-1.9.16p2-3_amd64.deb ...
Unpacking sudo (1.9.16p2-3) ...
Setting up sudo (1.9.16p2-3) ...
Processing triggers for man-db (2.13.1-1) ...
Processing triggers for libc-bin (2.41-12) ...
root@Debian-TP4-AltamiranoNadia:~# usermod -aG sudo altamiranonadia
root@Debian-TP4-AltamiranoNadia:~#

```

```
Debian GNU/Linux 13 Debian-TP4-AltamiranoNadia tty1
Debian-TP4-AltamiranoNadia login: altamiranonadia
Password:
Linux Debian-TP4-AltamiranoNadia 6.12.48+deb13-amd64 #1 SMP PREEMPT_DYNAMIC Debian 6.12.48-1 (2025-09-20) x86_64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
altamiranonadia@Debian-TP4-AltamiranoNadia:~$ sudo whoami
[sudo] password for altamiranonadia:
root
altamiranonadia@Debian-TP4-AltamiranoNadia:~$
```

7. Instalación del entorno LAMP

Se actualizó el sistema operativo y se instaló el entorno LAMP utilizando los comandos:

```
sudo apt update && sudo apt upgrade -y
```

```
sudo apt install apache2 mariadb-server php php-mysql -y
```

Esta instalación permitió disponer del servidor web Apache, la base de datos MariaDB y el intérprete PHP.

Una vez completada la instalación, se verificó el correcto funcionamiento de Apache accediendo a la página por defecto desde el navegador del sistema anfitrión.

```
update-alternatives: using /usr/bin/php8.4 to provide /usr/bin/php (php) in auto mode
update-alternatives: using /usr/bin/php8.4 to provide /usr/bin/php (php) in auto mode
update-alternatives: using /usr/bin/php8.4 to provide /usr/bin/php (php) in auto mode
Creating config file /etc/php8.4/cli/php.ini with new version
Setting up php-mysql (2:8.4+96) ...
Setting up libcurl-fast-perl (10:17-1) ...
Setting up apache2 (2.4.69-2) ...
Enabling module mpm_event.
Enabling module authz_core.
Enabling module authz_host.
Enabling module authn_core.
Enabling module auth_basic.
Enabling module access_compat.
Enabling module authn_file.
Enabling module auth_user.
Enabling module alias.
Enabling module dir.
Enabling module autoindex.
Enabling module env.
Enabling module mime.
Enabling module negotiation.
Enabling module setenvif.
Enabling module filter.
Enabling module deflate.
Enabling module status.
Enabling module ssl.
Enabling conf charset.
Enabling conf localized-error-pages.
Enabling conf other-vhosts-access-log.
Enabling conf security.
Enabling conf serve-cgi-bin.
Enabling site 000-default.
Created symlink /etc/systemd/system/multi-user.target.wants/apache2.service' - '/usr/lib/systemd/system/apache2.service'.
Created symlink /etc/systemd/system/multi-user.target.wants/apache-htcacheclean.service' - '/usr/lib/systemd/system/apache-htcacheclean.service'.
Setting up libapache2-mod-php8.4 (8.4.11-1) ...
Creating config file /etc/php8.4/apache2/php.ini with new version
module mpm_event disabled.
Enabling module mpm_prefork.
apache2_switch_mpm Switch to prefork
apache2_invoke: Enable module php8.4
Setting up php8.4 (8.4.11-1) ...
Setting up php (2:8.4+96) ...
Processing triggers for man-db (2.19.1-1) ...
Processing triggers for libc-bin (2.41-12) ...
Processing triggers for mariadb-server (1:11.8.3-0deb13u1) ...
Processing triggers for php8.4-cgi (8.4.11-1) ...
Processing triggers for libapache2-mod-php8.4 (8.4.11-1) ...
altmanranadis@debian-TP4-altmanranadis:~$
```

