

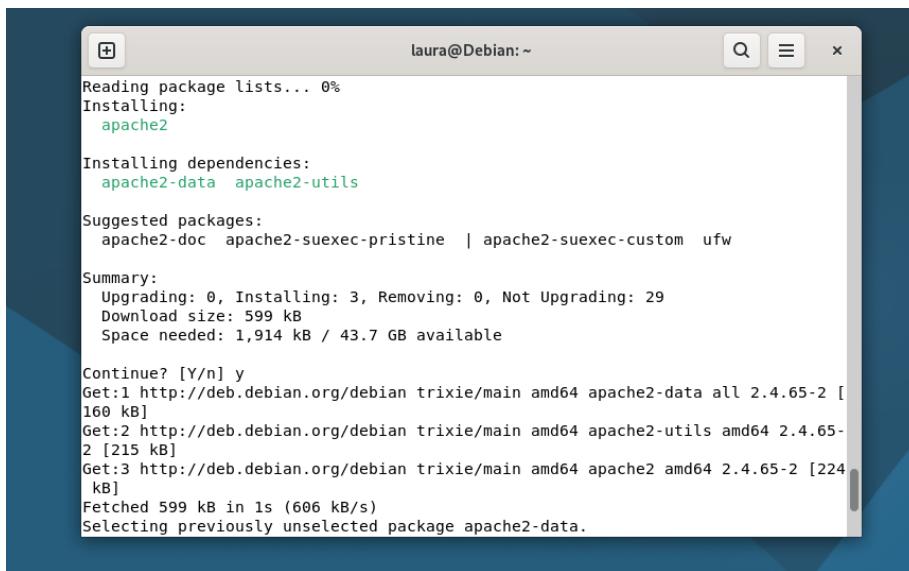
## **En Linux, instale Apache y PHP**

## Actualización de Librerías

```
Oct 3 1:19 PM

laura@Debian:~$ sudo apt update
[...]
Hit:1 http://security.debian.org/debian-security trixie-security InRelease
Hit:2 http://deb.debian.org/debian trixie InRelease
Hit:3 http://deb.debian.org/debian trixie-updates InRelease
Hit:4 https://packages.microsoft.com/repos/code stable InRelease
29 packages can be upgraded. Run 'apt list --upgradable' to see them.
laura@Debian:~$ sudo apt install apache2
```

## Instalación de Apache



```
laura@Debian:~$ sudo apt-get install apache2
Reading package lists... 0%
Installing:
  apache2

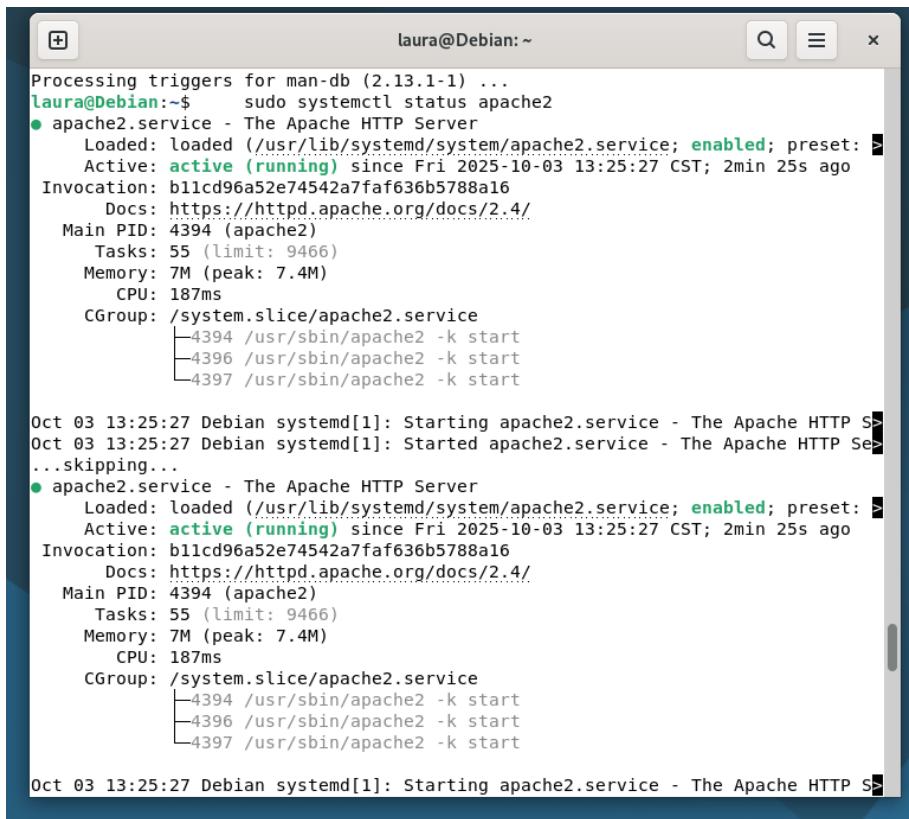
Installing dependencies:
  apache2-data  apache2-utils

Suggested packages:
  apache2-doc  apache2-suexec-pristine | apache2-suexec-custom  ufw

Summary:
  Upgrading: 0, Installing: 3, Removing: 0, Not Upgrading: 29
  Download size: 599 kB
  Space needed: 1,914 kB / 43.7 GB available

Continue? [Y/n] y
Get:1 http://deb.debian.org/debian trixie/main amd64 apache2-data all 2.4.65-2 [160 kB]
Get:2 http://deb.debian.org/debian trixie/main amd64 apache2-utils amd64 2.4.65-2 [215 kB]
Get:3 http://deb.debian.org/debian trixie/main amd64 apache2 amd64 2.4.65-2 [224 kB]
Fetched 599 kB in 1s (606 kB/s)
Selecting previously unselected package apache2-data.
```

## Revisión de que Apache esté activo



```
laura@Debian:~$ sudo systemctl status apache2
● apache2.service - The Apache HTTP Server
   Loaded: loaded (/usr/lib/systemd/system/apache2.service; enabled; preset: ▾)
   Active: active (running) since Fri 2025-10-03 13:25:27 CST; 2min 25s ago
     Invocation: b11cd96a52e74542a7faf636b5788a16
       Docs: https://httpd.apache.org/docs/2.4/
      Main PID: 4394 (apache2)
        Tasks: 55 (limit: 9466)
       Memory: 7M (peak: 7.4M)
         CPU: 187ms
      CGroup: /system.slice/apache2.service
              └─4394 /usr/sbin/apache2 -k start
                  ├─4396 /usr/sbin/apache2 -k start
                  ├─4397 /usr/sbin/apache2 -k start

Oct 03 13:25:27 Debian systemd[1]: Starting apache2.service - The Apache HTTP S>
Oct 03 13:25:27 Debian systemd[1]: Started apache2.service - The Apache HTTP Se>
...skipping...
● apache2.service - The Apache HTTP Server
   Loaded: loaded (/usr/lib/systemd/system/apache2.service; enabled; preset: ▾)
   Active: active (running) since Fri 2025-10-03 13:25:27 CST; 2min 25s ago
     Invocation: b11cd96a52e74542a7faf636b5788a16
       Docs: https://httpd.apache.org/docs/2.4/
      Main PID: 4394 (apache2)
        Tasks: 55 (limit: 9466)
       Memory: 7M (peak: 7.4M)
         CPU: 187ms
      CGroup: /system.slice/apache2.service
              └─4394 /usr/sbin/apache2 -k start
                  ├─4396 /usr/sbin/apache2 -k start
                  ├─4397 /usr/sbin/apache2 -k start

Oct 03 13:25:27 Debian systemd[1]: Starting apache2.service - The Apache HTTP S>
```

## Instalación de dependencias para PHP

The screenshot shows a terminal window titled "laura@Debian:~". The terminal displays the output of a command to update package lists and install the "apt-transport-https" package. The output shows that "lsb-release" and "ca-certificates" are already at their latest versions. The "apt-transport-https" package is being installed. The summary indicates no upgrades, one install, and no removes. The download size is 38.6 kB, and 49.2 kB of space is needed. The package is fetched from the "http://deb.debian.org/debian" repository. The command concludes with "laura@Debian:~\$".

```
laura@Debian:~$ sudo apt -y install lsb-release apt-transport-https ca-certificates
lsb-release is already the newest version (12.1-1).
lsb-release set to manually installed.
ca-certificates is already the newest version (20250419).
Installing:
  apt-transport-https

Summary:
  Upgrading: 0, Installing: 1, Removing: 0, Not Upgrading: 29
  Download size: 38.6 kB
  Space needed: 49.2 kB / 43.7 GB available

Get:1 http://deb.debian.org/debian trixie/main amd64 apt-transport-https all 3.0
.3 [38.6 kB]
Fetched 38.6 kB in 0s (151 kB/s)
Selecting previously unselected package apt-transport-https.
(Reading database ... 160698 files and directories currently installed.)
Preparing to unpack .../apt-transport-https_3.0.3_all.deb ...
Unpacking apt-transport-https (3.0.3) ...
Setting up apt-transport-https (3.0.3) ...
laura@Debian:~$
```

