



SSI - Sistemas Informáticos

Diego Ayala



SSII - 1.Linux administration

Diego Ayala

Resultados de aprendizaje - RA

- RA1- Evalúa sistemas informáticos, identificando sus componentes y características.
- RA2- Instala sistemas operativos planificando el proceso e interpretando documentación técnica.
- RA3- Gestiona la información del sistema identificando las estructuras de almacenamiento y aplicando medidas para asegurar la integridad de los datos.
- RA4-Gestiona sistemas operativos utilizando comandos y herramientas gráficas y evaluando las necesidades del sistema.

Resultados de aprendizaje - RA

- RA5-Interconecta sistemas en red configurando dispositivos y protocolos.
- RA6-Opera sistemas en red gestionando sus recursos e identificando las restricciones de seguridad existentes.
- RA7-Elabora documentación valorando y utilizando aplicaciones informáticas de propósito general.

RA- Equivalencia con el temario

- RA1- Evaluado en la FEM excepto CE) h
- RA2- Servicios de red: PF Samba
- RA3- PF RAIDS en Windows
- RA4- Administración de sistemas: Linux Comandos (50%) && Servicios de red: PF Samba (50%)
- RA5- Direccionamiento de red: IP y Subnetting
- RA6-Computación en la nube: Google Cloud || Cloudflare
- RA7- Documentación

RA- Evaluación y ponderación

● RA1- Cursará en FEM.	5%
● RA2- Defensa examen Samba	20%
● RA3- Defensa examen RAIDS	20%
● RA4- Exámen Comandos && (Defensa examen Samba)	15%
● RA5- Exámen Subnetting	10%
● RA6- Defensa PF Google cloud y cloudflare	20%
RA7- Documentación PF	10%
	— —
	100%

Evaluación final y recuperación de RA

- I Ordinaria:

El alumnado solo tendrá que recuperar los RA no superados durante el curso. Si tiene todos los RA superados, no tendrá que presentarse a recuperación.
- Periodo entre I y II Ordinaria

Se realizará un plan de recuperación con clases, actividades, trabajos o pruebas centradas en los RA pendientes.
- II Ordinaria

El alumnado solo será evaluado de los RA que sigan sin superar tras la I Ordinaria y el plan de recuperación.

Evaluación con pérdida de ev. continua

- Los alumnos que pierdan el derecho a evaluación continua serán calificados con “No Evaluado 1” en las evaluaciones parciales y deberán presentarse a las evaluaciones ordinaria y extraordinaria como si su calificación en todos los RA fuera negativa.
- Los alumnos en esta situación disponen únicamente de la evaluación ordinaria y extraordinaria para aprobar la materia, pudiendo ceñirse al mismo tipo de evaluación que en continua o con modificaciones.

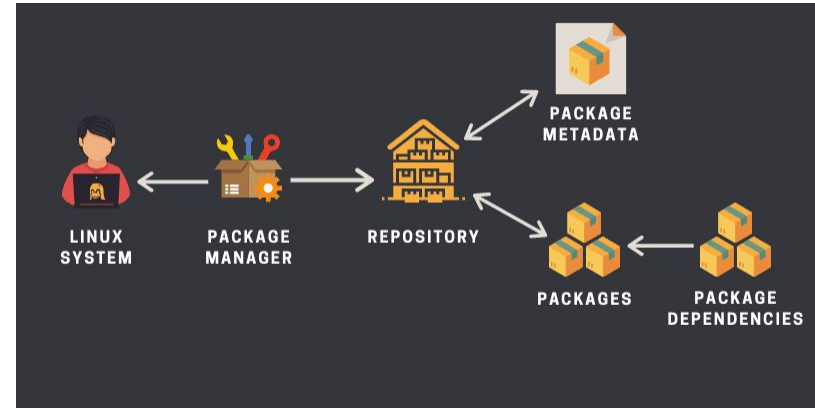
Applications in Linux

- Not directly tied to the inner workings of the computer, but with tasks performed by the user
- Linux distributions offer many application options to perform a variety of tasks



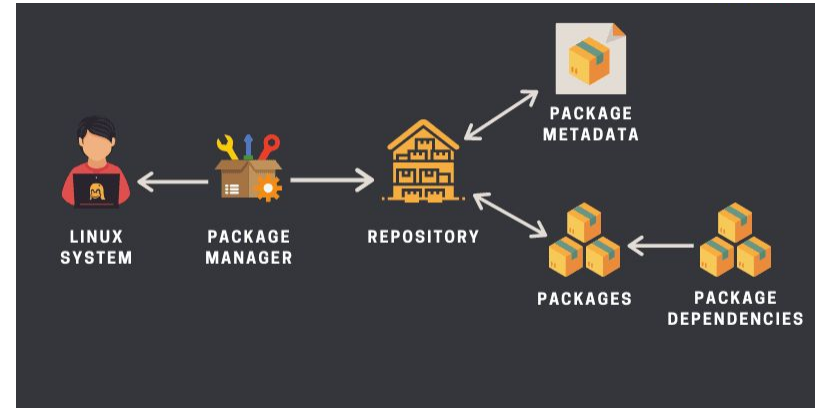
Software packages

- pre-installed applications
- package manager → package repository
- Several package managers (dpkg **Debian**, apt-get **Ubuntu** and apt **Linux mint**)
- apt-get vs apt Ubuntu



DEB vs RPM packages

- Debian, Ubuntu, Linux-Mint → Deb packages
- RedHat, Fedora, CentOS → RPM packages
- apt, apt-get, dpkg → Deb package manager
- rpm, dnf, yum → RPM package manager



Package Installation - Run package

- Package not installed

```
diego@ayala:~$ figlet  
No se ha encontrado la orden «figlet», pero se puede instalar con:
```

apt-cache search

- Search packages and list information (name, description, metadata)

```
diego@ayala:~$ apt-cache search figlet
figlet - Make large character ASCII banners out of ordinary text
irssi-scripts - collection of scripts for irssi
php-text-figlet - Engine for use FIGlet fonts to rendering text
presentty - Console-based presentation software
python3-pyfiglet - Python 3 port of the FIGlet specification
ruby-text - collection of text algorithms for Ruby
toilet - display large colourful characters in text mode
toilet-fonts - collection of TOilet fonts
```

Install package

- Installation, removal package → Special permissions
- Granted by system administrator → root
- sudo → grant permissions without root
- downloaded and installed (also dependencies)

```
diego@ayala:~$ sudo apt install figlet
[sudo] contraseña para diego:
Leyendo lista de paquetes... Hecho
Creando árbol de dependencias... Hecho
Leyendo la información de estado... Hecho
Se instalarán los siguientes paquetes NUEVOS:
  figlet
```

Install package

- downloaded and installed (also dependencies)

```
0 actualizados, 1 nuevos se instalarán, 0 para eliminar y 0 no actualizados.  
Se necesita descargar 133 kB de archivos.  
Se utilizarán 752 kB de espacio de disco adicional después de esta operación.  
Des:1 http://es.archive.ubuntu.com/ubuntu jammy/universe amd64 figlet amd64 2.2.5-3 [133 kB]  
Descargados 133 kB en 0s (271 kB/s)  
Seleccionando el paquete figlet previamente no seleccionado.  
(Leyendo la base de datos ... 205433 ficheros o directorios instalados actualmen  
te.)  
Preparando para desempaquetar .../figlet_2.2.5-3_amd64.deb ...  
Desempaquetando figlet (2.2.5-3) ...  
Configurando figlet (2.2.5-3) ...  
update-alternatives: utilizando /usr/bin/figlet-figlet para proveer /usr/bin/fig  
let (figlet) en modo automático  
Procesando disparadores para man-db (2.10.2-1) ...
```

Run command

- name package + input

```
diego@envy17:/mnt/c/Users/diego$ figlet 1-DAW la mejor clase
```

How to name a dog

Package removal

- remove name_package

```
$ sudo apt-get remove figlet
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages will be REMOVED:
  figlet
0 upgraded, 0 newly installed, 1 to remove and 0 not upgraded.
After this operation, 741 kB disk space will be freed.
Do you want to continue? [Y/n] Y
```

- confirm → package is erased from the system
(Configuration files remains on the system)

```
(Reading database ... 115775 files and directories currently installed.)
Removing figlet (2.2.5-2) ...
Processing triggers for man-db (2.7.6.1-2) ...
```

Linux- Ejercicio 1

- For each of the following commands, identify whether it is associated with the Debian packaging system or the Red Hat packaging system:

<code>dpkg</code>	
<code>rpm</code>	
<code>apt-get</code>	
<code>yum</code>	
<code>dnf</code>	

Linux- Ejercicio 2

- Which command could be used to install Blender on Ubuntu?
After installation, how can the program be executed?

Linux- Ejercicio 3

- Which software package do you need to install in order to be able to open Microsoft Word documents sent to you by a Windows user?

Linux- Ejercicio 4

- You know that configuration files are kept even if the associated package is removed from the system. How could you automatically remove the package named cups and its configuration files from a DEB based system?

Bash Shell

- Most common shell in Linux (csh, tcsh, zsh, ksh)
- Shell $\equiv$ command line
- Prompt $\rightarrow$ System is ready to exec commands

```
username@hostname current_directory shell_type
```

Bash Shell

- Username: User that runs the shell
- hostname: Name of the computer or server
- current_directory → Location where you are currently working
~ current user's home directory.
- shell_type → Permissions of the user (\$ and #)

```
username@hostname current_directory shell_type
```

Bash Shell - Shell_type

- Regular user prompt
- Super User's prompt

```
carol@mycomputer:~$
```

```
root@mycomputer:~#
```

Command Line Structure

- Command → Program to exec. `$ ls -l /home`
- Option(s)/Parameter(s) → A “switch” that modifies the behavior .
Short and Long form.
-l ≡ --format=long.
Letters can usually be typed together
`command [option(s)/parameter(s)...] [argument(s)...]`
- Argument(s) → additional data like filename or path

```
$ ls -al
$ ls -a -l
$ ls --all --format=long
```

Command Behavior Types

- Internal → Part of the self itself ~ 30
exec task inside shell (cd, set)
- External → PATH: route to executable file
users can create own external commands

Internal or external command?