```

Processing triggers for libc-bin (2.41-12) ...
Processing triggers for mariadb-server (1:11.8.3+deb11u1) ...
Processing triggers for postgresql (15.4-11.1) ...
Processing triggers for libapache2-mod-php-8.4 (8.4.11-1) ...
altairanoadis@debian-TP4-AltairanOdis:~$ sudo systemctl status apache2
* apache2.service - The Apache HTTP Server
   Loaded: loaded (/usr/lib/systemd/system/apache2.service; enabled; preset: enabled)
   Active: active (running) since Fri 2025-10-24 06:35:14 UTC; 6min ago
   Invocation: 75daf655e644f67adb526ab4695ac73
   Docs: https://httpd.apache.org/docs/2.4/
   Main PID: 1886 (apache2)
   Tasks: 6 (limit: 493)
   Memory: 15.0M (peak: 16.2M)
   CPU: 188ms
   CGroup: /system.slice/apache2.service
           └─1886 /usr/sbin/apache2 -k start
             └─1891 /usr/sbin/apache2 -k start
               └─1892 /usr/sbin/apache2 -k start
                 └─1893 /usr/sbin/apache2 -k start
                   └─1894 /usr/sbin/apache2 -k start
                     └─1895 /usr/sbin/apache2 -k start

Oct 24 06:35:04 debian-TP4-AltairanOdis systemd[1]: Starting apache2.service - The Apache HTTP Server...
altairanoadis@debian-TP4-AltairanOdis:~$ sudo systemctl status mariadb
* mariadb.service - MariaDB 11.8.3 database server
   Loaded: loaded (/usr/lib/systemd/system/mariadb.service; enabled; preset: enabled)
   Active: active (running) since Fri 2025-10-24 06:35:33 UTC; 1min ago
   Invocation: 974aff66524491d97f80bb6ba5245c
   Docs: man:mariadb(8)
           https://mariadb.com/Kb/en/library/systemd/
   Main PID: 861 (mariadb)
   Status: "Taking your SQL requests now..."
   Tasks: 9 (limit: 3245)
   Memory: 93.4M (peak: 107.2M, swap: 3.4M, swap peak: 3.4M)
   CPU: 2.18ms
   CGroup: /system.slice/mariadb.service
           └─861 /usr/sbin/mariadb

Oct 24 06:35:32 debian-TP4-AltairanOdis mariadb[861]: 2025-10-24 6:35:32 0 [Note] InnoDB: Buffer pool(s) load completed at 251024 6:35:32
Oct 24 06:35:33 debian-TP4-AltairanOdis mariadb[861]: 2025-10-24 6:35:33 0 [Note] Server socket created on IP: '127.0.0.1', port: '3306'.
Oct 24 06:35:33 debian-TP4-AltairanOdis mariadb[861]: 2025-10-24 6:35:33 0 [Note] mariadb: Event Scheduler: Loaded 0 events
Oct 24 06:35:33 debian-TP4-AltairanOdis mariadb[861]: 2025-10-24 6:35:33 0 [Note] /usr/sbin/mariadb: ready for connections.
Oct 24 06:35:33 debian-TP4-AltairanOdis mariadb[861]: Version: '11.8.3-MariaDB-odbc191 from Debian' socket: '/run/mysqld/mysqld.sock' port: 3306 - fr
Oct 24 06:35:33 debian-TP4-AltairanOdis systemd[1]: Started mariadb.service - MariaDB 11.8.3 database server.
Oct 24 06:35:33 debian-TP4-AltairanOdis /etc/mysql/debian-start[897]: Upgrading MariaDB tables if necessary.
Oct 24 06:35:33 debian-TP4-AltairanOdis /etc/mysql/debian-start[899]: Checking for insecure root accounts.
Oct 24 06:35:33 debian-TP4-AltairanOdis /etc/mysql/debian-start[1023]: Triggering mysqld-recover for all MySQL tables and aria-recover for all Aria tables
Oct 24 06:35:33 debian-TP4-AltairanOdis mariadb[861]: 2025-10-24 6:40:25 0 [Note] MariaDB: Memory pressure event disregarded: innodb_buffer_pool_size=12
lines 1-24/24 (END)