## Instalación de PHP

```
laura@Debian:~$ sudo apt -y install lsb-release apt-transport-https ca-certificates
lsb-release is already the newest version (12.1-1).
lsb-release set to manually installed.
ca-certificates is already the newest version (20250419).
Installing:
  apt-transport-https

Summary:
  Upgrading: 0, Installing: 1, Removing: 0, Not Upgrading: 29
  Download size: 38.6 kB
  Space needed: 49.2 kB / 43.7 GB available

Get:1 http://deb.debian.org/debian trixie/main amd64 apt-transport-https all 3.0.3 [38.6 kB]
Fetched 38.6 kB in 0s (151 kB/s)
Selecting previously unselected package apt-transport-https.
(Reading database ... 160698 files and directories currently installed.)
Preparing to unpack .../apt-transport-https_3.0.3_all.deb ...
Unpacking apt-transport-https (3.0.3) ...
Setting up apt-transport-https (3.0.3) ...
laura@Debian:~$ sudo apt install -y php
Installing:
  libapache2-mod-php8.4  php8.4      php8.4-common  php8.4-readline
  php-common            php8.4-cli   php8.4-opcache

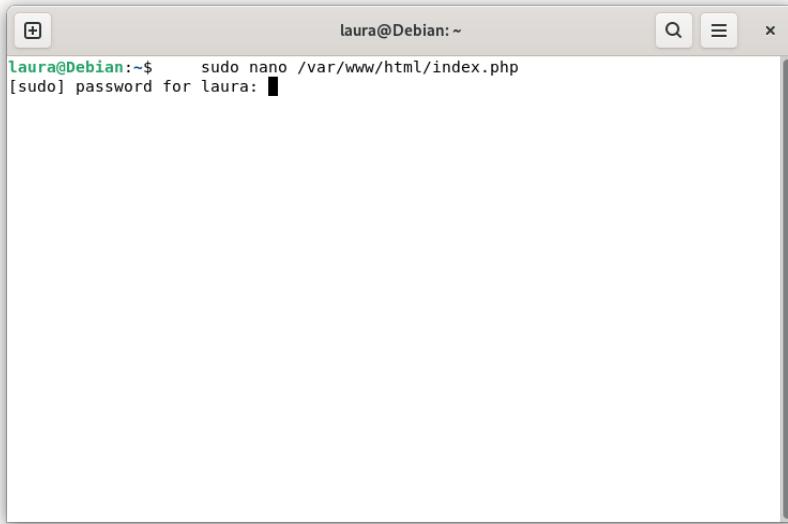
Suggested packages:
  php-pear

Summary:
  Upgrading: 0, Installing: 8, Removing: 0, Not Upgrading: 29
  Download size: 4,918 kB
  Space needed: 23.8 MB / 43.7 GB available

Get:1 http://deb.debian.org/debian trixie/main amd64 php-common all 2:96 [13.3 kB]
Get:2 http://deb.debian.org/debian trixie/main amd64 php8.4-common amd64 8.4.11-1 [761 kB]
Get:3 http://deb.debian.org/debian trixie/main amd64 php8.4-opcache amd64 8.4.11-1 [454 kB]
Get:4 http://deb.debian.org/debian trixie/main amd64 php8.4-readline amd64 8.4.11-1 [12.7 kB]
Get:5 http://deb.debian.org/debian trixie/main amd64 php8.4-cli amd64 8.4.11-1 [1,849 kB]
Get:6 http://deb.debian.org/debian trixie/main amd64 libapache2-mod-php8.4 amd64 8.4.11-1 [1,787 kB]
```

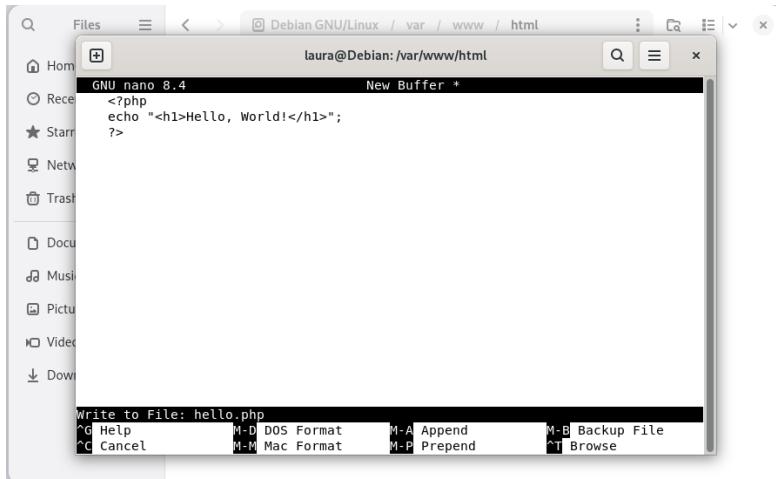
## Prepare un Hello World en PHP y pruebe que funcione en su máquina virtual

Creación del archivo



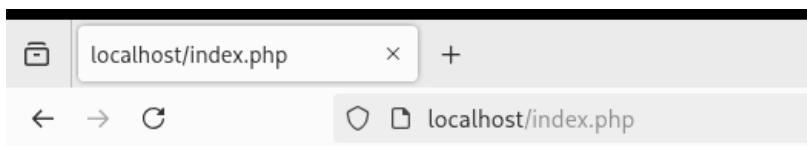
```
laura@Debian:~$ sudo nano /var/www/html/index.php
[sudo] password for laura: [REDACTED]
```

Contenido del archivo



```
GNU nano 8.4          New Buffer *
<?php
echo "<h1>Hello, World!</h1>";
?>
```

Resultado al entrar en Firefox



**Hello, World!**

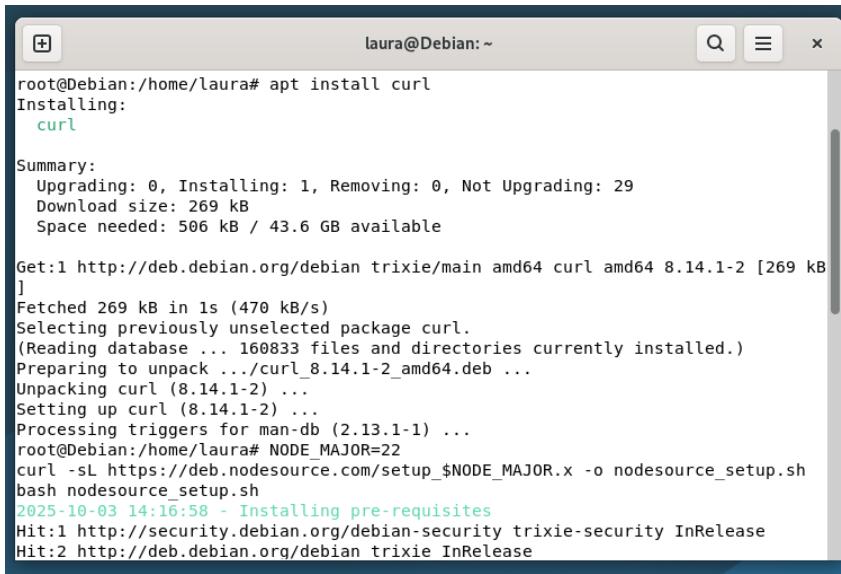
**Reinicie su máquina virtual y una vez que reinicie, sin modificar nada en su sesión, verifique si su Hello World sigue funcionando.**

Después de reiniciar aún funciona



**Instale Node.js y haga un Hello World con Node y Express.**

Antes de instalar node.js se instalan estas dependencias.

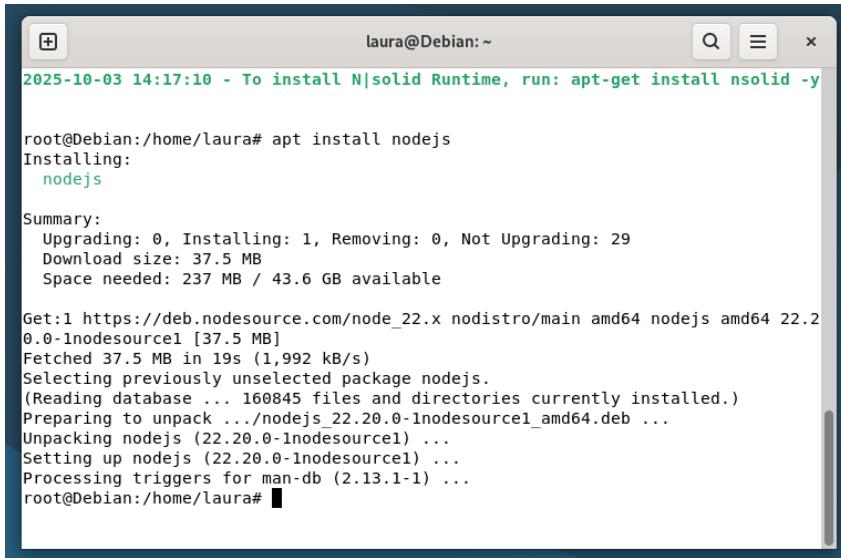


```
laura@Debian:~
root@Debian:/home/laura# apt install curl
Installing:
  curl

Summary:
  Upgrading: 0, Installing: 1, Removing: 0, Not Upgrading: 29
  Download size: 269 kB
  Space needed: 506 kB / 43.6 GB available

Get:1 http://deb.debian.org/debian trixie/main amd64 curl amd64 8.14.1-2 [269 kB]
] Fetched 269 kB in 1s (470 kB/s)
Selecting previously unselected package curl.
(Reading database ... 160833 files and directories currently installed.)
Preparing to unpack .../curl_8.14.1-2_amd64.deb ...
Unpacking curl (8.14.1-2) ...
Setting up curl (8.14.1-2) ...
Processing triggers for man-db (2.13.1-1) ...
root@Debian:/home/laura# NODE_MAJOR=22
curl -sL https://deb.nodesource.com/setup_$NODE_MAJOR.x -o nodesource_setup.sh
bash nodesource_setup.sh
2025-10-03 14:16:58 - Installing pre-requisites
Hit:1 http://security.debian.org/debian-security trixie-security InRelease
Hit:2 http://deb.debian.org/debian trixie InRelease
```