- `type` → shows the type of the command
- if (alias) then `type -a` command

```
$ type echo
echo is a shell builtin
$ type man
man is /usr/bin/man
```

man vs help

- man → full documentation
only external commands
- help → in a nutshell
only internal commands
- Full doc of internal commands → man bash
Exact match: `/\bcd\b` “\b” → delimiter

Quoting

```
$ echo "I am $USER"  
I am tom
```

- Double Quotes → Only exec \$, \, ` two strings as an individual argument
vs
both strings as one argument

```
$ touch new file  
$ ls -l  
-rw-rw-r-- 1 tom students 0 Oct 8 15:18 file  
-rw-rw-r-- 1 tom students 0 Oct 8 15:18 new  
$ touch "new file"  
$ ls -l  
-rw-rw-r-- 1 tom students 0 Oct 8 15:19 new file
```

Quoting

- Single Quotes → Nothing inside these quotes is interpreted
Treated as a literal

```
$ echo 'I am $USER'  
I am $USER
```

```
#!/bin/bash  
to_print='Hola mundo'
```

Quoting

- Backslash → ignore special meaning the character it precedes may possess

```
$ echo \ $USER  
$USER
```

Linux- Ejercicio 5



Split the lines below into the components of command, option(s)/parameter(s) and argument(s):

- Example: `cat -n /etc/passwd`

Command:	<code>cat</code>
Option:	<code>-n</code>
Argument:	<code>/etc/passwd</code>

Linux- Ejercicio 5

● ls -l /etc

ls -l -a

cd /home/user

Linux- Ejercicio 6

- Find what type the following commands are:

Example:

<code>pwd</code>	Shell builtin
<code>mv</code>	External command
<code>cd</code>	
<code>cat</code>	
<code>exit</code>	

Linux- Ejercicio 7

● Resolve the following commands that use quotes:

Example:

<pre>echo "\$HOME is my home directory"</pre>	<pre>echo /home/user is my home directory</pre>
---	---

<pre>touch "\$USER"</pre>	
<pre>touch 'touch'</pre>	

Linux- Ejercicio 8

- With one command and using brace expansion in Bash (review the man page for Bash), create 5 files numbered 1 to 5 with the prefix game (game1, game2, ...).
- With one command and using brace expansion in Bash (review the man page for Bash), create 5 files numbered 1 to 9 with the prefix 'game' (game1, game3, game5, game7, game9), using an increment of 2.

Linux- Ejercicio 9

- Delete all 5 files that you just created with just one command, using a different special character (review Pathname Expansion in the Bash man pages).

Linux- Ejercicio 10

- Is there any other way to make two commands interact with each other? What are those?

Types of variables

- Local variables → Shell process only
- Environment variables → Capital letters (PATH, DATE, USER)
Shared in subprocess

Local variables

- using the = (equal) operator
- \$ → access the value of the variable

```
$ greeting=hello
```

```
$ echo greeting  
greeting
```

```
$ echo $greeting  
hello
```

Local variables

- not shared in subprocess

```
$ echo $greeting world  
hello world  
$ bash -c 'echo $greeting world'  
world
```

Remove variable

- command unset
- name of variable instead of the value

```
$ echo $greeting  
hey  
  
$ unset greeting  
  
$ echo $greeting
```

Global variables

- Convert local to environment

```
$ greeting=hello  
$ export greeting
```

```
$ export greeting=hey
```

Global variables

- shared in subprocess

```
$ export greeting=hey
$ echo $greeting world
hey world
$ bash -c 'echo $greeting world'
hev world
```

Global variables

- env → display all environment variables

```
diego@ayala:~$ env
SHELL=/bin/bash
SESSION_MANAGER=local/ayala:@/tmp/.ICE-unix/907,unix/ayala:/tmp/.ICE-unix/907
QT_ACCESSIBILITY=1
COLORTERM=truecolor
XDG_CONFIG_DIRS=/etc/xdg/xdg-ubuntu:/etc/xdg
SSH_AGENT_LAUNCHER=gnome-keyring
XDG_MENU_PREFIX=gnome-
GNOME_DESKTOP_SESSION_ID=this-is-deprecated
GNOME_SHELL_SESSION_MODE=ubuntu
SSH_AUTH_SOCK=/run/user/1000/keyring/ssh
XMODIFIERS=@im=ibus
DESKTOP_SESSION=ubuntu
GTK_MODULES=gail:atk-bridge
PWD=/home/diego
LOGNAME=diego
XDG_SESSION_DESKTOP=ubuntu
XDG_SESSION_TYPE=wayland
SYSTEMD_EXEC_PID=953
```

Linux- Ejercicio 11

- Create a local variable `nr_files` and assign the number of lines found in the `/etc/passwd` file. Hint: Look into the command `wc` and command substitution and don't forget about quotation marks.

Linux- Ejercicio 12

- Create a local variable number.

Create an environment variable ORDER.

Display both the variable names and their contents.

What are the scopes of the previously created variables?

Linux- Ejercicio 13

- Create a local variable `nr_files` and assign the number of lines found in the `/etc/passwd` file. Hint: Look into the command `wc` and command substitution and don't forget about quotation marks.

Linux- Ejercicio 14

- Create an environment variable ME. Assign the USER variable's value to it.

Linux- Ejercicio 15

- Create another variable called `today1` and assign the system's date to it.

Show it.

Do it again with format ISO 8601. Y-M-D

MAN

- Divided in maximum of 11 sections
- Internally man → less
- ?data_to_find → reverse search

Sección	Descripción
NAME	Nombre del comando y breve descripción
SYNOPSIS	Descripción de la sintaxis del comando
DESCRIPTION	Descripción de los efectos del comando
OPTIONS	Opciones disponibles
ARGUMENTS	Argumentos disponibles
FILES	Archivos auxiliares
EXAMPLES	Una muestra de la línea de comando
SEE ALSO	Referencias cruzadas a los temas relacionados
DIAGNOSTICS	Mensajes de advertencia y error
COPYRIGHT	Autor (es) del comando
BUGS	Cualquier limitación conocida del comando

INFO PAGES

- More detailed than the man pages
- Hyperlinks

```
* Menu:

* Exit status::          Indicating program success or failure.
* Backup options::      -b -S, in some programs.
* Block size::          BLOCK_SIZE and -block-size, in some programs.
* Floating point::      Floating point number representation.
* Signal specifications:: Specifying signals using the -signal option.
* Disambiguating names and IDs:: chgrp, chown, chroot, id: user and group synta\
X
* Random sources::      -random-source, in some programs.
* Target directory::    Specifying a target directory, in some programs\
*
* Trailing slashes::    -strip-trailing-slashes, in some programs.
* Traversing symlinks:: -H, -L, or -P, in some programs.
```

usr/share/doc

- Store most of the documentation
- Contains readme.txt

```
diego@ayala:/usr/share/doc/cups$ ls
changelog.Debian.gz  examples  NOTICE  README.md.gz
copyright            HOWTO_BUGREPORT.txt  online-docs
CREDITS.md           NEWS.Debian.gz        README.Debian.gz
```

Command locate

- Find for directories and files
- Quickest vs find
- Searches within a database
- updatedb to update the files and dir

```
$ locate note  
/lib/udev/keymaps/zepto-znote  
/usr/bin/zipnote  
/usr/share/doc/initramfs-tools/maintainer-notes.html  
/usr/share/man/man1/zipnote.1.gz
```

Command find

- searches a directory tree recursively, including its subdirectories.
- requires at least the path it should search

```
~$ cd Downloads
~/Downloads
$ find . -name thesis.pdf
./thesis.pdf
~/Downloads
$ find ~ -name thesis.pdf
/home/carol/Downloads/thesis.pdf
```

Linux- Ejercicio 16

- Use el comando man para averiguar qué hace cada comando

Comando	Descripción
ls	Mostrar el contenido de un directorio.
cat	
cut	
cd	
cp	
mv	
mkdir	
touch	
wc	
passwd	
rm	
rmdir	
more	
less	
whereis	
head	
tail	

sort	
tr	
chmod	
grep	

Linux- Ejercicio 17

- Open the ls info page and

Find the option that allows you to sort the output by modification time.

Linux- Ejercicio 18

- Display the path to the first 3 README files. Use the man command to identify the correct option for locate.

Linux- Ejercicio 19

- Create a file called test in your home directory. Find its absolute path with the locate command.

Did you find it immediately? What did you have to do in order for locate to find it?

Linux- Ejercicio 20

- Search for the test file that you previously created, using the find command. What syntax did you use and what is the absolute path ?

Linux- Ejercicio 21

- There is one command in the table above that doesn't have a man page. Which one is it and why do you think that the command doesn't have a man page?

Linux- Ejercicio 22

- Using the commands in the table above, create the following file tree. The names that start with a capital are Directories and the ones in lower case are files.

```
User
├── Documents
│   ├── Hello
│   │   ├── hey2
│   │   ├── helloa
│   │   └── ola5
│   └── World
│       └── earth9
├── Downloads
│   ├── Music
│   └── Songs
│       ├── collection1
│       └── collection2
├── Test
│   └── passa
└── test
```

Linux- Ejercicio 23

- Display on the screen the present working directory, including the subfolders.

Linux- Ejercicio 24

- Search within the tree for all files that end with a number.

Linux- Ejercicio 25

- Remove the entire directory tree with a single command.

Directories

- Can contain files and other directories

```
$ tree
```

```
Documents
```

```
├── Mission-Statement.txt
```

```
└── Reports
```

```
    └── report2018.txt
```

```
1 directory, 2 files
```

File and directory names

- Good practice → not use spaces or special characters
- Spaces → escape character \

```
$ cd Mission\ Statements
```

Getting current location

- Current location → Reports directory
- pwd → working directory

```
user@hostname ~/Documents/Reports $
```

```
user@hostname ~/Documents/Reports $ pwd  
/home/user/Documents/Reports
```

Listing Directory Contents

- Contents of the current directory
- Not about parent directories or subdirectories

```
user@hostname ~/Documents/Reports $ ls  
report2018.txt
```

Changing Current Directory

- Navigation → cd command

```
user@hostname ~ $ cd /home/user/Documents
user@hostname ~/Documents $ pwd
/home/user/Documents
user@hostname ~/Documents $ ls
Mission-Statement.txt Reports
```

Changing Current Directory

- Navigation → `cd` command

```
user@hostname ~/Documents $ cd Reports
user@hostname ~/Documents/Reports $ pwd
/home/user/Documents/Reports
user@hostname ~/Documents/Reports $ ls
report2018.txt
```

Absolute Paths

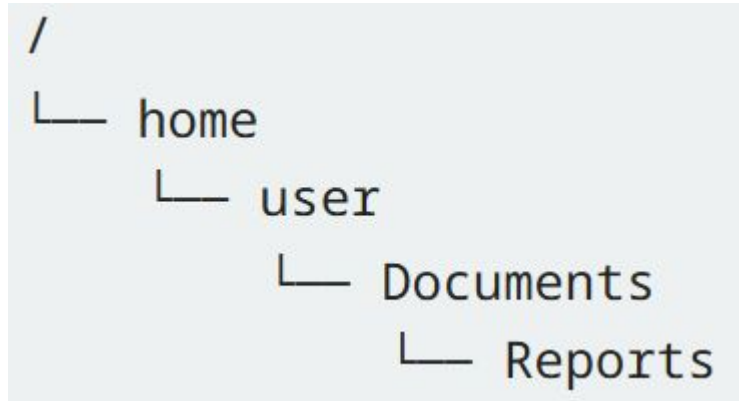
- `pwd` → absolute path
- the path contains every step of the path, from the top of the filesystem (`/`) to the bottom (Reports).
- Absolute paths always begin with `/`

```
/
└─ home
    └─ user
        └─ Documents
            └─ Reports
```

Absolute Paths

- All the information to get to Reports from anywhere.
- The path contains every step of the path, from the top (/) to the bottom (Reports).