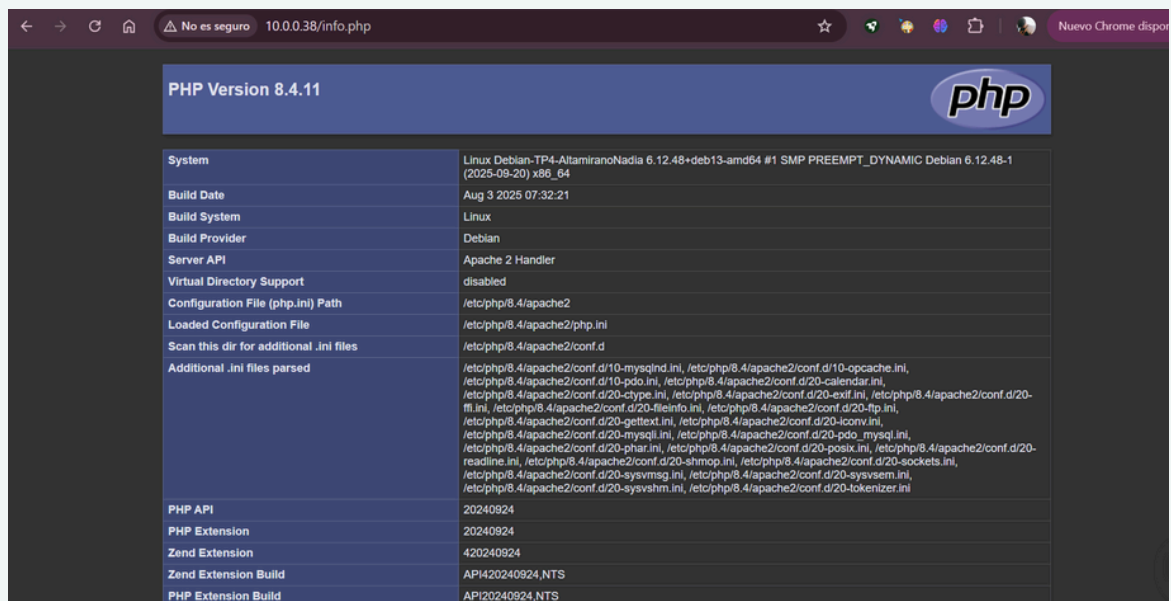
```


- e corrigieron errores de ruta, se creó el archivo info.php correctamente, se instalaron permisos y se instaló curl. Se verificó que PHP funcione.