Luego se instala node.js



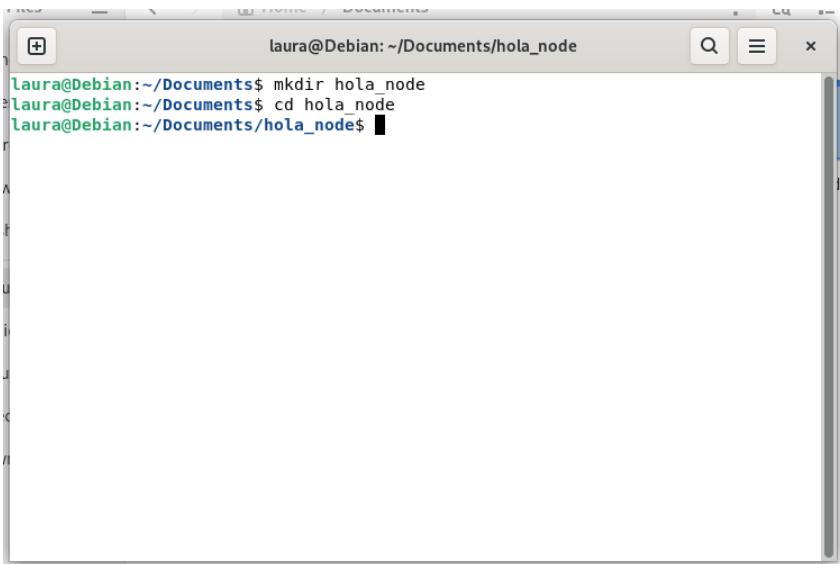
```
laura@Debian:~
2025-10-03 14:17:10 - To install N|solid Runtime, run: apt-get install nsolid -y

root@Debian:/home/laura# apt install nodejs
Installing:
  nodejs

Summary:
  Upgrading: 0, Installing: 1, Removing: 0, Not Upgrading: 29
  Download size: 37.5 MB
  Space needed: 237 MB / 43.6 GB available

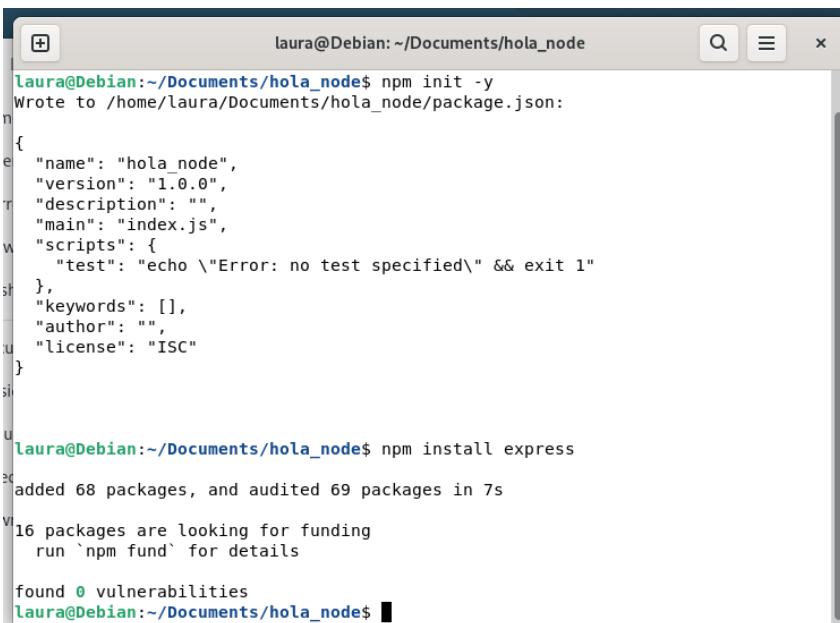
Get:1 https://deb.nodesource.com/node_22.x nodistro/main amd64 nodejs amd64 22.20.0-1nodesource1 [37.5 MB]
] Fetched 37.5 MB in 19s (1,992 kB/s)
Selecting previously unselected package nodejs.
(Reading database ... 160845 files and directories currently installed.)
Preparing to unpack .../nodejs_22.20.0-1nodesource1_amd64.deb ...
Unpacking nodejs (22.20.0-1nodesource1) ...
Setting up nodejs (22.20.0-1nodesource1) ...
Processing triggers for man-db (2.13.1-1) ...
root@Debian:/home/laura#
```

Creamos un directorio para el proyecto



```
laura@Debian:~/Documents/hola_node$ mkdir hola_node
laura@Debian:~/Documents$ cd hola_node
laura@Debian:~/Documents/hola_node$
```

E iniciamos un nuevo proyecto e instalamos express



```
laura@Debian:~/Documents/hola_node$ npm init -y
Wrote to /home/laura/Documents/hola_node/package.json:

{
  "name": "hola_node",
  "version": "1.0.0",
  "description": "",
  "main": "index.js",
  "scripts": {
    "test": "echo \\" Error: no test specified \\ && exit 1"
  },
  "keywords": [],
  "author": "",
  "license": "ISC"
}

laura@Debian:~/Documents/hola_node$ npm install express
added 68 packages, and audited 69 packages in 7s
16 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities
laura@Debian:~/Documents/hola_node$
```

Creamos el archivo hola.js

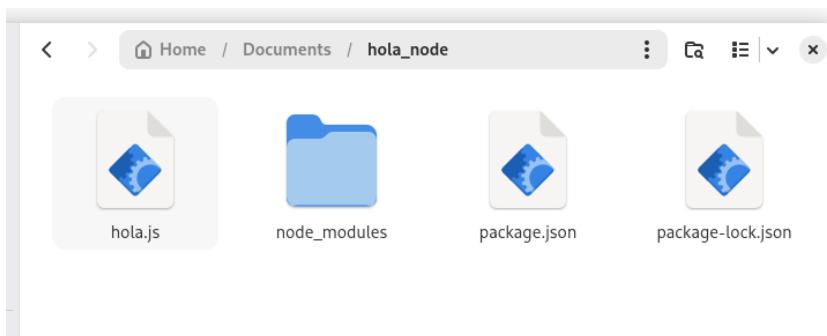
The screenshot shows the Geany code editor interface. The title bar reads "hola.js - /home/laura/Documents/hola\_node - Geany". The menu bar includes File, Edit, Search, View, Document, Project, Build, Tools, and Help. The toolbar has icons for file operations like Open, Save, Print, and Find. The main window displays the code for "hola.js":

```
const express = require('express');
const app = express();
const port = 3000;

app.get('/', (req, res) => {
  res.send('¡Hola Mundo!');
});

app.listen(port, () => {
  console.log(`La aplicación está escuchando en http://localhost:${port}`);
});
```

The status bar at the bottom shows the log: "14:27:35: This is Geany 2.0.", followed by several file opening and saving entries. The status bar also indicates the current file is "hola.js" with "line: 3/12 col: 22 sel: 0 INS TAB EOL: LF encoding: UTF-8 filetype: Javascript scope: unknown".



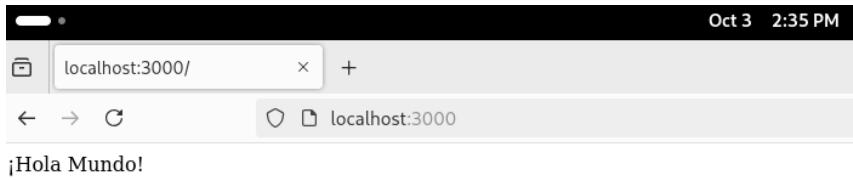
Ejecutamos el servidor dentro de la carpeta

The screenshot shows a terminal window titled "hola.js - /home/laura/Documents/hola\_node - Geany". The title bar shows the user "laura@Debian: ~/Documents/hola\_node\$". The terminal output is:

```
laura@Debian:~/Documents/hola_node$ node hola.js
La aplicación está escuchando en http://localhost:3000
```

The status bar at the bottom shows the log entry: "14:28:05: File /home/laura/Documents/hola\_node/hola.js saved."

Se ingresa al navegador y se visita el localhost con el puerto elegido en el programa



**Reinicie su máquina virtual y una vez que reinicie, sin modificar nada en su sesión, verifique si su Hello World sigue funcionando.**

Luego del reinicio:



## Unable to connect

Firefox can't establish a connection to the server at localhost:3000.

- The site could be temporarily unavailable or too busy. Try again in a few moments.
- If you are unable to load any pages, check your computer's network connection.
- If your computer or network is protected by a firewall or proxy, make sure that Firefox is permitted to access the web.