Absolute paths always begin with /



Relative Paths

- Based in your current location

```
user@hostname ~/Documents $ cd Reports
```

Special Relative Paths

- . → current location
- .. → parent directory

```
user@hostname ~/Documents/Reports $ ls -a  
.  
..  
report2018.txt
```

Special Relative Paths

- . → current location
- .. → parent directory

```
user@hostname ~/Documents/Reports $ cd ..  
user@hostname ~/Documents $ pwd  
/home/user/Documents
```

```
user@hostname ~/Documents $ cd ../../  
$ pwd  
/home
```

Linux- Ejercicio 26

- For each of the following paths, identify whether it is absolute or relative:

<code>/home/user/Downloads</code>	
<code>../Reports</code>	
<code>/var</code>	
<code>docs</code>	
<code>/</code>	

Linux- Ejercicio 27

- Observe the following file structure. Note: Directories end with a slash (/) when tree is invoked with the -F option. You will need elevated privileges in order to run the tree command on the root (/) directory. The following is example output and is not indicative of a full directory structure. Use it to answer the following questions:

A user enters the following commands:

```
$ cd /etc/udev
```

```
$ ls -a
```

What will be the output of the ls -a command?

```
$ sudo tree -F /
```

```
/
├── etc/
│   ├── network/
│   │   └── interfaces
│   ├── systemd/
│   │   ├── resolved.conf
│   │   ├── system/
│   │   ├── system.conf
│   │   ├── user/
│   │   └── user.conf
│   └── udev/
│       ├── rules.d/
│       └── udev.conf
└── home/
    ├── lost+found/
    └── user/
        └── Documents/
```

12 directories, 5 files

Linux- Ejercicio 28

● Enter the shortest possible command for each of the following:

- Your current location is root (/). Enter the command to navigate to `lost+found` within the `home` directory (example):

```
$ cd home/lost+found
```

- Your current location is root (/). Enter the command to navigate to the directory named `/etc/network/`.
- Your current location is `/home/user/Documents/`. Navigate to the directory named `/etc/`.
- Your current location is `/etc/systemd/system/`. Navigate to the directory named `/home/user/`.

Linux- Ejercicio 29

- Consider the following commands:

```
$ pwd  
/etc/udev/rules.d  
$ cd ../../systemd/user  
$ cd ..  
$ pwd
```

What is the output of the final pwd command?

Linux- Ejercicio 30

- Suppose a user has entered the following commands:

```
$ mkdir "this is a test"  
$ ls  
this is a test
```

What cd command would allow you to enter this directory?

Linux- Ejercicio 31

- Try this again, but after typing in `cd` this, press the TAB key. What is now displayed on the prompt?

Linux- Ejercicio 32

- Try to create a directory whose name contains a \ character. Display the directory's name with ls and delete the directory.

Case Sensitivity in paths

- Ubuntu → Case Sensitive
- Windows → !Case Sensitive

```
$ cd /  
$ ls  
bin    dev    home  lib64  mnt    proc   run    srv    tmp    var  
boot   etc     lib   media  opt    root   sbin   sys    usr  
$ cd ETC  
bash: cd: ETC: No such file or directory  
$ pwd  
/  
$ cd etc  
$ pwd  
/etc
```

Creating Directories

- mkdir
- -p → create parent directories

```
$ mkdir creating moving copying/files copying/directories deleting/directories deleting/files  
globs  
mkdir: cannot create directory 'copying/files': No such file or directory  
mkdir: cannot create directory 'copying/directories': No such file or directory  
mkdir: cannot create directory 'deleting/directories': No such file or directory  
mkdir: cannot create directory 'deleting/files': No such file or directory  
$ ls  
creating  globs  moving
```

Creating Directories

- `mkdir -p`
- `find` as `ls` without options

```
$ mkdir -p creating moving copying/files copying/directories deleting/directories  
deleting/files globs
```

```
$ find  
.  
./creating  
./moving  
./globs  
./copying  
./copying/files  
./copying/directories  
./deleting  
./deleting/directories  
./deleting/files
```

Creating Files

- touch
- existing file → contents ==
modification timestamp !=

Creating Simple Text Files

- `echo "data" > name_file`
- `>` → write output in the file
- if file exists overwritten it

```
$ echo hello > question15
$ cat question15
hello
```

Renaming Files

- mv
- if name exists overwritten it
- -i to ask permission

```
$ mv file22 file2
$ ls
file1  file2  file3  file4
```

```
$ mv -i file4 file3
mv: overwrite 'file3'? y
```

Moving Files

- `mv` → move files inside directory
- last argument == directory
- 1 or more files

```
$ mv file1 dir1
$ ls
dir1  dir2  file2  file3  file5
$ ls dir1
file1
```

```
$ mv file2 file3 dir2
$ ls
dir1  dir2  file5
$ ls dir2
file2  file3
```

Renaming directories

- `mv` → arguments should be directories

```
$ ls
dir1  dir2  file5
$ ls dir1
file1
$ mv dir1 dir3
$ ls
dir2  dir3  file5
$ ls dir3
file1
```

Deleting files and directories

- `rm` → delete files and directories
- `rmdir` → delete empty directories

```
$ cd ~/linux_essentials-2.4/moving
$ ls
dir2  dir3  file5
$ rmdir file5
rmdir: failed to remove 'file5': Not a directory
$ rm file5
$ ls
dir2  dir3
```

Deleting files and directories

- `rmdir` → only empty directories
- `rm` → `-r` files, directories and subdirectories

Copying Files and Directories

- cp → copy files inside directory
- last argument == directory
- 1 or more files

```
$ cp /etc/nsswitch.conf files/nsswitch.conf  
$ cp /etc/issue /etc/hostname files
```

```
$ cat hostname  
mycomputer  
$ cat issue  
Debian GNU/Linux 9 \n \l  
  
$ cp hostname issue  
$ cat issue  
mycomputer
```

Copying Files and Directories

- `cp` → `-r` for directories
- last argument == directory
- 1 or more files

```
$ cp /etc/nsswitch.conf files/nsswitch.conf  
$ cp /etc/issue /etc/hostname files
```

```
$ cat hostname  
mycomputer  
$ cat issue  
Debian GNU/Linux 9 \n \l  
  
$ cp hostname issue  
$ cat issue  
mycomputer
```

Linux- Ejercicio 33

- Given the following, select the directories that would be created by the command `mkdir -p /tmp/outfiles/text/today /tmp/infiles/text/today`

```
$ pwd
/tmp
$ find
.
./outfiles
./outfiles/text
```

/tmp

/tmp/outfiles

/tmp/outfiles/text

/tmp/outfiles/text/today

/tmp/infiles

/tmp/infiles/text

/tmp/infiles/text/today

Linux- Ejercicio 34

- What does -v do for mkdir, rm, and cp?

Linux- Ejercicio 35

- What happens when you use `mv` to move a directory into itself?

Linux- Ejercicio 36

- What happens if you accidentally attempt to copy three files on the same command line to a file that already exists instead of a directory?

Linux- Ejercicio 37

- Use the cp man page to find out how to make a copy of a file and have the permissions and modification time match the original.

Linux- Ejercicio 38

- What does the `rmdir -p` command do? Experiment with it and explain how it differs from `rm -r`.

Linux- Ejercicio 39

- DO NOT ACTUALLY EXECUTE THIS COMMAND: What do you think `rm -ri /*` will do? (HONESTLY, DO NOT ATTEMPT TO DO THIS!)

Linux- Ejercicio 40

- Other than using `-i`, is it possible to prevent `mv` from overwriting destination files?

Linux- Ejercicio 41

- Explain the command `cp -u`.

Globbering

- POSIX.1-2017
- *.?.[]
- 1 or more files

```
$ ls
question1    question14  question2012  star10      star2002
question13   question15  question23    star1100    star2013
$ ls star1*
star10  star1100
$ ls star*
star10  star1100  star2002  star2013
$ ls star2*
star2002  star2013
$ ls star2*2
star2002
$ ls star2013*
star2013
```

Globbing

- POSIX.1-2017

- `?`

```
$ ls
question1    question14  question2012  star10      star2002
question13   question15  question23    star1100    star2013
$ ls question?
question1
$ ls question1?
question13  question14  question15
$ ls question?3
question13  question23
$ ls question13?
ls: cannot access question13?: No such file or directory
```

Globbing

- POSIX.1-2017

- `[]`

```
$ ls
file1  file2  file3  file4  file5  file6  file7  filea  fileb  filec
$ ls file[1-2]
file1  file2
$ ls file[1-3]
file1  file2  file3
```

Globbing

- POSIX.1-2017

- `[]`

```
$ ls file[1-25-7]
```

```
file1  file2  file5  file6  file7
```

```
$ ls file[1-35-6a-c]
```

```
file1  file2  file3  file5  file6  filea  fileb  filec
```

```
$ ls file[1a5] $ ls file[^a]
```

```
file1  file5  file1  file2  file3  file4  file5  file6  file7  fileb  f
```

Globbing

- POSIX.1-2017

- `[]`

```
$ ls file[1a5]  
file1  file5  filea
```

```
$ ls file[^a]  
file1  file2  file3  file4  file5  file6  file7  fileb  filec
```

Globbing

- POSIX.1-2017
- [1] man 7 regex

```
$ ls file[[:digit:]]
file1  file2  file3  file4  file5  file6  file7
$ touch file1a file11
$ ls file[[:digit:]]a
file1  file2  file3  file4  file5  file6  file7  filea
$ ls file[[:digit:]]a
file1a
```

Linux- Ejercicio 42

● Which of the following files would `log_[a-z]_201?*_01.txt` match?