```
curl http://localhost/info.php
```

```
|  |  |  |
| --- | --- | --- |
| <tokenize> | </td><td class="v">Andrei Zilevski, Johannes Schlueter | </td></tr> |

```

| <td class="v">XXX | </td><td class="v">Stig Bakken, Thies C. Arntzen, Sterling Hughes | </td></tr> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | <td class="v">Reader | </td><td class="v">Rob Richards | </td></tr> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | <td class="v">Writer | </td><td class="v">Rob Richards, Pierre-Alain Joye | </td></tr> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 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Brown, Thiago Henrique Feijda</td></tr> | | | | <tr class="h"><td colspan="2">Other Contributors</td><td class="v">Previously active authors, editors and other contributors are listed in the manual.</td></tr> | | | | </table> | | | | <table> | | | | <tr class="h"><th colspan="2">PHP Quality Assurance Team</th></tr> | | | | <tr class="h"><td colspan="2">Iliia Alshanskyi, Joerg Behrens, Antony Dovgal, Stefan Esser, Moriyooshi Koizumi, Magnus Maatta, Sebastian Nohn, Derick Rethans, Melynn Sopacua, Pierre-Alain Joye, Dmitry Stogov, Felipe Pena, David Soria Parra, Stanislav Malyshev, Julien Pauli, Stephen Zarkos, Anatol Beliski, Remi Collet, Ferenc Kovacs</td></tr> | | | | </table> | | | | <table> | | | | <tr class="h"><th colspan="2">Websites and Infrastructure Team</th></tr> | | | | <tr class="h"><td colspan="2">PHP Websites Team</td><td class="v">Rasmus Lerdorf, Hannes Magnusson, Philip Olson, Lukas Kahwe Smith, Pierre-Alain Joye, Kalle Sommer Nielsen, Peter Coudoun, Adam Harvey, Ferenc Kovacs, Levi Morrison</td></tr> | | | | <tr class="h"><td colspan="2">Event Maintainers</td><td class="v">Damien Seguy, Daniel P. Brown</td></tr> | | | | <tr class="h"><td colspan="2">Network Infrastructure</td><td class="v">Daniel P. Brown</td></tr> | | | | <tr class="h"><td colspan="2">Windows Infrastructure</td><td class="v">Alex Schoenmaker</td></tr> | | | | </table> | | | | <table> | | | | <tr class="h"><th colspan="2">On-hold Packaging</th></tr> | | | | <tr class="h"><td colspan="2">(and/or) Sung</td></tr> | | | | </table> | | | | <td colspan="2">PHP License</td> | | | | <table> | | | | <tr class="v"><td> | | | | </tr> | | | | This program is free software; you can redistribute it and/or modify it under the terms of the PHP License as published by the PHP Group and included in the distribution in the file: LICENSE | | | | </p> | | | | This program is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. | | | | </p> | | | | If you did not receive a copy of the PHP license, or have any questions about PHP licensing, please contact license@php.net. | | | | </p> | | | | </td></tr> | | | | </table> | | | | </div></body></html> | | | | </table> | | | | </div><script src="http://www.php.net/ftp-aliases.php"></script> | | | | | | | | |


8. Creación del sitio web

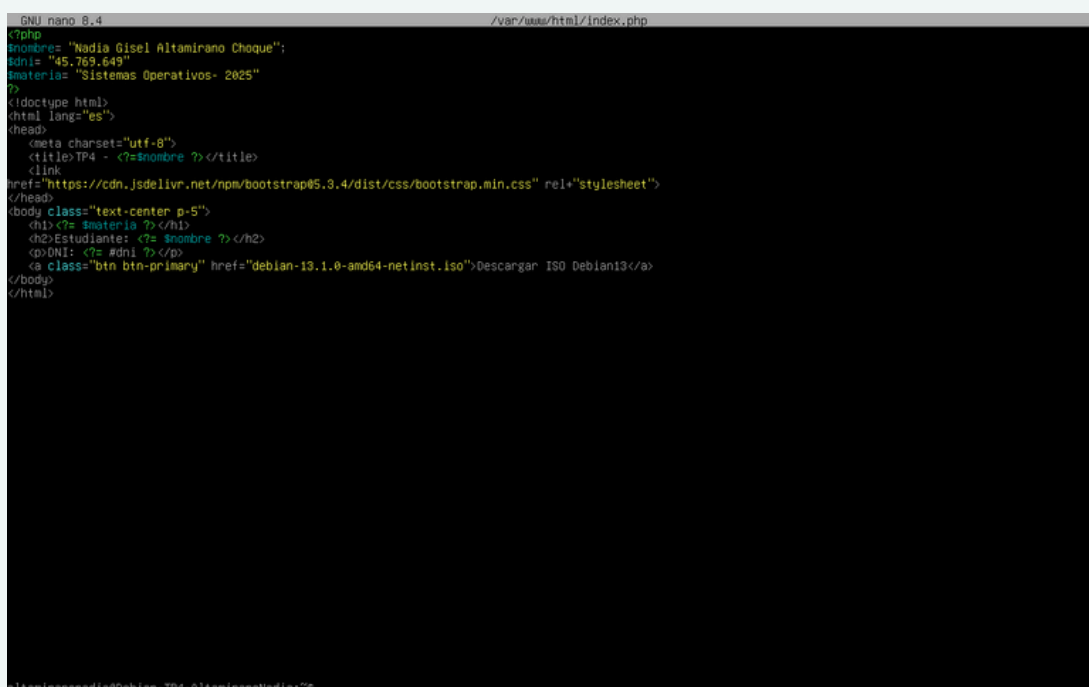
Se creó un archivo PHP de prueba en el directorio principal del servidor web:

```
sudo nano /var/www/html/index.php
```

Contenido del archivo:

```
<?php
$nombre = "Nadia Gisel Altamirano Choque";
$dni = "45.769.649";
$materia = "Sistemas Operativos – Año 2025";
$hora = date("Y-m-d H:i:s");
?>
<!doctype html>
<html lang="es">
<head>
  <meta charset="utf-8">
  <title>TP4 – <?= $nombre ?></title>
  <link href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/css/bootstrap.min.css"
rel="stylesheet">
</head>
<body class="text-center p-5">
  <h1><?= $materia ?></h1>
  <h2>Estudiante: <?= $nombre ?></h2>
  <p>DNI: <?= $dni ?></p>
  <p>Fecha y hora: <?= $hora ?></p>
  <a class="btn btn-primary" href="debian-13.1.0-amd64-netinst.iso">Descargar ISO Debian 13</a>
</body>
</html>
```

Se guardaron los cambios y se verificó el acceso al sitio ingresando la dirección IP del servidor en el navegador.