[Try Again](#)

**Investigue y compare Apache con Express.**

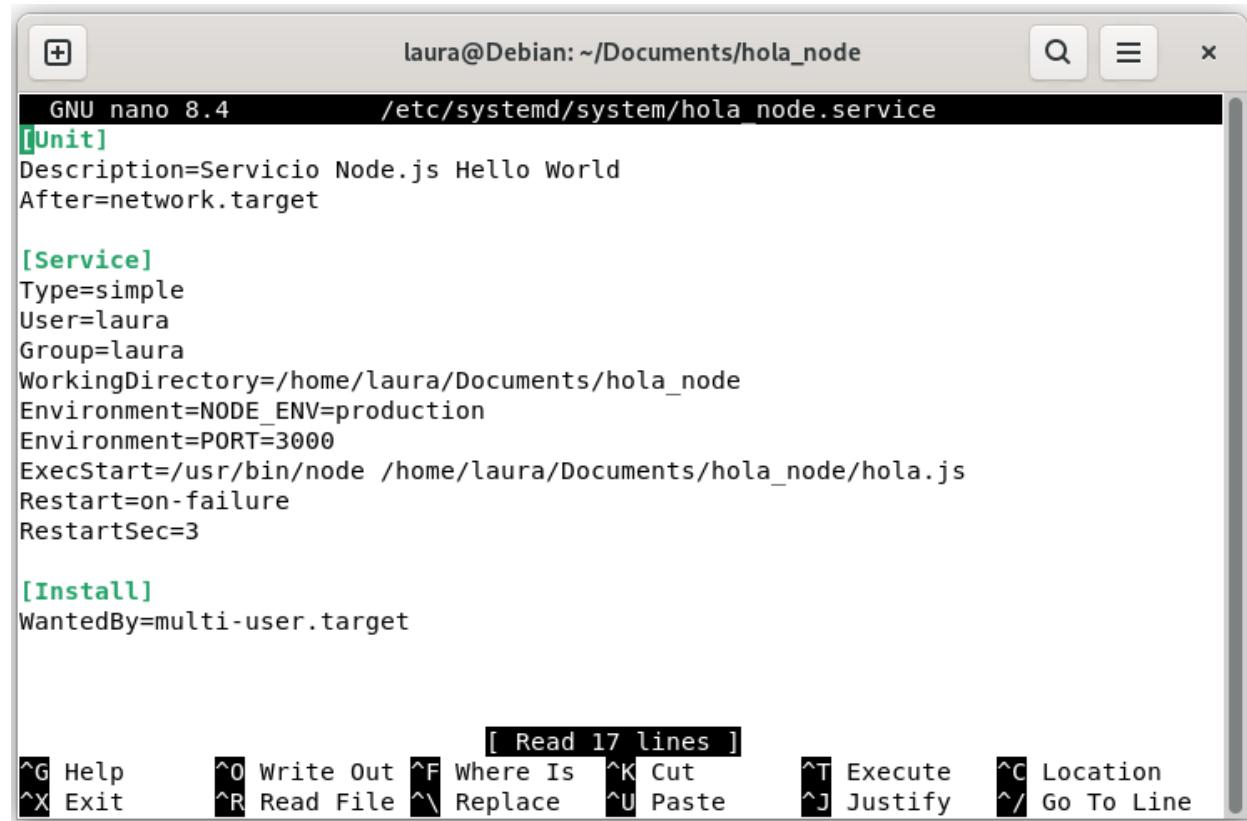
Apache es un servidor web gratuito y libre, el cual distribuye contenido web a través del internet. Siendo software libre, es bastante amigable para desarrolladores que quieran utilizarlo, y por ende se ha vuelto sumamente usado a nivel global. Parte de su éxito también se da por su confiabilidad, flexibilidad y soporte extenso (Sumo Logic, 2023).

Express, por otro lado, es un marco de aplicación web para Node.js el cual facilita el manejo de procedimientos HTTP. Está diseñado para construir aplicaciones web y APIs. Proporciona una estructura para el manejo de rutas, peticiones HTTP y middleware, lo que abstrae muchas de las funcionalidades estándar que tienen que ver con aplicaciones web (Express.js, s.f.).

Apache es un servidor web que se utiliza para páginas estáticas y dinámicas, mientras que Express es un framework de aplicaciones web que se enfoca en la lógica del backend, la gestión de peticiones HTTP y la creación de APIs. Apache se usa comúnmente para servir archivos y actuar como proxy, mientras que Express se utiliza para el código de la aplicación.

**Diseñe un servicio de Linux cuyo propósito sea habilitar automáticamente en tiempo de boot su Hello World de NodeJS, de forma que funcione similar a la versión de PHP. 25 puntos.**

Se creó el archivo para el servicio



The screenshot shows a terminal window titled "laura@Debian: ~/Documents/hola\_node". The command entered is "/etc/systemd/system/hola\_node.service". The file contains the following configuration:

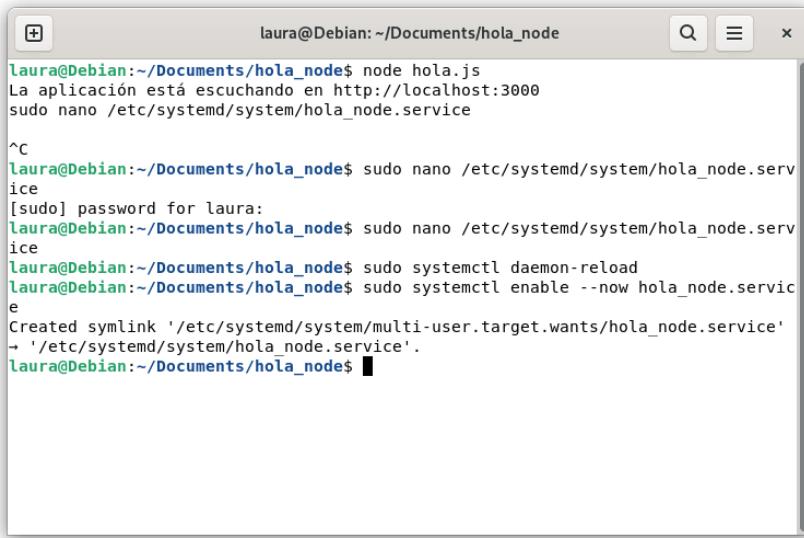
```
GNU nano 8.4          /etc/systemd/system/hola_node.service
[Unit]
Description=Servicio Node.js Hello World
After=network.target

[Service]
Type=simple
User=laura
Group=laura
WorkingDirectory=/home/laura/Documents/hola_node
Environment=NODE_ENV=production
Environment=PORT=3000
ExecStart=/usr/bin/node /home/laura/Documents/hola_node/hola.js
Restart=on-failure
RestartSec=3

[Install]
WantedBy=multi-user.target
```

At the bottom of the terminal window, there is a menu bar with the following options: [ Read 17 lines ], Help (^G), Write Out (^O), Where Is (^F), Cut (^K), Execute (^T), Location (^C), Exit (^X), Read File (^R), Replace (^V), Paste (^U), Justify (^J), and Go To Line (^L).

Activación del servicio



```
laura@Debian:~/Documents/hola_node$ node hola.js
La aplicación está escuchando en http://localhost:3000
sudo nano /etc/systemd/system/hola_node.service

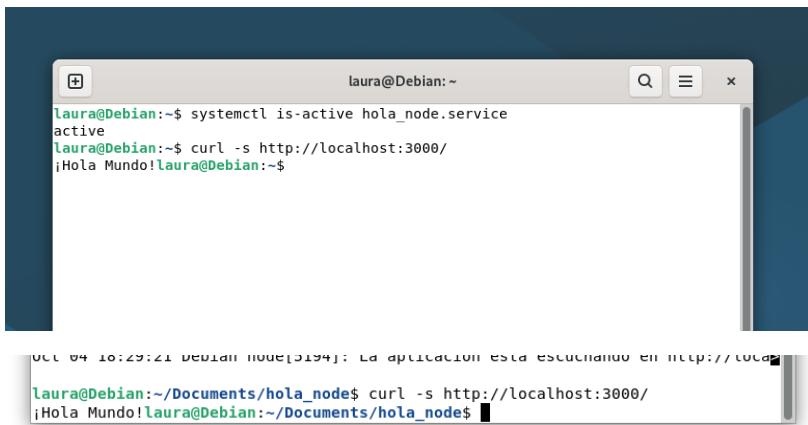
^C
laura@Debian:~/Documents/hola_node$ sudo nano /etc/systemd/system/hola_node.servi
ce
[sudo] password for laura:
laura@Debian:~/Documents/hola_node$ sudo nano /etc/systemd/system/hola_node.servi
ce
laura@Debian:~/Documents/hola_node$ sudo systemctl daemon-reload
laura@Debian:~/Documents/hola_node$ sudo systemctl enable --now hola_node.servic
e
Created symlink '/etc/systemd/system/multi-user.target.wants/hola_node.service' → '/etc/systemd/system/hola_node.service'.
laura@Debian:~/Documents/hola_node$
```

Prueba de que está activo



```
→ '/etc/systemd/system/hola_node.service'.
laura@Debian:~/Documents/hola_node$ systemctl status hola_node.service
● hola_node.service - Servicio Node.js Hello World
    Loaded: loaded (/etc/systemd/system/hola_node.service; enabled; preset: en>
      Active: active (running) since Sat 2025-10-04 18:29:21 CST; 36s ago
        Invocation: e54c88b8e4f44d55828606cc66fa67d5
          Main PID: 5194 (node)
            Tasks: 7 (limit: 9466)
          Memory: 12.5M (peak: 17M)
            CPU: 404ms
          CGroup: /system.slice/hola_node.service
                  └─5194 /usr/bin/node /home/laura/Documents/hola_node/hola.js

Oct 04 18:29:21 Debian node[5194]: La aplicación está escuchando en http://locat>
laura@Debian:~/Documents/hola_node$
```