<code>log_3_2017_Jan_01.txt</code>	
<code>log+_2017_Feb_01.txt</code>	
<code>log_b_2007_Mar_01.txt</code>	
<code>log_f_201A_Wednesday_01.txt</code>	

Linux- Ejercicio 43

- Create a few globs to match the following list of file names:

doc100

doc200

doc301

doc401

Compression

- cp → copy files inside directory

- last argument == directory

```
$ cat /etc/* > bigfile 2> /dev/null
```

```
$ cp bigfile bigfile2
```

```
$ cp bigfile bigfile3
```

```
$ cp bigfile bigfile4
```

```
$ ls -lh
```

```
total 2.8M
```

```
-rw-r--r-- 1 emma emma 712K Jun 23 08:08 bigfile
```

```
-rw-r--r-- 1 emma emma 712K Jun 23 08:08 bigfile2
```

```
-rw-r--r-- 1 emma emma 712K Jun 23 08:08 bigfile3
```

```
-rw-r--r-- 1 emma emma 712K Jun 23 08:08 bigfile4
```

Compression

- Removed the uncompressed files
- Sizes of compressed files

```
$ bzip2 bigfile2
```

```
$ gzip bigfile3
```

```
$ xz bigfile4
```

```
$ ls -lh
```

```
total 1.2M
```

```
-rw-r--r-- 1 emma emma 712K Jun 23 08:08 bigfile
```

```
-rw-r--r-- 1 emma emma 170K Jun 23 08:08 bigfile2.bz2
```

```
-rw-r--r-- 1 emma emma 179K Jun 23 08:08 bigfile3.gz
```

```
-rw-r--r-- 1 emma emma 144K Jun 23 08:08 bigfile4.xz
```

Uncompression

- Removed the compressed files
- Sizes of compressed files

```
$ bunzip2 bigfile2.bz2
```

```
$ gunzip bigfile3.gz
```

```
$ unxz bigfile4.xz
```

```
$ ls -lh
```

```
total 2.8M
```

```
-rw-r--r-- 1 emma emma 712K Jun 23 08:20 bigfile
```

```
-rw-r--r-- 1 emma emma 712K Jun 23 08:20 bigfile2
```

```
-rw-r--r-- 1 emma emma 712K Jun 23 08:20 bigfile3
```

```
-rw-r--r-- 1 emma emma 712K Jun 23 08:20 bigfile4
```

Compression Levels

```
$ cp /etc/hosts ./
```

```
$ gzip hosts
```

```
$ zcat hosts.gz
```

```
127.0.0.1      localhost
```

```
# The following lines are desirable for IPv6 capable host
```

```
::1      localhost ip6-localhost ip6-loopback
```

```
ff02::1 ip6-allnodes
```

```
ff02::2 ip6-allrouters
```

```
-rw-r--r-- 1 emma emma 156K Jun 23 08:08 bigfile-xz1.xz
```

```
-rw-r--r-- 1 emma emma 143K Jun 23 08:08 bigfile-xz9.xz
```

Compression Levels

- prefix:z bz xz

- Leves [1..9]

```
$ cp /etc/hosts ./
```

```
$ gzip hosts
```

```
$ zcat hosts.gz
```

```
127.0.0.1      localhost
```

```
# The following lines are desirable for IPv6 capable hosts
```

```
::1      localhost ip6-localhost ip6-loopback
```

```
ff02::1 ip6-allnodes
```

```
ff02::2 ip6-allrouters
```

Compression Levels

- Default compression 6
- Leves [1..9]

GZIP(1)

General Commands Manual

GZIP(1)

NAME

gzip, gunzip, zcat - compress or expand files

SYNOPSIS

```
gzip [ -acdfhklLnNrtvV19 ] [-S suffix] [ name ... ]  
gunzip [ -acfhkllLnNrtvV ] [-S suffix] [ name ... ]  
zcat [ -fhLV ] [ name ... ]
```

Tarball

- Packages multiple files and directories into a single file (**tar command**)
- Preserves directory structure, file names, metadata (permissions, timestamps)
- **Does not compress**: sum of the original files' sizes + metadata.

Tarball

- Create compression archive
- View content
- Extract file

```
$ tar cf archiving/3.1.tar compression
```

```
$ tar -tf 3.1.tar
compression/
compression/bigfile-xz1.xz
compression/bigfile-gz9.gz
compression/hosts.gz
compression/bigfile2
compression/bigfile
compression/bigfile-gz1.gz
compression/bigfile-xz9.xz
compression/bigfile3
compression/bigfile4
```

```
$ tar xf 3.1.tar
$ ls
3.1.tar  compression
```

Compression

- z, j, J → compression options
- second extension
- tar.gz → .tgz

```
$ ls
bigfile  bigfile3  bigfile-gz1.gz  bigfile-xz1.xz  hosts.gz
bigfile2 bigfile4  bigfile-gz9.gz  bigfile-xz9.xz
$ tar -czf gzip.tar.gz bigfile bigfile2 bigfile3
$ tar -cjf bzip2.tar.bz2 bigfile bigfile2 bigfile3
$ tar -cJf xz.tar.xz bigfile bigfile2 bigfile3
$ ls -l | grep tar
-rw-r--r-- 1 emma emma 450202 Jun 27 05:56 bzip2.tar.bz2
-rw-r--r-- 1 emma emma 548656 Jun 27 05:55 gzip.tar.gz
-rw-r--r-- 1 emma emma 147068 Jun 27 05:56 xz.tar.xz
```

Add files to tarball

- -u → add uncompressed files

- compressed files → error

```
$ ls
bigfile  bigfile3  bigfile-gz1.gz  bigfile-xz1.xz  bzip2.tar.bz2  hosts.gz
bigfile2  bigfile4  bigfile-gz9.gz  bigfile-xz9.xz  gzip.tar.gz    xz.tar.xz
$ tar cf plain.tar bigfile bigfile2 bigfile3
$ tar tf plain.tar
bigfile
bigfile2
bigfile3
$ tar uf plain.tar bigfile4
$ tar tf plain.tar
bigfile
bigfile2
bigfile3
bigfile4
$ tar uzf gzip.tar.gz bigfile4
tar: Cannot update compressed archives
Try 'tar --help' or 'tar --usage' for more information.
```

Zip

- -r → recursive
- unzip

```
$ zip -r zipfile.zip dir
adding: dir/ (stored 0%)
adding: dir/file1 (stored 0%)
adding: dir/file2 (stored 0%)
```

```
$ ls
zipfile.zip
$ unzip zipfile.zip
Archive:  zipfile.zip
    creating: dir/
    extracting: dir/file1
    extracting: dir/file2
$ find
.
./zipfile.zip
./dir
./dir/file1
./dir/file2
```

Linux- Ejercicio 44

- According to the extensions, which of the following tools were used to create these files?

Filename	tar	gzip	bzip2	xz
archive.tar				
archive.tgz				
archive.tar.xz				

Linux- Ejercicio 45

- According to the extensions, which of the following tools were used to create these files?

Filename	Archive	Compressed
file.tar		
file.tar.bz2		
file.zip		
file.xz		

Linux- Ejercicio 46

- How would you add a file to a gzip compressed tar file?

Linux- Ejercicio 47

- Which tar option instructs tar to include the leading / in absolute paths?

Linux- Ejercicio 48

- Does zip support different compression levels?

Linux- Ejercicio 49

- When extracting files, does tar support globs in the file list?

Linux- Ejercicio 50

- Does zip support different compression levels?

Linux- Ejercicio 51

- What happens if you try to extract a file from a tar archive that already exists on your filesystem?

Linux- Ejercicio 52

- How would you extract the file archive.tgz without using the tar z option?

Linux- Ejercicio 53

Búsquedas en el sistema de ficheros. Comodines. Crear un subdirectorio prueba que cuelgue del directorio de inicio del usuario, y dentro de él, crear un árbol de directorios con un mínimo de dos niveles de profundidad, y de dos subdirectorios hijos por cada directorio, con nombres cualesquiera. Crear también un mínimo de seis ficheros (aunque estén vacíos) en cada uno de los directorios generados, incluyendo los subdirectorios intermedios, dos de ellos con un nombre cualquiera y extensión `.cpp`, otros dos con los mismos nombres pero usando la extensión `.h`, y otros dos con la extensión `.txt`¹. Al menos un fichero de cada subdirectorio debe llamarse con un nombre que empiece por 'a'. Usar para todo ello los comandos `mkdir` y `touch`. Volver finalmente al directorio de inicio y, desde allí, usar el comando `find` para mostrar toda la jerarquía construida. Usando convenientemente los comodines y las opciones `-name`, `-type f` y `-type d`, mostrar solamente: *a)* todos los directorios, *b)* todos los ficheros, *c)* todos los ficheros con extensión `.h`, *d)* todos los ficheros con extensión de exactamente tres caracteres, *e)* todos los ficheros cuyo nombre empiece por 'a', *f)* todos los ficheros cuyo nombre no empiece por 'a', *g)* todos los ficheros cuyo nombre empiece por una letra entre la 'a' y la 'g'.

Linux- Ejercicio 54

- **Copias de seguridad. Compresión y descompresión.** Generar una copia de todo el árbol de directorios prueba llamada `copiaprueba`, usando la orden `cp -Rp`. Consulta en el manual de `cp` qué significan exactamente estas dos opciones. Copiar también dentro de alguno de los subdirectorios algunos comandos del directorio `/usr/bin` (para que ocupen algún espacio). Genera ahora, usando la orden `tar` con las opciones `czvf`, un fichero comprimido llamado `prueba.tar.gz`, que contenga todo el directorio `prueba`. Comprobar el tamaño del directorio en disco (con `du -hs`, y compararlo con el tamaño del fichero comprimido generado (con `ls -l`). Listar los contenidos del mismo con `tar tzvf`, y una vez comprobada la corrección del mismo, intentar borrar íntegramente el directorio con `rmdir`. Al no estar vacío, no se puede borrar, así que tendremos que borrarlo usando las opciones `-rf` del comando `rm` (consultar en el manual su significado). Finalmente, y una vez comprobado con `ls` que el directorio ha sido convenientemente borrado, restaurarlo con `tar xzvf`².

Linux- Ejercicio 55



Archiva y comprime con la orden `tar` todos los ficheros de tu directorio de trabajo y de sus subdirectorios en un fichero llamado `trabajo.tgz`.

Linux- Ejercicio 56,57,58



1. Haz una copia de seguridad de los subdirectorios `/boot` y `/sbin` en un fichero llamado `/root/backup1.tgz`. La copia de seguridad ha de estar empaquetada y comprimida.
2. Dentro del directorio `/root` crea un subdirectorio llamado `boot_sbin` y recupera en su interior todos los ficheros de la copia `/root/backup1.tgz`.
3. ¿Qué opción habría que indicar al hacer la copia de seguridad, y al deshacerla, para que los nombres de todos los ficheros almacenados se guarden con ruta absoluta y no con relativa?

Linux

- ```
sudo dd if=/dev/zero of=/root/fichero_sf bs=1k count=1440
sudo losetup -f /root/fichero_sf
losetup -a | grep fichero_sf
```

# Linux- Ejercicio 59

Haz una copia de seguridad de los subdirectorios `/boot` y `/sbin` en un fichero llamado `/root/backup1.tgz`. La copia de seguridad ha de estar empaquetada y comprimida.

Dentro del directorio `/root` crea un subdirectorio llamado `boot_sbin` y recupera en su interior todos los ficheros de la copia `/root/backup1.tgz`.

¿Qué opción habría que indicar al hacer la copia de seguridad, y al deshacerla, para que los nombres de todos los ficheros almacenados se guarden con ruta absoluta y no con relativa?

Haz una copia de seguridad del directorio `/etc/rc.d` sobre el dispositivo `/dev/loop1`. La copia tiene que estar empaquetada y comprimida con la herramienta `bzip2`, además tiene que almacenar para los enlaces simbólicos el fichero al que apuntan y no el fichero enlace simbólico.

**NOTA IMPORTANTE:** En el caso de que el dispositivo destino de la copia, `/dev/loop1`, estuviese formateado previamente, debes tener en cuenta que al realizar esta copia el sistema lo va a tratar como un fichero, eliminando la estructura de sistema de ficheros que había inicialmente con el formato dado. Por tanto, a partir de ese momento, ese dispositivo no se podrá montar, ya que no hay sistema de ficheros creado, habiéndose perdido toda la jerarquía de directorios y toda la información que contuviese. Sólo se podrá acceder a él como un fichero de copia de seguridad.