```
GNU nano 8.4 /var/www/html/index.php
<?php
$nombre= "Nadia Gisel Altamirano Choque";
$dni= "45.769.649"
$materia= "Sistemas Operativos- 2025"
?>
<!doctype html>
<html lang="es">
<head>
  <meta charset="utf-8">
  <title>TP4 - <?=$nombre ?></title>
  <link
href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.4/dist/css/bootstrap.min.css" rel="stylesheet">
</head>
<body class="text-center p-5">
  <h1><?= $materia ?></h1>
  <h2>Estudiante: <?= $nombre ?></h2>
  <p>DNI: <?= $dni ?></p>
  <p>Fecha y hora: <?= $hora ?></p>
  <a class="btn btn-primary" href="debian-13.1.0-amd64-netinst.iso">Descargar ISO Debian13</a>
</body>
</html>
```


9. Publicación de archivo de gran tamaño

Para realizar pruebas de transferencia, se descargó una imagen ISO de Debian 13 dentro del servidor web:

```
cd /var/www/html
```

```
sudo wget https://cdimage.debian.org/debian-cd/current/amd64/iso-cd/debian-13.1.0-amd64-netinst.iso
```

```
sudo chmod 644 debian-13.1.0-amd64-netinst.iso
```

El archivo quedó disponible para descarga directa desde el navegador mediante la URL del servidor

10. Pruebas de rendimiento

Se realizaron pruebas locales y mediciones de consumo de recursos utilizando las siguientes herramientas:

Monitoreo del sistema:

```
htop
```

```
free -h
```

```
df -h
```

Prueba de carga concurrente con Apache Benchmark:

```
ab -n 100 -c 10 http://localhost/
```

Prueba de descarga de archivo:

```
wget -O /tmp/test.iso http://localhost/debian-13.1.0-amd64-netinst.iso
```

Durante las pruebas se observaron los valores de CPU, memoria y tráfico de red.

El sistema respondió correctamente, sin alcanzar saturación de recursos.

11. Publicación del servidor en Internet

Para exponer el sitio públicamente se utilizó Cloudflare Tunnel, herramienta que crea un túnel seguro entre el servidor local y la nube de Cloudflare.

Instalación y ejecución:

```
sudo apt install cloudflared
```

```
cloudflared tunnel --url http://localhost:80
```

El sistema generó una URL temporal accesible desde cualquier dispositivo con conexión a Internet.

Luego, se realizó un registro del sitio en Archive.org (Save Page Now) como evidencia de su publicación.

12. Repositorio del proyecto

Se creó un repositorio en GitHub para almacenar los archivos del trabajo práctico:

```
git init
```

```
git add .
```

```
git commit -m "TP4 Sistemas Operativos - Debian 13"
```

```
git remote add origin https://github.com/AltamiranoNadia/SO-TP4-Debian13.git
```

```
git push -u origin main
```

En el repositorio se incluyeron los archivos principales:

index.php, install_lamp.sh, capturas, evidencias y el informe en PDF.

13. Análisis y conclusiones

El proceso de instalación y configuración del servidor LAMP en Debian 13 permitió comprender la estructura básica de un entorno de alojamiento web y la interacción entre sus componentes.

El sistema operativo demostró estabilidad y bajo consumo de recursos, y el servidor Apache respondió eficientemente durante las pruebas de carga.

Entre los principales aprendizajes se destacan:

- Comprensión del flujo completo de implementación de un servidor desde cero.
- Familiarización con herramientas de medición y monitoreo.
- Manejo de la publicación de servicios en entornos virtualizados.
- Importancia de la documentación ordenada para el seguimiento y replicabilidad del trabajo.

La exposición del servidor mediante túnel (Cloudflare) resultó práctica y efectiva, evitando configuraciones complejas en el router.

En general, se logró cumplir con todos los requerimientos del trabajo práctico.