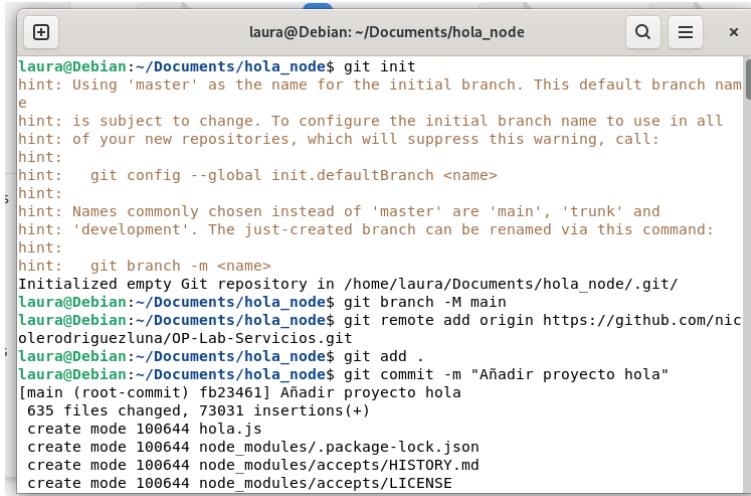


```
laura@Debian:~$ systemctl is-active hola_node.service
active
laura@Debian:~$ curl -s http://localhost:3000/
¡Hola Mundo!laura@Debian:~$
```

```
Oct 04 18:29:21 Debian node[5194]: La aplicación está escuchando en http://locat>
laura@Debian:~/Documents/hola_node$ curl -s http://localhost:3000/
¡Hola Mundo!laura@Debian:~/Documents/hola_node$
```

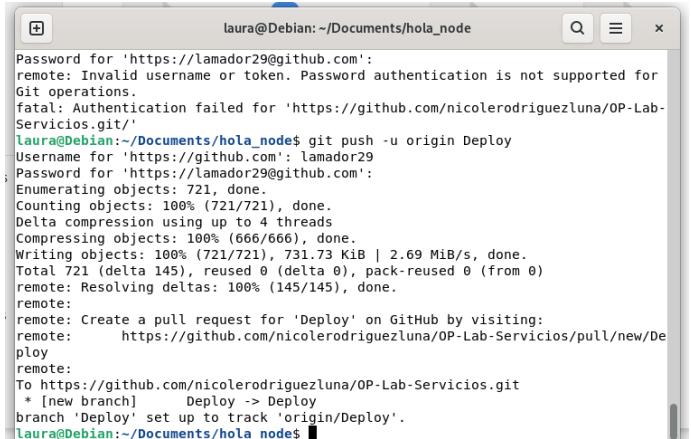
**Suba el código fuente de su proyecto en Node a un servicio de versionamiento basado en GIT, como GitHub o GitLab.**

Enlace al GitHub: <https://github.com/nicolerodriguezluna/OP-Lab-Servicios.git>

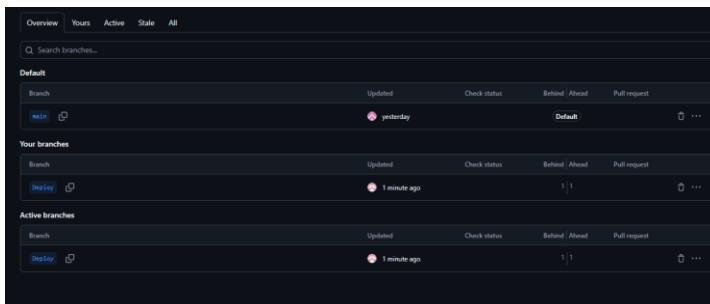


```
laura@Debian:~/Documents/hola_node$ git init
hint: Using 'master' as the name for the initial branch. This default branch name
      is subject to change. To configure the initial branch name to use in all
      of your new repositories, which will suppress this warning, call:
      hint:   git config --global init.defaultBranch <name>
      hint:
      hint: Names commonly chosen instead of 'master' are 'main', 'trunk' and
      hint: 'development'. The just-created branch can be renamed via this command:
      hint:
      hint:   git branch -m <name>
Initialized empty Git repository in /home/laura/Documents/hola_node/.git/
laura@Debian:~/Documents/hola_node$ git branch -M main
laura@Debian:~/Documents/hola_node$ git remote add origin https://github.com/nicolerodriguezluna/OP-Lab-Servicios.git
laura@Debian:~/Documents/hola_node$ git add .
laura@Debian:~/Documents/hola_node$ git commit -m "Añadir proyecto hola"
[main (root-commit) fb23461] Añadir proyecto hola
 635 files changed, 73031 insertions(+)
 create mode 100644 hola.js
 create mode 100644 node_modules/.package-lock.json
 create mode 100644 node_modules/accepts/HISTORY.md
 create mode 100644 node_modules/accepts/LICENSE
```

**Haga dentro de su repositorio un branch llamado Deploy.**



```
laura@Debian:~/Documents/hola_node$ Password for 'https://lamador29@github.com':
remote: Invalid username or token. Password authentication is not supported for
Git operations.
fatal: Authentication failed for 'https://github.com/nicolerodriguezluna/OP-Lab-Servicios.git'
laura@Debian:~/Documents/hola_node$ git push -u origin Deploy
Username for 'https://github.com': lamador29
Password for 'https://lamador29@github.com':
Enumerating objects: 721, done.
Counting objects: 100% (721/721), done.
Delta compression using up to 4 threads
Compressing objects: 100% (666/666), done.
Writing objects: 100% (721/721), 731.73 KiB | 2.69 MiB/s, done.
Total 721 (delta 145), reused 0 (delta 0), pack-reused 0 (from 0)
remote: Resolving deltas: 100% (145/145), done.
remote:
remote: Create a pull request for 'Deploy' on GitHub by visiting:
remote:   https://github.com/nicolerodriguezluna/OP-Lab-Servicios/pull/new/Deploy
remote:
remote: To https://github.com/nicolerodriguezluna/OP-Lab-Servicios.git
 * [new branch]      Deploy -> Deploy
branch 'Deploy' set up to track 'origin/Deploy'.
laura@Debian:~/Documents/hola_node$
```



The screenshot shows the GitHub 'Your branches' page. It has three tabs at the top: 'Overview', 'Yours', 'Active', and 'All'. The 'Yours' tab is selected. Below the tabs is a search bar with placeholder text 'Search branches...'. There are three sections: 'Default', 'Your branches', and 'Active branches'. In the 'Default' section, there is one branch named 'main'. In the 'Your branches' section, there are two branches: 'main' and 'Deploy'. In the 'Active branches' section, there is one branch named 'Deploy'. Each branch entry includes columns for 'Branch', 'Updated', 'Check status', 'Behind / Ahead', and 'Pull request'.

**Diseñe un servicio de Linux cuyo propósito sea consultar si el branch Deploy tiene cambios, y si los tiene, detener el sistema, actualizarlo a la última versión, y volver a levantararlo.**

Se creó el servicio para consultar si el Branch tiene cambios

```

laura@Debian: ~/Documents/hola_node
/usr/local/bin/deploy_check.sh

GNU nano 2.4
#!/bin/bash
#set -eu pipefail

APP_USER="laura"
REPO_DIR="/home/laura/Documents/hola_node"
BRANCH="main"
COMMIT_MSG="holo_node.service"
SLOGTAG="deploy-check"
STATE_FILE="/STATE_DIR/last_commit.sha"

as_user() { sudo -u "$APP_USER" bash -c "$@"; }

log() { logger -t "$SLOGTAG" "$@" & echo "[SLOGTAG] $@"; }

mkdir -p "$STATE_DIR"
chmod 755 "$STATE_DIR"

[[ -d "$REPO_DIR" ]] || { log "Directorio $REPO_DIR no existe."; exit 1; }

as_user "cd '$REPO_DIR' && git rev-parse --is-inside-work-tree >/dev/null 2>&1"; then
as_user "cd '$REPO_DIR' && git fetch origin $BRANCH --quiet"
as_user "cd '$REPO_DIR' && git checkout -b $BRANCH origin/$BRANCH"
else
as_user "cd '$REPO_DIR' && git checkout $BRANCH"
fi

LOCAL_COMMIT=$(as_user "cd '$REPO_DIR' && git rev-parse HEAD")
REMOTE_COMMIT=$(as_user "cd '$REPO_DIR' && git rev-parse origin/$BRANCH")
LAST_DEPLOYED=$(cat "$STATE_FILE" 2>/dev/null || echo "")

# Caso 1: remoto distinto -> hay cambios en GitHub
if [[ "$LOCAL_COMMIT" != "$REMOTE_COMMIT" ]]; then
log "Local commit '$LOCAL_COMMIT' != Remote commit '$REMOTE_COMMIT'. Deteniendo servicio..."
systemctl stop "$SERVICE_NAME"
as_user "cd '$REPO_DIR' && git reset --hard origin/$BRANCH"
fi
[[ ! -f "$REPO_DIR/package-lock.json" ]]; then
as_user "cd '$REPO_DIR' && npm ci --without-dev"
else
as_user "cd '$REPO_DIR' && npm install --production"
fi

# Help      Write Out  Where Is  Cut      Execute  Location  Undo  Set Mark  To Bracket
# Exit      Read File Replace  Paste   Justify  Go To Line  Redo  Copy  Where Was