# Standard Output

- `>` → redirect standard output
- if file exists → overwrite

```
$ echo "Hello World!" > text
$ cat text
Hello World!
```

```
$ echo "Hello!" > text
$ cat text
Hello!
```

# Standard Output

- >> → redirect standard output
- if file exists → append

```
$ echo "Hello to you too!" >> text
$ cat text
Hello!
Hello to you too!
```

# Standard Error

- 2> → redirect standard error
- if file exists → overwrite
- bit bucket

```
$ sort /etc 2> /dev/null
```

```
$ find /usr games 2> text-error
```

```
/usr
```

```
/usr/share
```

```
/usr/share/misc
```

```
-----Omitted output-----
```

```
/usr/lib/libmagic.so.1.0.0
```

```
/usr/lib/libdns.so.81
```

```
/usr/games
```

```
$ cat text-error
```

```
find: `games': No such file or directory
```

# Redirecting Standard Input

- `<` → from file to command
- Usually for commands don't accept file arguments (tr)

```
$ tr -d "l" < text
Heo!
Heo to you too!
```

```
$ cat < text
Hello!
Hello to you too!
```

# Here Documents

- << → Here Documents
- first word (delimiter) == end of the input

```
$ cat << hello
> hey
> ola
> hello
hey
ola
```

# Combinations

- **&>**    **&>>** → standard output and standard error output to the same file

```
$ find /usr admin &> newfile
$ cat newfile
/usr
/usr/share
/usr/share/misc
-----Omitted output-----
/usr/lib/libmagic.so.1.0.0
/usr/lib/libdns.so.81
/usr/games
find: `admin': No such file or directory
$ find /etc/calendar &>> newfile
$ cat newfile
/usr
/usr/share
/usr/share/misc
-----Omitted output-----
/usr/lib/libmagic.so.1.0.0
/usr/lib/libdns.so.81
/usr/games
find: `admin': No such file or directory
/etc/calendar
/etc/calendar/default
```

# Command Line Pipes

- | → First command's output becomes the second command's input

```
$ cat /etc/passwd | less
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/bin/sh
bin:x:2:2:bin:/bin:/bin/sh
:
```

```
$ ls -l | head | wc -w
10
```

# Linux- Ejercicio 60

- List the contents of your current directory, including the ownership and permissions, and redirect the output to a file called contents.txt within your home directory.

# Linux- Ejercicio 61

- Sort the contents of the contents.txt file from your current directory and append it to the end of a new file named contents-sorted.txt.

# Linux- Ejercicio 62

- Display the last 10 lines of the `/etc/passwd` file and redirect it to a new file in the your user's Documents directory. (`tail`)

# Linux- Ejercicio 63

- Count the number of words within the contents.txt file and append the output to the end of a file field2.txt in your home directory. You will need to use both input and output redirection.

# Linux- Ejercicio 64

- Display the first 5 lines of the `/etc/passwd` file and sort the output reverse alphabetically.

# Linux- Ejercicio 65

- Using the previously created contents.txt file, count the number of characters of the last 9 lines.

# Linux- Ejercicio 66

- Count the number of files called test within the /usr/share directory and its subdirectories. Note: each line output from the find command represents a file.

# Linux- Ejercicio 67

- Select the second field of the contents.txt file and redirect the standard output and error output to another file called field1.txt.

# Linux- Ejercicio 68

- Using the input redirection operator and the tr command, delete the dashes (-) from the contents.txt file.

# Linux- Ejercicio 69

- What is the biggest advantage of only redirecting errors to a file?

# Linux- Ejercicio 70

- Replace all recurrent spaces within the alphabetically sorted contents.txt file with a single space.

# Linux- Ejercicio 71

- In one command line, eliminate the recurrent spaces (as done in the previous exercise), select the ninth field and sort it reverse alphabetically and non-case sensitive. How many pipes did you have to use?

# Searching within Files with grep

- grep → “global regular expression print”
- Outputs the line containing the specified pattern highlighted in red.

# Searching within Files with grep

- grep → “global regular expression print”

.

Match any single character (except newline)

[abcABC]

Match any one character within the brackets

[^abcABC]

Match any one character except the ones in the brackets

[a-z]

Match any character in the range

[^a-z]

Match any character except the ones in the range

sun|moon

Find either of the listed strings

^

Start of a line

\$

End of a line

# Searching within Files with grep

- “ ” → exact match
- “ [ ] ” → any character inside bracket

```
$ grep "ab" text.txt
```

```
aaabbb1
```

```
abab2
```

```
$ grep "[ab]" text.txt
```

```
aaabbb1
```

```
abab2
```

```
class1
```

```
alien2
```

# Searching within Files with grep

- “^x” → start line
- “2\$” → end of line

```
$ grep "^a" text.txt
aaabbb1
abab2
alien2

$ grep "2$" text.txt
abab2
noone2
alien2
```

# grep- Meta-characters to multiplication pattern



A regular expression may be followed by one of several repetition operators:

|                                  |                                                                                          |
|----------------------------------|------------------------------------------------------------------------------------------|
| <code>?</code>                   | The preceding item is optional and matched at most once.                                 |
| <code>*</code>                   | The preceding item will be matched zero or more times.                                   |
| <code>+</code>                   | The preceding item will be matched one or more times.                                    |
| <code>{<u>n</u>}</code>          | The preceding item is matched exactly <u>n</u> times.                                    |
| <code>{<u>n</u>,}</code>         | The preceding item is matched <u>n</u> or more times.                                    |
| <code>{,<u>m</u>}</code>         | The preceding item is matched at most <u>m</u> times. This is a GNU extension.           |
| <code>{<u>n</u>,<u>m</u>}</code> | The preceding item is matched at least <u>n</u> times, but not more than <u>m</u> times. |

# grep- Meta-characters to multiplication pattern

- `grep -E` → basic (BRE) vs extended (“ERE”)  
ERE: Don’t need to use backslash (“\”) to escape metacharacters

```
$ grep -E "ab.+" text.txt
aaabbb1
abab2
```

# grep- Meta-characters to multiplication pattern

- grep -E → basic (BRE) vs extended (“ERE”)

grep understands three different versions of regular expression syntax: “basic” (BRE), “extended” (ERE) and “perl” (PCRE). In GNU grep there is no difference in available functionality between basic and extended syntaxes. In other implementations, basic regular expressions are less powerful. The following description applies to extended regular expressions; differences for basic regular expressions are summarized afterwards. Perl-compatible regular expressions give additional functionality, and are documented in B<pcresyntax>(3) and B<pcregex>(3), but work only if PCRE support is enabled.

The fundamental building blocks are the regular expressions that match a single character. Most characters, including all letters and digits, are regular expressions that match themselves. Any meta-character with special meaning may be quoted by preceding it with a backslash.

## Basic vs Extended Regular Expressions

In basic regular expressions the meta-characters `?`, `+`, `{`, `|`, `(`, and `)` lose their special meaning; instead use the backslashed versions `\?`, `\+`, `\{`, `\|`, `\(`, and `\)`.

# grep- Meta-characters to multiplication pattern

- `grep -E` → To use ERE

```
$ grep -E "ab.+" text.txt
aaabbb1
abab2
```

# Linux- Ejercicio 72..77

- Using grep and the /usr/share/hunspell/en\_US.dic file, find the lines that match the following criteria:

72-All lines containing the word cat anywhere on the line.

73-All lines that do not contain any of the following characters: sawgtfixk.

74-All lines that start with any 3 letters and the word dig.

75-All lines that end with at least one e.

76-All lines that contain one of the following words: org , kay or tuna.

77-Number of lines that start with one or no c followed by the string ati.

# Linux- Ejercicio 78

Find the regular expression that matches the words in the “Include” line and doesn’t match the ones in the “Exclude” line:

Include: pot, spot, apot

Exclude: potic, spots, potatoe

Include: arp99, apple, zipper

Exclude: zoo, arive, attack

Include: arcane, capper, zoology

Exclude: air, coper, zoloc

Include: 0th/pt, 3th/tc, 9th/pt

Exclude: 0/nm, 3/nm, 9/nm

Include: Hawaii, Dario, Ramiro

Exclude: hawaii, Ian, Alice

# Linux- Ejercicio 79

- What other useful command is commonly used to search within the files? What additional functionalities does it have?

# Linux- Ejercicio 80

- Use one of the examples and try to look for a specific pattern within the output of the command, with the help of grep.

# Printing Output

- Sending the command to the file

```
$ echo 'echo "Hello World! "' > new_script
$ cat new_script
echo "Hello World!"
```

# Making a Script Executable

- command doesn't exist. Why?
- second extension
- tar.gz → .tgz

```
$ new_script
/bin/bash: new_script: command not found
```

# Commands and PATH

- which → pathname to the command
- \$PATH → contains all the directories of the command, delimiter :

```
$ which ls
/bin/ls
```

```
$ echo $PATH
/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap
/bin
```

# Commands and PATH

- best approach→ specify the current location

```
$./new_script
/bin/bash: ./new_script: Permission denied
```

# Execute Permissions

- best approach → Owner, group, others

**Lectura (r)** = 4

**Escritura (w)** = 2

**Ejecución (x)** = 1

**rw~~x~~** = 4 + 2 + 1 = 7

**rw~~-~~** = 4 + 2 + 0 = 6

**r~~--~~** = 4 + 0 + 0 = 4

```
$ ls -l new_script
-rw-rw-r-- 1 user user 20 Apr 30 12:12 new_script
```

# Execute Permissions

- `chmod` → change permissions
  - `+x` allow execute permissions to all users

```
$ chmod +x new_script
$ ls -l new_script
-rwxrwxr-x 1 user user 20 Apr 30 12:12 new_script
```

```
$./new_script
Hello World!
```

# Defining the Interpreter

- `#!/bin/bash` → shebang  
S.O have to use this interpreter to exec the script  
`.sh` → 'extension' of the script

```
#!/bin/bash

This is our first comment.

echo "Hello World!"
```

# Variables

- declaring variables → without spaces (avoiding errors)

implicit type in variables → strings  
`$((a+b))`

```
#!/bin/bash

Este es nuestro primer

username=Carol

echo "Hello $username!"
```

```
#!/bin/bash

Este es nuestro primer

username=Carol
x=2
y=4
z=$((x+y))
echo "Hello $username!"
echo "$x + $y"
echo "$z"
```

# Using Quotes with Variables

- Interpreted line-by-line
- whitespace → end of the assignment

```
#!/bin/bash

This is our first comm

username=Carol Smith

echo "Hello $username!"
```

```
$./new_script.sh
./new_script.sh: line 5: Smith: command not found
Hello !
```