```

laura@Debian:~/Documents/hola\_node

```

#!/bin/bash
# deploy-check.sh
# This script checks if there are changes in the repository and deploys them if necessary.

# Variables
REPO_DIR="/home/laura/Documents/hola_node"
STATE_FILE="$REPO_DIR/.deploy-state"

# Functions
function log() {
    echo "$1" | tee -a $STATE_FILE
}

function check_for_changes() {
    if [ ! -d "$REPO_DIR/.git" ]; then
        log "No se ha encontrado el repositorio local en $REPO_DIR"
        return 1
    fi
    git rev-parse HEAD > $STATE_FILE
    log "Cambiados en origen/$BRANCH: $LOCAL_COMMIT -> $REMOTE_COMMIT. Deteniendo servicio..."
    systemctl stop $SERVICE_NAME
    log "Despliegue completado (remoto)."
    exit 0
}

function deploy() {
    log "Lanzando servicio $SERVICE_NAME..."
    systemctl start $SERVICE_NAME
    log "El servicio $SERVICE_NAME ha comenzado."
    log "Despliegue completado (local)."
    exit 0
}

function main() {
    log "Sin cambios en origen/$BRANCH (commit $REMOTE_COMMIT). Ya desplegado ($LAST_DEPLOYED)."
    log "Revisando cambios en $REPO_DIR/package-lock.json"
    if [ ! -f "$REPO_DIR/package-lock.json" ]; then
        log "No se han encontrado cambios en package-lock.json"
        deploy
    else
        log "Se han encontrado cambios en package-lock.json"
        log "Actualizando servicio $SERVICE_NAME..."
        systemctl start $SERVICE_NAME
        log "El servicio $SERVICE_NAME ha comenzado."
        log "Despliegue completado (local)."
        exit 0
    fi
}

# Main loop
while true; do
    main
    sleep 30s
done

```

laura@Debian:~/Documents/hola\_node\$ sudo tee /etc/systemd/system/deploy-check.service >/dev/null <<'EOF'
[Unit]
Description=Check & auto-deploy from origin/Deploy for hola\_node
After=network-online.target
Wants=network-online.target

[Service]
Type=oneshot
ExecStart=/usr/local/bin/deploy-check.sh
[Install]
WantedBy=multi-user.target
EOF
laura@Debian:~/Documents/hola\_node\$ sudo tee /etc/systemd/system/deploy-check.timer >/dev/null <<'EOF'
[Unit]
Description=Run deploy-check.service periodically

[Timer]
OnBootSec=5min
Unit=deploy-check.service
AccuracySec=30s
Persistent=true

[Install]
WantedBy=timers.target
EOF
laura@Debian:~/Documents/hola\_node\$

laura@Debian:~/Documents/hola\_node\$ sudo /usr/local/bin/deploy-check.sh

```

Already on 'origin/Deploy'.
Your branch is up to date with 'origin/Deploy'.
[deploy-check] Sin cambios en origin/Deploy (commit 8b5ac29d39c232ddc48691393fb64d2f083e9892). Ya desplegado (8b5ac29d39c232ddc48691393fb64d2f083e9892).
laura@Debian:~/Documents/hola_node$ sudo systemctl daemon-reload
laura@Debian:~/Documents/hola_node$ sudo systemctl start deploy-check.service
laura@Debian:~/Documents/hola_node$ sudo systemctl status deploy-check.service
● deploy-check.service - Check & auto-deploy from origin/Deploy for hola_node
   Loaded: loaded (/etc/systemd/system/deploy-check.service; disabled; preset: enabled)
     Active: inactive (dead) since Sat 2025-10-04 20:47:33 CST; 15s ago
   Invoked-By: 9408122c4a7ea08744277d3a2048
TriggeredBy: deploy-check.timer
   Process: 8997 ExecStart=/usr/local/bin/deploy-check.sh (code=exited, status=0/SUCCESS)
    Main PID: 8997 (code=exited, status=0/SUCCESS)
      Mem peak: 13.4M
        CPU: 530ms

Oct 04 20:47:33 Debian sudo[9034]:      root : PWD=/ : /usr/bin/bash -lc '\cd \'`/home/laura/Documents/hola_node`\' && git pull --rebase' -u origin Deploy
Oct 04 20:47:33 Debian sudo[9034]: pam_unix(sudo:session): session opened for user laura(uid=1000) by (uid=0)
Oct 04 20:47:33 Debian sudo[9034]: pam_unix(sudo:session): session closed for user laura
Oct 04 20:47:33 Debian sudo[9039]:      root : PWD=/ : /usr/bin/bash -lc '\cd \'`/home/laura/Documents/hola_node`\' && git pull --rebase' -u origin Deploy
Oct 04 20:47:33 Debian sudo[9039]: pam_unix(sudo:session): session opened for user laura(uid=1000) by (uid=0)
Oct 04 20:47:33 Debian sudo[9039]: pam_unix(sudo:session): session closed for user laura
Oct 04 20:47:33 Debian deploy-check[9046]: Sin cambios en origin/Deploy (commit 8b5ac29d39c232ddc48691393fb64d2f083e9892). Ya desplegado (8b5ac29d39c232ddc48691393fb64d2f083e9892)
Oct 04 20:47:33 Debian deploy-check.sh[8997]: [deploy-check] Sin cambios en origin/Deploy (commit 8b5ac29d39c232ddc48691393fb64d2f083e9892)
Oct 04 20:47:33 Debian systemd[1]: deploy-check.service: deactivated successfully.
Oct 04 20:47:33 Debian systemd[1]: Finished deploy-check.service - Check & auto-deploy from origin/Deploy for hola_node.
```

```

laura@Debian:~/Documents/hola_node$ journalctl -u deploy-check.service -n 100 --no-pager
Hint: You are currently not seeing messages from other users and the system.
      Users in groups 'adm', 'systemd-journal' can see all messages.
      Pass -q to turn off this notice.
Oct 04 20:02:38 Debian deploy-check.sh[6616]: Already on 'Deploy'
Oct 04 20:02:38 Debian deploy-check.sh[6616]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:07:54 Debian deploy-check.sh[6747]: Already on 'Deploy'
Oct 04 20:07:54 Debian deploy-check.sh[6747]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:10:14 Debian deploy-check.sh[6901]: Already on 'Deploy'
Oct 04 20:10:14 Debian deploy-check.sh[6901]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:15:33 Debian deploy-check.sh[7107]: Already on 'Deploy'
Oct 04 20:15:33 Debian deploy-check.sh[7107]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:15:41 Debian deploy-check.sh[7159]: Already on 'Deploy'
Oct 04 20:15:41 Debian deploy-check.sh[7159]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:21:04 Debian deploy-check.sh[7272]: Already on 'Deploy'
Oct 04 20:21:04 Debian deploy-check.sh[7272]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:25:24 Debian deploy-check.sh[7370]: Already on 'Deploy'
Oct 04 20:25:24 Debian deploy-check.sh[7370]: Your branch is behind 'origin/Deploy' by 1 commit, and can be fast-forwarded.
Oct 04 20:25:24 Debian deploy-check.sh[7370]: (use "git pull" to update your local branch)
Oct 04 20:25:24 Debian deploy-check.sh[7390]: HEAD is now at fafe775 Hello World
Oct 04 20:25:26 Debian deploy-check.sh[7397]: added 68 packages, and audited 69 packages in 2s
Oct 04 20:25:26 Debian deploy-check.sh[7397]: 16 packages are looking for funding
Oct 04 20:25:26 Debian deploy-check.sh[7397]: run 'npm fund' for details
Oct 04 20:25:26 Debian deploy-check.sh[7397]: found 0 vulnerabilities
Oct 04 20:30:34 Debian deploy-check.sh[7668]: Already on 'Deploy'
Oct 04 20:30:34 Debian deploy-check.sh[7668]: Your branch is up to date with 'origin/Deploy'.
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Oct 04 20:30:36 Debian deploy-check.sh[7689]: 16 packages are looking for funding
Oct 04 20:30:36 Debian deploy-check.sh[7689]: run 'npm fund' for details
Oct 04 20:30:36 Debian deploy-check.sh[7689]: found 0 vulnerabilities
Oct 04 20:32:37 Debian deploy-check.sh[7953]: Already on 'Deploy'
Oct 04 20:32:37 Debian deploy-check.sh[8122]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:38:04 Debian deploy-check.sh[8122]: Already on 'Deploy'
Oct 04 20:38:04 Debian deploy-check.sh[8122]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:38:05 Debian deploy-check.sh[8144]: added 68 packages, and audited 69 packages in 1s
Oct 04 20:38:05 Debian deploy-check.sh[8144]: 16 packages are looking for funding
Oct 04 20:38:05 Debian deploy-check.sh[8144]: run 'npm fund' for details
Oct 04 20:38:05 Debian deploy-check.sh[8144]: found 0 vulnerabilities
Oct 04 20:39:16 Debian deploy-check.sh[8408]: Already on 'Deploy'
Oct 04 20:39:16 Debian deploy-check.sh[8408]: M          hola.js
Oct 04 20:39:16 Debian deploy-check.sh[8408]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:40:18 Debian deploy-check.sh[8496]: Already on 'Deploy'
Oct 04 20:40:18 Debian deploy-check.sh[8496]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:40:20 Debian deploy-check.sh[8516]: added 68 packages, and audited 69 packages in 1s
Oct 04 20:40:20 Debian deploy-check.sh[8516]: 16 packages are looking for funding
Oct 04 20:40:20 Debian deploy-check.sh[8516]: run 'npm fund' for details
Oct 04 20:40:20 Debian deploy-check.sh[8516]: found 0 vulnerabilities