# Using Quotes with Variables

- ‘ ‘ → avoid expanding variables
- “ “ → expanding variables

```
#!/bin/bash

Este es nuestro primer

username="Carol Smith"

echo "Hello $username!"
echo 'Hello $username!'
```

```
$./new_script.sh
Hello Carol Smith!
Hello $username!
```

# Arguments

- arguments → \$1 .. \$9
- “ “ → expanding variables

```
#!/bin/bash

Este es nuestro primer comentario

username=$1

echo "Hello $username!"
```

```
$./new_script.sh Carol
Hello Carol!
```

```
#!/bin/bash

Este es nuestro primer comentario. Tal vez el segundo.

username1=$1
username2=$2
echo "Hello $username1 and $username2!"
```

```
$./new_script.sh Carol Dave
Hello Carol and Dave!
```

# Returning the number of args

- `$#` → contains the number of arguments.

```
#!/bin/bash

Este es nuestro primer comentario

username=$1

echo "Hello $username!"
echo "Number of arguments: $#."
```

```
$./new_script.sh Carol Dave
Hello Carol!
Number of arguments: 2.
```

# Conditional Logic

- if [boolean exp]  
    then
- else

fi

```
$./new_script.sh
Please enter only one argument.
Number of arguments: 0.
$./new_script.sh Carol
Hello Carol!
Number of arguments: 1.
```

```
if [$# -eq 1]
then
 username=$1

 echo "Hello $username!"
else
 echo "Please enter only one argument."
fi
echo "Number of arguments: $#."
```

# Conditional logic

- man test → all comparisons

```
STRING1 != STRING2
 the strings are not equal

INTEGER1 -eq INTEGER2
 INTEGER1 is equal to INTEGER2

INTEGER1 -ge INTEGER2
 INTEGER1 is greater than or equal to INTEGER2

INTEGER1 -gt INTEGER2
 INTEGER1 is greater than INTEGER2
```

# Linux- Ejercicio 81

- The user types the following to their shell:

```
$ PATH=~/.scripts
$ ls
Command 'ls' is available in '/bin/ls'
The command could not be located because '/bin' is not included in the PATH environment
variable.
ls: command not found
```

What has the user done?

What command will combine the current value of PATH with the new directory ~/.scripts?

# Linux- Ejercicio 82

- Notice that it is using elif to check for a second condition:

The lines marked with a > contain errors

. Fix the errors.

```
> /!bin/bash

> fruit1 = Apples
> fruit2 = Oranges

 if [$1 -lt $#]
 then
 echo "This is like comparing $fruit1 and $fruit2!"
> elif [$1 -gt $2]
 then
> echo '$fruit1 win!'
 else
> echo "Fruit2 win!"
> done
```

# Linux- Ejercicio 83

- What will the output be in the following situations?

`./last.sh 3 0`

`./last.sh 2 4`

`./last.sh 0 1`

# Linux- Ejercicio 84

- Write a simple script that will check if exactly two arguments are passed. If so, print the arguments in reverse order.

# Linux- Ejercicio 85

- There is an environment variable that will print the current directory. Use `env` to discover the name of this variable.

# Linux- Ejercicio 86

- Write a script that accepts an argument. If an argument is passed, check if that argument matches the name of the current directory. If so, print yes. Otherwise, print no.

# Linux- Ejercicio 87

- Necesitamos comprobar la existencia de un archivo antes de procesarlo. Crea un script que acepte un argumento y verifique si un archivo con ese nombre existe en el directorio actual.

Output esperado en caso de error: `./check_file.sh <nombre_de_archivo>`

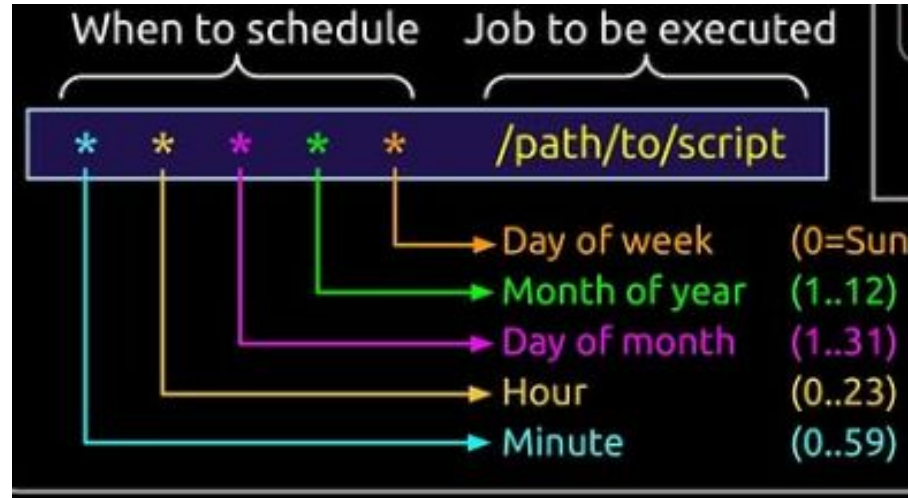
Se deberá usar la directiva `exit 1` para abortar la ejecución del programa

# Jobs with Cron

- cron → daemon
- What's a daemon?
  - starts automatically when system boots
  - no graphically interface
  - in background

# Jobs with Cron

- crontab
  - cronjob
  - cronjob
  - cronjob



# Linux- Ejercicio 88

- Create a simple scheduled job that executes the date command every day at 01:00 pm and save the info inside a file in your home directory

# Linux- Ejercicio 89

- Create another scheduled job that executes the command `ls` every minute, redirecting the output to the `output.log` file in your home directory

# Linux- Ejercicio 90

- Crear un cron job que:

Se ejecute todos los días a las 23:00

Cree un archivo comprimido .tar.gz con la fecha del día.

Guarde ese archivo en /home/tu\_nombre\_user/backups/.

# Linux- Ejercicio 91

- Modifica el cron job anterior para que se guarde un log a la vez que se crea el backup en un fichero copias.log almacenado en tu directorio /home

[Wed Apr 9 23:00:01 UTC 2025] Comenzando backup...

[Wed Apr 9 23:00:02 UTC 2025] Backup completado: backup-2025-04-09.tar.gz

# Google Cloud - GCP

Free trial status: €263.97 credit and 91 days remaining. Activate your full account to get unlimited access to all of Google Cloud—use any remaining credits, then pay only for what you use.

Google Cloud My First Project

Search (/) for resources, docs, products, and more Search

## Welcome, Diego

**You're in Free Trial**

0 out of €264 credits used

Expires August 5, 2025

[What happens when trial ends?](#)

[Activate full account](#)

You're working on project [My First Project](#)

Number: 1051435552624 ID: elite-destiny-459021-c2

[Add people to your project](#)

[Set up budget alerts](#)

[Review product spend](#)

Try Gemini 2.0 Flash

Try Gemini →

Recommended based on your interest in [Web](#), [Mobile](#), [Game](#), [Storage](#)

## Products

|                                                                                                                                           |                                                                                                                           |                                                                                                                               |                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
|  <b>Create a VM</b><br>Compute Engine                    |  <b>Create a database</b><br>Cloud SQL |  <b>Deploy an application</b><br>Cloud Run |  <b>Create a storage bucket</b><br>Cloud Storage |
|  <b>Create a Kubernetes cluster</b><br>Kubernetes Engine |  <b>Access services</b><br>APIs        |  <b>Create a network</b><br>VPC            |  <b>Build a mobile or web app</b><br>Firebase    |

# Google Cloud - GCP

- **NUNCA** SELECCIONAR ACTIVAR SINO SE TE COBRARÁ CUANDO GASTES LOS 300



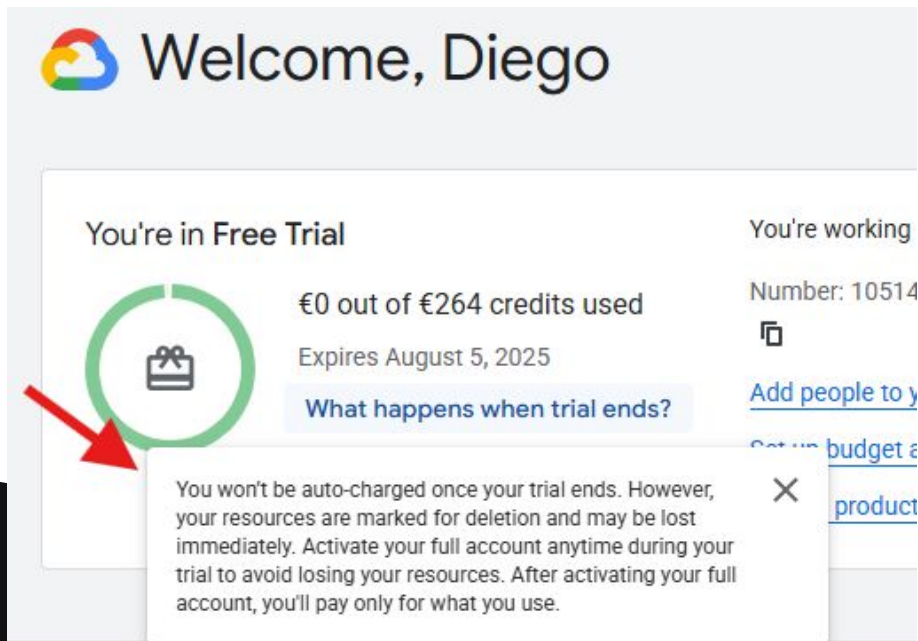
Free trial status: €263.97 credit and 91 days remaining. Activate your full account to get unlimited access to all of Google Cloud—use any remaining credits, then pay only for what you use.

DISMISS

ACTIVATE

# Google Cloud - GCP

## ● INFO Facturación GCP



Welcome, Diego

You're in Free Trial

€0 out of €264 credits used

Expires August 5, 2025

[What happens when trial ends?](#)

You're working

Number: 10514

[Add people to your team](#)

[Set up a budget alert](#)

[Get started with product](#)

You won't be auto-charged once your trial ends. However, your resources are marked for deletion and may be lost immediately. Activate your full account anytime during your trial to avoid losing your resources. After activating your full account, you'll pay only for what you use.

No se te cobrará automáticamente cuando finalice la prueba. Sin embargo, tus recursos están marcados para eliminarse y se pueden perder de inmediato. Activa tu cuenta completa en cualquier momento durante la prueba para evitar perder los recursos. Después de activar la cuenta completa, solo pagarás por lo que uses.

# Google Cloud - GCP

## ● Creación de una VM

The screenshot shows the Google Cloud console dashboard. At the top, there's a header with the Google Cloud logo, a project selector showing "My First Project", and a search bar. Below the header, a large banner says "Welcome, Diego". To the right of the banner is a navigation menu with icons for various services. Below the banner, there's a "You're in Free Trial" section with a progress indicator showing "€0 out of €264 credits used" and an expiration date of "August 5, 2025". It includes links for "What happens when trial ends?", "Activate full account", "Add people to your project", "Set up budget alerts", and "Review product spend". To the right of this section, it says "You're working on project My First Project" with project details and links for "Add people to your project", "Set up budget alerts", and "Review product spend". On the far right, there are two buttons: "Try Gemini 2.0 Flash" and "Try Gemini" with a right arrow.

Recommended based on your interest in [Web](#), [Mobile](#), [Game](#), [Storage](#)

### Products

A grid of recommended Google Cloud products. The first product, "Create a VM" (Compute Engine), is highlighted with a red border. The other products are "Create a database" (Cloud SQL), "Deploy an application" (Cloud Run), "Create a storage bucket" (Cloud Storage), "Create a Kubernetes cluster" (Kubernetes Engine), "Access services" (APIs), "Create a network" (VPC), and "Build a mobile or web app" (Firebase).

|                                                  |                                |                                    |                                          |
|--------------------------------------------------|--------------------------------|------------------------------------|------------------------------------------|
| Create a VM<br>Compute Engine                    | Create a database<br>Cloud SQL | Deploy an application<br>Cloud Run | Create a storage bucket<br>Cloud Storage |
| Create a Kubernetes cluster<br>Kubernetes Engine | Access services<br>APIs        | Create a network<br>VPC            | Build a mobile or web app<br>Firebase    |

[View all products](#)

[View all APIs](#)

[Compare with AWS and Azure](#)

# Google Cloud - GCP

- Compute Engine API → Gestion VM  
Gcloud CLI



# Google Cloud - GCP

## Machine configuration

Name \*  
servidor-lm-si

Region \*  
us-central1 (Iowa)

Zone \*  
us-central1-a

Region is permanent

Zone is permanent

NEW: General-purpose C4D machine series in Preview

Try the new C4D machine series with leading price-performance and advanced

Try now

☒ General purpose

☐ Compute optimized

☐ Memory optimized

☐ Storage optimized

☐ GPUs

Machine types for common workloads, optimized for cost and flexibility

| Series                              | Description                                  | vCPUs     | Memory       | CPU Platform    |
|-------------------------------------|----------------------------------------------|-----------|--------------|-----------------|
| <input type="radio"/> C4            | Consistently high performance                | 2 - 192   | 4 - 1,488 GB | Intel Emerald   |
| <input type="radio"/> C4A           | Arm-based consistently high performance      | 1 - 72    | 2 - 576 GB   | Google Axion    |
| <input type="radio"/> C4D           | <b>Preview</b> Consistently high performance | 2 - 384   | 3 - 3,024 GB | AMD Turin       |
| <input type="radio"/> N4            | Flexible & cost-optimized                    | 2 - 80    | 4 - 640 GB   | Intel Emerald   |
| <input type="radio"/> C3            | Consistently high performance                | 4 - 192   | 8 - 1,536 GB | Intel Sapphire  |
| <input type="radio"/> C3D           | Consistently high performance                | 4 - 360   | 8 - 2,880 GB | AMD Genoa       |
| <input checked="" type="radio"/> E2 | Low cost, day-to-day computing               | 0.25 - 32 | 1 - 128 GB   | Intel Broadwell |
| <input type="radio"/> N2            | Balanced price & performance                 | 2 - 128   | 2 - 864 GB   | Intel Cascade   |
| <input type="radio"/> N2D           | Balanced price & performance                 | 2 - 224   | 2 - 896 GB   | AMD Milan       |
| <input type="radio"/> T2A           | Scale-out workloads                          | 1 - 48    | 4 - 192 GB   | Ampere Altra    |
| <input type="radio"/> T2D           | Scale-out workloads                          | 1 - 60    | 4 - 240 GB   | AMD Milan       |
| <input type="radio"/> N1            | Balanced price & performance                 | 0.25 - 96 | 0.6 - 624 GB | Intel Haswell   |

## Monthly estimate

\$13.23

That's about \$0.02 hourly

Pay for what you use: no upfront costs and per second billing

| Item                           | Monthly estimate            |
|--------------------------------|-----------------------------|
| 2 vCPU + 2 GB memory           | \$12.23                     |
| 10 GB balanced persistent disk | \$1.00                      |
| <a href="#">Logging</a>        | <a href="#">Cost varies</a> |
| <a href="#">Monitoring</a>     | <a href="#">Cost varies</a> |
| Snapshot schedule              | <a href="#">Cost varies</a> |
| Total                          | \$13.23                     |

[Compute Engine pricing](#)

[Cloud Operations pricing](#)

[Less](#)

# Google Cloud - GCP

## Machine type

Choose a machine type with preset amounts of vCPUs and memory that suit most workloads. Or, you can create a custom machine for your workload's particular needs. [Learn more](#)

Preset

Custom

e2-small (2 vCPU, 1 core, 2 GB memory)



vCPU

0.5-2 vCPU (1 shared core)

Memory

2 GB

✓ Advanced configurations

# Google Cloud - GCP



My First Project

compute engine

X

Search

Navigation menu (.)

Create an instance

Create VM from...

- Machine configuration  
e2-small, us-central1-a
- OS and storage**  
Ubuntu 24.04 LTS Minimal
- Data protection  
Snapshot schedules
- Networking  
1 network interface
- Observability  
Install Ops Agent
- Security
- Advanced

## Operating system and storage

|                     |                              |
|---------------------|------------------------------|
| Name                | servidor-lm-si               |
| Type                | New balanced persistent disk |
| Size                | 10 GB                        |
| Snapshot schedule ? | default-schedule-1           |
| License type ?      | Free                         |
| Image               | Ubuntu 24.04 LTS Minimal     |

Change

## Additional disks

+ Add new disk

+ Attach existing disk

+ Add local SSD

## Container ?

Deploy a container image to this VM instance

Deploy container

## Monthly estimate

**\$13.23**  
That's about \$0.02 hourly  
Pay for what you use: no upfront costs and per second billing

| Item                           | Monthly estimate            |
|--------------------------------|-----------------------------|
| 2 vCPU + 2 GB memory           | \$12.23                     |
| 10 GB balanced persistent disk | \$1.00                      |
| <a href="#">Logging</a>        | <a href="#">Cost varies</a> |
| <a href="#">Monitoring</a>     | <a href="#">Cost varies</a> |
| Snapshot schedule              | <a href="#">Cost varies</a> |
| <b>Total</b>                   | <b>\$13.23</b>              |

[Compute Engine pricing](#)  
[Cloud Operations pricing](#)  
[Less](#)

# Google Cloud - GCP

[Public images](#)[Custom images](#)[Snapshots](#)[Archive Snapshots](#)[Existing Disks](#)

Operating system

Ubuntu

Version \*

Ubuntu 24.04 LTS Minimal

x86/64, amd64 noble minimal image built on 2025-05-01

Boot disk type \*

Balanced persistent disk

[Compare disk types](#)

Size (GB) \*

10

Provision between 10 and 3072 GB

[✓ Show advanced configuration](#)

Select

Cancel

# Google Cloud - GCP

Google Cloud

My First Project

compute engine

X

Search

Create an instance

Create VM from...

- Machine configuration  
e2-small, us-central1-a
- OS and storage  
Ubuntu 24.04 LTS Minimal
- Data protection  
Snapshot schedules
- Networking**  
2 firewall rules, 1 network interface
- Observability  
Install Ops Agent
- Security
- Advanced

## Networking

### Firewall

Add tags and firewall rules to allow specific network traffic from the Internet

- ☒ Allow HTTP traffic
- ☒ Allow HTTPS traffic
- ☐ Allow Load Balancer Health Checks

Network tags

?

Hostname

?

Set a custom hostname for this instance or leave it default. Choice is permanent

### IP forwarding

☐ Enable

## Network performance configuration

### Network bandwidth

☐ Enable per VM Tier\_1 networking performance

Maximum outbound network bandwidth: 1Gbps

VM to Public IP: 1Gbps

### Network interfaces

Network interface is permanent

▼ default default IPv4 (10.128.0.0/20)



[Add a network interface](#)

## Monthly estimate

\$13.23

That's about \$0.02 hourly

Pay for what you use: no upfront costs and per second billing

| Item                           | Monthly estimate            |
|--------------------------------|-----------------------------|
| 2 vCPU + 2 GB memory           | \$12.23                     |
| 10 GB balanced persistent disk | \$1.00                      |
| <a href="#">Logging</a>        | <a href="#">Cost varies</a> |
| <a href="#">Monitoring</a>     | <a href="#">Cost varies</a> |
| Snapshot schedule              | <a href="#">Cost varies</a> |
| Total                          | \$13.23                     |

[Compute Engine pricing](#)

[Cloud Operations pricing](#)

[^ Less](#)

# GCP- VM Instance On

Google Cloud

My First Project

compute engine

Search

Compute Engine

Overview

Security risk overview

Virtual machines

VM instances

Instance templates

Self-managed nodes

VM instances

Create Instance

Import VM

Refresh

Instances

Observability

Instance schedules

VM instances

Filter

Enter property name or value

| Status                              | Name ↑                         | Zone          | Recommendations | In use by | Internal IP       | External IP                         | Connect |
|-------------------------------------|--------------------------------|---------------|-----------------|-----------|-------------------|-------------------------------------|---------|
| <input checked="" type="checkbox"/> | <a href="#">servidor-lm-si</a> | us-central1-a |                 |           | 10.128.0.2 (nic0) | <a href="#">34.68.160.31</a> (nic0) | SSH     |

| Status                              | Name ↑                         | Zone          | Recommendations | In use by | Internal IP       | External IP                         | Connect |
|-------------------------------------|--------------------------------|---------------|-----------------|-----------|-------------------|-------------------------------------|---------|
| <input checked="" type="checkbox"/> | <a href="#">servidor-lm-si</a> | us-central1-a |                 |           | 10.128.0.2 (nic0) | <a href="#">34.68.160.31</a> (nic0) | SSH     |

# GCP - SSH in browser

## VM instances

Filter Enter property name or value

| <input type="checkbox"/> | Status | Name ↑                         | Zone          | Recommendations | In use by | Internal IP       | External IP                         | Connect |
|--------------------------|--------|--------------------------------|---------------|-----------------|-----------|-------------------|-------------------------------------|---------|
| <input type="checkbox"/> | ✓      | <a href="#">servidor-lm-si</a> | us-central1-a |                 |           | 10.128.0.2 (nic0) | <a href="#">34.68.160.31</a> (nic0) | SSH ▾   |

## Related actions

### Explore Backup and DR New

Back up your VMs and set up disaster recovery

### Set up firewall rules

Control traffic to and from a VM instance

```
ssh.cloud.google.com/v2/ssh/projects/elite-destiny-459021-c2/zones/us-central1-a/instances/ser...
ssh.cloud.google.com/v2/ssh/projects/elite-destiny-459021-c2/zones/us-central1-a/instances/s...
SSH-in-browser
UPLOAD FILE
DOWNLOAD FILE
Welcome to Ubuntu 24.04.2 LTS (GNU/Linux 6.11.0-1013-gcp x86_64)

* Documentation: https://help.ubuntu.com
* Management: https://landscape.canonical.com
* Support: https://ubuntu.com/pro

This system has been minimized by removing packages and content that are
not required on a system that users do not log into.

To restore this content, you can run the 'unminimize' command.

Expanded Security Maintenance for Applications is not enabled.

11 updates can be applied immediately.
11 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

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

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

diego_ayala_bernal2@servidor-lm-si:~$
```

# GCP - CLI config

## ● Instalación CLI Google Cloud

### Instrucciones de instalación ↗

Estas instrucciones son para instalar Google Cloud CLI. Para obtener información sobre cómo instalar componentes adicionales, como los comandos de la CLI de gcloud en el nivel de actualización alfa o beta, consulta [Administra los componentes de la CLI de gcloud](#).