```

## Ejemplo cambio local

```

laura@Debian:~/Documents/hola_node
laura@Debian:~/Documents/hola_node$ curl http://localhost:3000/
;Hola prueba local ayudala
laura@Debian:~/Documents/hola_node$ git checkout Deploy
M    hola.js
Already on 'Deploy'
Your branch is up to date with 'origin/Deploy'.
laura@Debian:~/Documents/hola_node$ git pull
Already up to date.
laura@Debian:~/Documents/hola_node$ nano hola.js
laura@Debian:~/Documents/hola_node$
```

```

laura@Debian:~/Documents/hola_node
laura@Debian:~/Documents/hola_node$ nano 8.4
GNU nano 8.4                                     hola.js *
// Deploy - Rama automatizada
const express = require('express');
  const app = express();
  const port = 3000;

app.get('/', (req, res) => {
  res.send(';Hola mundo estoy haciendo pruebas de cambios locales;');
});

app.listen(port, () => {
  console.log(`La aplicación está escuchando en http://localhost:${port}`);
});
```

```
laura@Debian:~/Documents/hola_node$ nano hola.js
laura@Debian:~/Documents/hola_node$ git add hola.js
laura@Debian:~/Documents/hola_node$ git commit -m "Prueba local cambio holamundo"
[Deploy 6da28a3] Prueba local cambio holamundo
 1 file changed, 1 insertion(+), 1 deletion(-)
laura@Debian:~/Documents/hola_node$ git push origin Deploy
Enumerating objects: 5, done.
Counting objects: 100% (5/5), done.
Delta compression using up to 4 threads
Compressing objects: 100% (3/3), done.
Writing objects: 100% (3/3), 339 bytes | 339.00 KiB/s, done.
Total 3 (delta 2), reused 0 (delta 0), pack-reused 0 (from 0)
remote: Resolving deltas: 100% (2/2), completed with 2 local objects.
To https://github.com/nicolerodriguezluna/OP-Lab-Servicios.git
  8b5ac29..6da28a3 Deploy -> Deploy
laura@Debian:~/Documents/hola_node$ sudo systemctl start deploy-check.service
laura@Debian:~/Documents/hola_node$ journalctl -u deploy-check.service -n 50 --no-pager
Hint: You are currently not seeing messages from other users and the system.
      Users in groups 'adm', 'systemd-journal' can see all messages.
      Pass -q to turn off this notice.
Oct 04 20:10:14 Debian deploy-check.sh[6901]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:15:33 Debian deploy-check.sh[7107]: Already on 'Deploy'
Oct 04 20:15:33 Debian deploy-check.sh[7107]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:15:41 Debian deploy-check.sh[7159]: Already on 'Deploy'
Oct 04 20:15:41 Debian deploy-check.sh[7159]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:21:04 Debian deploy-check.sh[7272]: Already on 'Deploy'
Oct 04 20:21:04 Debian deploy-check.sh[7272]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:25:24 Debian deploy-check.sh[7370]: Already on 'Deploy'
Oct 04 20:25:24 Debian deploy-check.sh[7370]: Your branch is behind 'origin/Deploy' by 1 commit, and can be fast-forwarded.
Oct 04 20:25:24 Debian deploy-check.sh[7370]: (use "git pull" to update your local branch)
Oct 04 20:25:24 Debian deploy-check.sh[7390]: HEAD is now at fafe75 Hello World
Oct 04 20:25:26 Debian deploy-check.sh[7397]: added 68 packages, and audited 69 packages in 2s
Oct 04 20:25:26 Debian deploy-check.sh[7397]: 16 packages are looking for funding
Oct 04 20:25:26 Debian deploy-check.sh[7397]: run 'npm fund' for details
Oct 04 20:25:26 Debian deploy-check.sh[7397]: found 0 vulnerabilities
Oct 04 20:30:34 Debian deploy-check.sh[7668]: Already on 'Deploy'
Oct 04 20:30:34 Debian deploy-check.sh[7668]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:30:36 Debian deploy-check.sh[7689]: added 68 packages, and audited 69 packages in 2s
Oct 04 20:30:36 Debian deploy-check.sh[7689]: 16 packages are looking for funding
Oct 04 20:30:36 Debian deploy-check.sh[7689]: run 'npm fund' for details
Oct 04 20:30:36 Debian deploy-check.sh[7689]: found 0 vulnerabilities
```

```
[laura@Debian: ~/Documents/hola_node]
Oct 04 20:21:04 Debian deploy-check.sh[7272]: Already on 'Deploy'.
Oct 04 20:21:04 Debian deploy-check.sh[7272]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:25:24 Debian deploy-check.sh[7370]: Already on 'Deploy'.
Oct 04 20:25:24 Debian deploy-check.sh[7370]: Your branch is behind 'origin/Deploy' by 1 commit, and can be fast-forwarded.
Oct 04 20:25:24 Debian deploy-check.sh[7370]: (use "git pull" to update your local branch)
Oct 04 20:25:24 Debian deploy-check.sh[7390]: HEAD is now at fale775 Hello World
Oct 04 20:25:26 Debian deploy-check.sh[7397]: added 68 packages, and audited 69 packages in 2s
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Oct 04 20:25:26 Debian deploy-check.sh[7397]: run 'npm fund' for details
Oct 04 20:25:26 Debian deploy-check.sh[7397]: found 0 vulnerabilities
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Oct 04 20:30:36 Debian deploy-check.sh[7689]: run 'npm fund' for details
Oct 04 20:30:36 Debian deploy-check.sh[7689]: found 0 vulnerabilities
Oct 04 20:32:37 Debian deploy-check.sh[7953]: Already on 'Deploy'
Oct 04 20:32:37 Debian deploy-check.sh[7953]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:38:04 Debian deploy-check.sh[8122]: Already on 'Deploy'
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Oct 04 20:38:05 Debian deploy-check.sh[8144]: run 'npm fund' for details
Oct 04 20:38:05 Debian deploy-check.sh[8144]: found 0 vulnerabilities
Oct 04 20:39:16 Debian deploy-check.sh[8408]: Already on 'Deploy'
Oct 04 20:39:16 Debian deploy-check.sh[8408]: M hola.js
Oct 04 20:39:16 Debian deploy-check.sh[8408]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:40:18 Debian deploy-check.sh[8496]: Already on 'Deploy'
Oct 04 20:40:18 Debian deploy-check.sh[8496]: Your branch is up to date with 'origin/Deploy'.
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Oct 04 20:40:20 Debian deploy-check.sh[8516]: run 'npm fund' for details
Oct 04 20:40:20 Debian deploy-check.sh[8516]: found 0 vulnerabilities
Oct 04 20:45:34 Debian deploy-check.sh[8773]: Already on 'Deploy'
Oct 04 20:45:34 Debian deploy-check.sh[8773]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:47:33 Debian deploy-check.sh[9031]: Already on 'Deploy'
Oct 04 20:47:33 Debian deploy-check.sh[9031]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:52:33 Debian deploy-check.sh[9158]: Already on 'Deploy'
Oct 04 20:52:33 Debian deploy-check.sh[9158]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:56:05 Debian deploy-check.sh[9392]: Already on 'Deploy'
Oct 04 20:56:05 Debian deploy-check.sh[9392]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:56:07 Debian deploy-check.sh[9314]: added 68 packages, and audited 69 packages in 1s
Oct 04 20:56:07 Debian deploy-check.sh[9314]: 16 packages are looking for funding
Oct 04 20:56:07 Debian deploy-check.sh[9314]: run 'npm fund' for details
Oct 04 20:56:07 Debian deploy-check.sh[9314]: found 0 vulnerabilities
tail@Debian:~/Documents/hola_node$ curl http://localhost:3000
|Hola mundo estoy haciendo pruebas de cambios locales|laura@Debian:~/Documents/hola_node$
```

Se puede observar que si se hizo el cambio y la actualización correctamente con ayuda del servicio cuando se hizo un commit a nivel local.

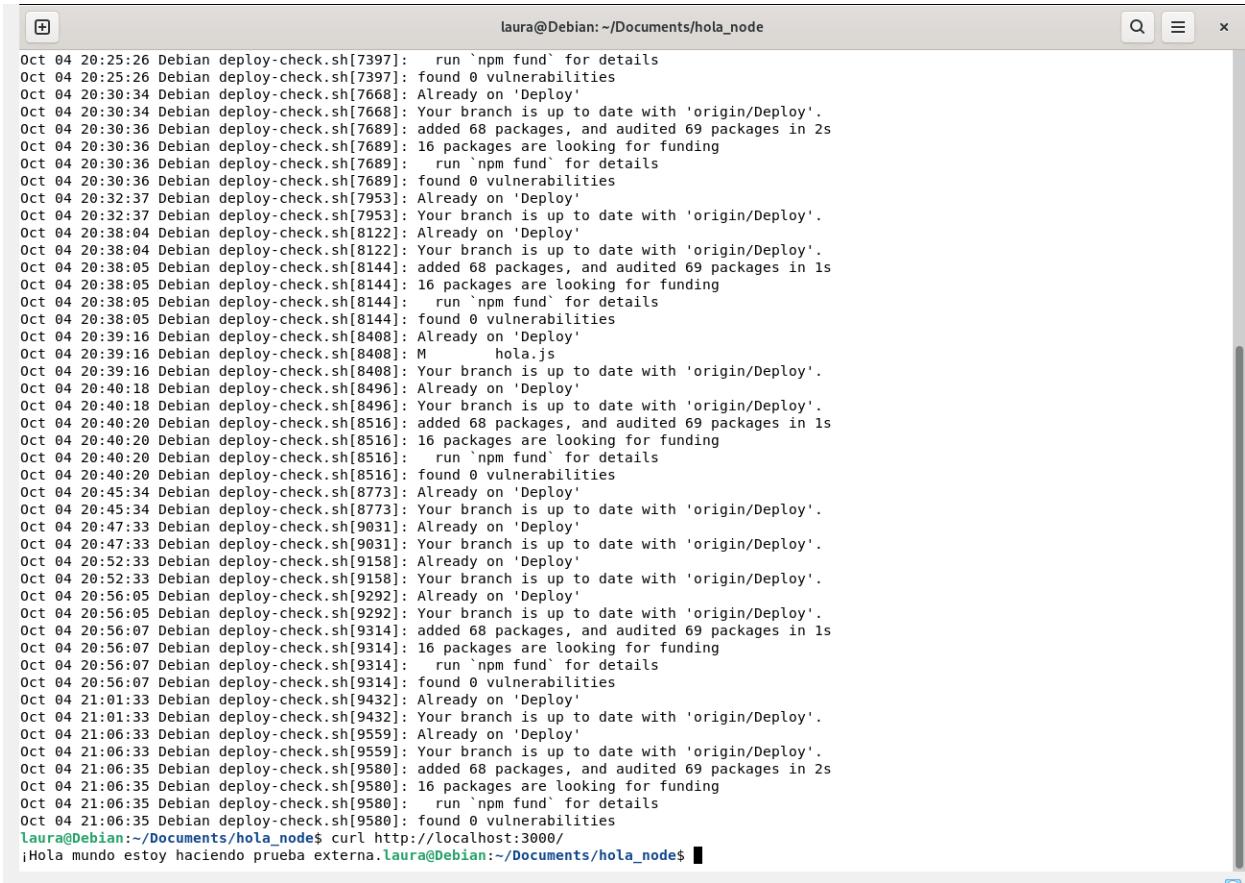
## Ejemplo cambio desde otra fuente:

Se cambió el archivo desde otra computadora:

The screenshot shows a GitHub repository interface. At the top, there's a banner indicating "Deploy had recent pushes 8 minutes ago". Below the banner, there are navigation links for "Deploy", "2 Branches", "0 Tags", and search/filter options like "Go to file" and "Add file". A green "Compare & pull request" button is also visible. In the center, a message states "This branch is 11 commits ahead of main.". To the right, there's a "Contribute" button. The main area displays a list of recent commits by the user "nicolerodriguezluna". The commits are as follows:

Commit	Message	Date
.gitignore	Agregar gitignore	1 hour ago
README.md	Initial commit	yesterday
holajs	Cambio de mensaje	now
package-lock.json	Añadir proyecto hola	2 hours ago
packagejson	Añadir proyecto hola	2 hours ago

```
laura@Debian:~/Documents/hola_node$ curl http://localhost:3000/
¡Hola mundo estoy haciendo pruebas de cambios localeslaura@Debian:~/Documents/hola_node$ git checkout Deploy
Already on 'Deploy'
Your branch is up to date with 'origin/Deploy'.
laura@Debian:~/Documents/hola_node$ git pull
remote: Enumerating objects: 5, done.
remote: Counting objects: 100% (5/5), done.
remote: Compressing objects: 100% (1/1), done.
remote: Total 3 (delta 2), reused 3 (delta 2), pack-reused 0 (from 0)
Unpacking objects: 100% (3/3), 301 bytes | 150.00 KiB/s, done.
From https://github.com/nicolerodriguezluna/OP-Lab-Servicios
  6da28a3..29ee620  Deploy      -> origin/Deploy
Updating 6da28a3..29ee620
Fast-forward
  holajs | 2 ++
  1 file changed, 1 insertion(+), 1 deletion(-)
laura@Debian:~/Documents/hola_node$ sudo systemctl start deploy-check.service
laura@Debian:~/Documents/hola_node$ journalctl -u deploy-check.service -n 50 --no-pager
Hint: You are currently not seeing messages from other users and the system.
      Users in groups 'adm', 'systemd-journal' can see all messages.
      Pass -q to turn off this notice.
Oct 04 20:25:24 Debian deploy-check.sh[7370]: Your branch is behind 'origin/Deploy' by 1 commit, and can be fast-forwarded.
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Oct 04 20:39:16 Debian deploy-check.sh[8408]: M      holajs
Oct 04 20:39:16 Debian deploy-check.sh[8408]: Your branch is up to date with 'origin/Deploy'.
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Oct 04 20:40:18 Debian deploy-check.sh[8496]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:40:18 Debian deploy-check.sh[8496]:
```



```
laura@Debian: ~/Documents/hola_node
Oct 04 20:25:26 Debian deploy-check.sh[7397]: run `npm fund` for details
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Oct 04 20:38:05 Debian deploy-check.sh[8144]: found 0 vulnerabilities
Oct 04 20:39:16 Debian deploy-check.sh[8408]: Already on 'Deploy'
Oct 04 20:39:16 Debian deploy-check.sh[8408]: M hola.js
Oct 04 20:39:16 Debian deploy-check.sh[8408]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:40:18 Debian deploy-check.sh[8496]: Already on 'Deploy'
Oct 04 20:40:18 Debian deploy-check.sh[8496]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:40:20 Debian deploy-check.sh[8516]: added 68 packages, and audited 69 packages in 1s
Oct 04 20:40:20 Debian deploy-check.sh[8516]: 16 packages are looking for funding
Oct 04 20:40:20 Debian deploy-check.sh[8516]: run `npm fund` for details
Oct 04 20:40:20 Debian deploy-check.sh[8516]: found 0 vulnerabilities
Oct 04 20:45:34 Debian deploy-check.sh[8773]: Already on 'Deploy'
Oct 04 20:45:34 Debian deploy-check.sh[8773]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:47:33 Debian deploy-check.sh[9031]: Already on 'Deploy'
Oct 04 20:47:33 Debian deploy-check.sh[9031]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:52:33 Debian deploy-check.sh[9158]: Already on 'Deploy'
Oct 04 20:52:33 Debian deploy-check.sh[9158]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:56:05 Debian deploy-check.sh[9292]: Already on 'Deploy'
Oct 04 20:56:05 Debian deploy-check.sh[9292]: Your branch is up to date with 'origin/Deploy'.
Oct 04 20:56:07 Debian deploy-check.sh[9314]: added 68 packages, and audited 69 packages in 1s
Oct 04 20:56:07 Debian deploy-check.sh[9314]: 16 packages are looking for funding
Oct 04 20:56:07 Debian deploy-check.sh[9314]: run `npm fund` for details
Oct 04 20:56:07 Debian deploy-check.sh[9314]: found 0 vulnerabilities
Oct 04 21:01:33 Debian deploy-check.sh[9432]: Already on 'Deploy'
Oct 04 21:01:33 Debian deploy-check.sh[9432]: Your branch is up to date with 'origin/Deploy'.
Oct 04 21:06:33 Debian deploy-check.sh[9559]: Already on 'Deploy'
Oct 04 21:06:33 Debian deploy-check.sh[9559]: Your branch is up to date with 'origin/Deploy'.
Oct 04 21:06:35 Debian deploy-check.sh[9580]: added 68 packages, and audited 69 packages in 2s
Oct 04 21:06:35 Debian deploy-check.sh[9580]: 16 packages are looking for funding
Oct 04 21:06:35 Debian deploy-check.sh[9580]: run `npm fund` for details
Oct 04 21:06:35 Debian deploy-check.sh[9580]: found 0 vulnerabilities
laura@Debian:~/Documents/hola_node$ curl http://localhost:3000/
¡Hola mundo estoy haciendo prueba externa.laura@Debian:~/Documents/hola_node$
```

## Investigue el concepto de Continuous Deployment y compárelo con lo que ha hecho hasta este punto.

Según [Susnjara & Smalley \(2025\)](#) “La implementación continua es una estrategia en el desarrollo de software en la que los cambios de código en una aplicación se liberan automáticamente en el entorno de producción.”. Tomando en cuenta lo anterior, el automatizar el proceso de despliegue del “Hola Mundo” para que no dependa de que se inicialice desde cero cada vez que contenga cambios el servicio, permitiendo poder ver los cambios que se hacen desde el desarrollo hasta el producto en producción de manera inmediata. Lo cual permite que sea optimizado el tiempo dentro del ciclo de desarrollo.

## A modo de conclusiones, discuta cuál es el propósito de los servicios de Linux y qué aplicaciones tienen en un entorno de desarrollo basado en Linux.

La integración continua en Linux es esencial para poder proveer un funcionamiento estable y correcto de los servicios que se implementan en productos de software.

Los servicios en Linux sirven para que procesos esenciales se ejecuten en segundo plano de forma continua, algunas veces incluso desde que el sistema se arranca, y sin la necesidad de intervención directa del usuario. Se aseguran de que funciones críticas como el manejo de redes,

logging, servidores, y entre otras funcionalidades, estén siempre disponibles y trabajando mientras el sistema está activo (Red Hat, 2023).

Algunas de las aplicaciones o usos que tienen en un entorno de desarrollo de Linux son:

Servidores Web (Apache, Nginx): se ejecutan continuamente como servicios para aplicaciones web PHP. Por ejemplo, Apache, el cual usamos durante el laboratorio, se levanta como daemon al inicio del sistema para responder peticiones HTTP sin necesidad de intervención manual (Red Hat, 2023).

Bases de Datos (MySQL, PostgreSQL, MongoDB, Redis): se ejecutan como servicios para poder recibir consultas desde otras aplicaciones durante el ciclo de vida completo del sistema (Oracle Corporation, s.f.).

Aplicaciones Backend Persistentes (Node.js/Express): en el proceso de desarrollo se pueden levantar manualmente, pero al poner un proyecto en producción deben convertirse en servicios que se inicien al boot, se reinicien tras fallos, y dependan correctamente de la red y otros servicios (NodeSource, 2016).

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