★ **Nota:** Si estás detrás de un proxy o firewall, consulta la página sobre la [configuración de proxy](#) para obtener más información sobre la instalación.

Linux Debian/Ubuntu Red Hat/Fedora/CentOS macOS Windows

Google Cloud CLI funciona en Windows 8.1 y versiones posteriores, y en Windows Server 2012 y versiones posteriores.

1. Descarga el [instalador de la Google Cloud CLI](#).

También puedes abrir una terminal de PowerShell y ejecutar los siguientes comandos.



# GCP - CLI config

```
Welcome to the Google Cloud CLI! Run "gcloud -h" to get the list of available commands.
```

```

```

```
Welcome! This command will take you through the configuration of gcloud.
```

```
Your current configuration has been set to: [default]
```

```
You can skip diagnostics next time by using the following flag:
```

```
gcloud init --skip-diagnostics
```

```
Network diagnostic detects and fixes local network connection issues.
```

```
Checking network connection...done.
```

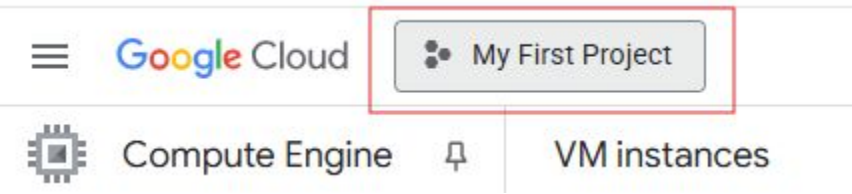
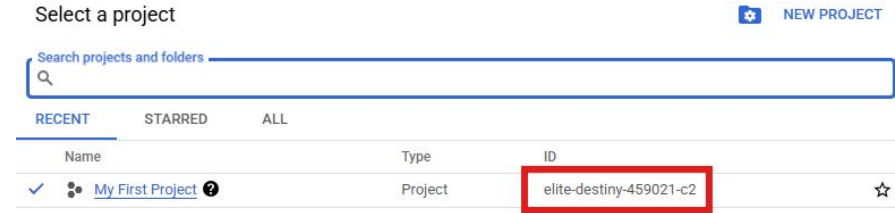
```
Reachability Check passed.
```

```
Network diagnostic passed (1/1 checks passed).
```

```
You must sign in to continue. Would you like to sign in (Y/n)?
```

# GCP - CLI config

- Mismo id de proyecto que el asignado a nuestra VM



| Name                                                                                                                   | Type    | ID                      |
|------------------------------------------------------------------------------------------------------------------------|---------|-------------------------|
| ✓  <a href="#">My First Project</a> ? | Project | elite-destiny-459021-c2 |

```
You are signed in as: [diego.ayala.bernal2@gmail.com].
```

```
Pick cloud project to use:
```

```
[1] elite-destiny-459021-c2
```

```
[2] Enter a project ID
```

```
[3] Create a new project
```

```
Please enter numeric choice or text value (must exactly match list item): 1
```

# GCP - CLI config

- Mismo id de proyecto que el asignado a nuestra VM

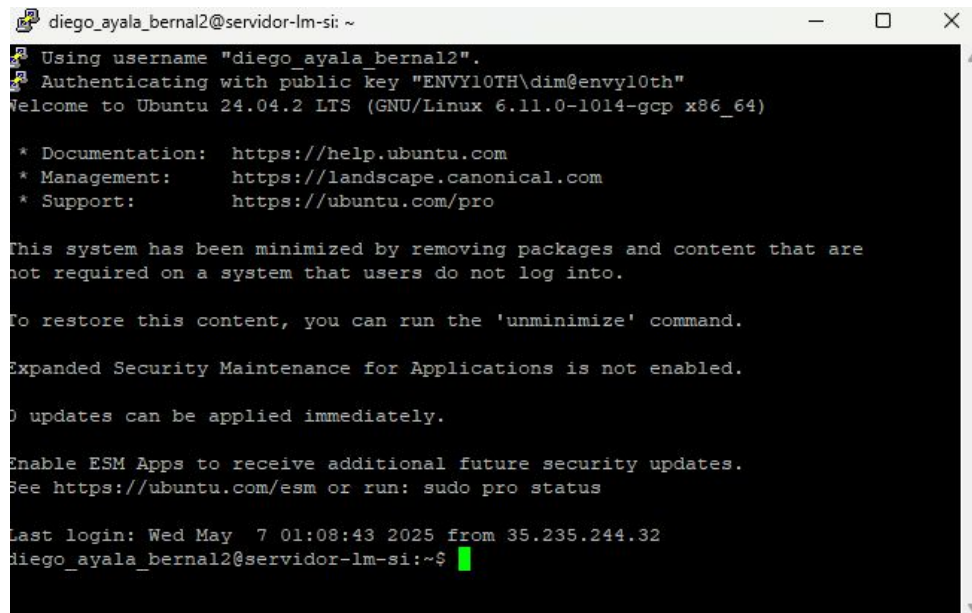
```
Do you want to configure a default Compute Region and Zone? (Y/n)?
```

| <input type="checkbox"/> Status | Name ↑                         | Zone          | Recommendations | In use by | Internal IP                         | External IP                                                             | Connect |
|---------------------------------|--------------------------------|---------------|-----------------|-----------|-------------------------------------|-------------------------------------------------------------------------|---------|
| <input type="checkbox"/>        | <a href="#">servidor-lm-si</a> | us-central1-a |                 |           | 10.128.0.2 ( <a href="#">nic0</a> ) | <a href="#">34.68.160.31</a> <a href="#">↗</a> ( <a href="#">nic0</a> ) | SSH ▾   |

# GCP - CLI ssh

- Conexión ssh desde la terminal

```
gcloud compute ssh diego_ayala_bernal2@servidor-lm-si
```

A terminal window titled 'diego\_ayala\_bernal2@servidor-lm-si: ~' showing the output of an SSH command. The window has standard Linux window controls (minimize, maximize, close) in the top right. The terminal text shows the SSH process using a public key, welcoming the user to Ubuntu 24.04.2 LTS, and displaying system information and security notices. The prompt 'diego\_ayala\_bernal2@servidor-lm-si:~\$' is visible at the bottom with a green cursor.

```
diego_ayala_bernal2@servidor-lm-si: ~
Using username "diego_ayala_bernal2".
Authenticating with public key "ENVY10TH\dim@envyl0th"
Welcome to Ubuntu 24.04.2 LTS (GNU/Linux 6.11.0-1014-gcp x86_64)

 * Documentation: https://help.ubuntu.com
 * Management: https://landscape.canonical.com
 * Support: https://ubuntu.com/pro

This system has been minimized by removing packages and content that are
not required on a system that users do not log into.

To restore this content, you can run the 'unminimize' command.

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

Last login: Wed May 7 01:08:43 2025 from 35.235.244.32
diego_ayala_bernal2@servidor-lm-si:~$
```

# GCP - CLI scp

- SCP → Subida de archivos al server

¿Porque nos da este error? → Problema de permisos (chown, chmod)

```
gcloud compute scp --recurse .* diego_ayala_bernal2@servidor-lm-si:/var/www/html/
```

```
pscp: unable to open /var/www/html//readme.md: permission denied
pscp: unable to open /var/www/html//word.css: permission denied
pscp: unable to open /var/www/html//word.html: permission denied
pscp: unable to open /var/www/html//word.js: permission denied
ERROR: (gcloud.compute.scp) [C:\Users\diega\AppData\Local\Google\Cloud SDK\google-cloud-sdk\bin\sdk\pscp.exe] exited with return code [1].
```

# GCP - CLI scp Solución

- SCP → Subida de archivos al server

¿Porque nos da este error? → Problema de permisos (chown, chmod)

```
diego_ayala_bernal2@servidor-lm-si:~$ sudo chown -R $USER:www-data /var/www/html && sudo chmod -R 750 /var/www/html
```

```
C:\Users\diega\Desktop\MODULOS SOLUCIONES\LM\3-JS\Web-dev-mini-projects-main\word counter>gcloud compute scp --recurse .* diego_ayala_bernal2@servidor-lm-si:/var/www/html/
```

|           |       |           |               |      |
|-----------|-------|-----------|---------------|------|
| readme.md | 0 kB  | 0.7 kB/s  | ETA: 00:00:00 | 100% |
| word.css  | 3 kB  | 3.1 kB/s  | ETA: 00:00:00 | 100% |
| word.html | 1 kB  | 1.4 kB/s  | ETA: 00:00:00 | 100% |
| word.js   | 12 kB | 12.0 kB/s | ETA: 00:00:00 | 100% |

# GCP - Apache

- Conexión apache→ Seleccionaremos la IP externa de nuestro servidor

## VM instances

Filter Enter property name or value

| <input type="checkbox"/> | Status | Name ↑                         | Zone          | Recommendations | In use by | Internal IP                         | External IP                                                             | Connect |
|--------------------------|--------|--------------------------------|---------------|-----------------|-----------|-------------------------------------|-------------------------------------------------------------------------|---------|
| <input type="checkbox"/> | ✓      | <a href="#">servidor-lm-si</a> | us-central1-a |                 |           | 10.128.0.2 ( <a href="#">nic0</a> ) | <a href="#">34.68.160.31</a> <a href="#">↗</a> ( <a href="#">nic0</a> ) | SSH ▾ ⋮ |

# GCP - Apache

- index.html → página de ayuda de apache

⚠ No es seguro 34.68.160.31/index.html



## Apache2 Default Page

Ubuntu

It works!

This is the default welcome page used to test the correct operation of the Apache2 server after installation on Ubuntu systems. It is based on the equivalent page on Debian, from which the Ubuntu Apache packaging is derived. If you can read this page, it means that the Apache HTTP server installed at this site is working properly. You should **replace this file** (located at `/var/www/html/index.html`) before continuing to operate your HTTP server.

If you are a normal user of this web site and don't know what this page is about, this probably means that the site is currently unavailable due to maintenance. If the problem persists, please contact the site's administrator.

### Configuration Overview

Ubuntu's Apache2 default configuration is different from the upstream default configuration, and split into several files optimized for interaction with Ubuntu tools. The configuration system is **fully documented in `/usr/share/doc/apache2/README.Debian.gz`**. Refer to this for the full documentation. Documentation for the web server itself can be found by accessing the **manual** if the `apache2-doc` package was installed on this server.

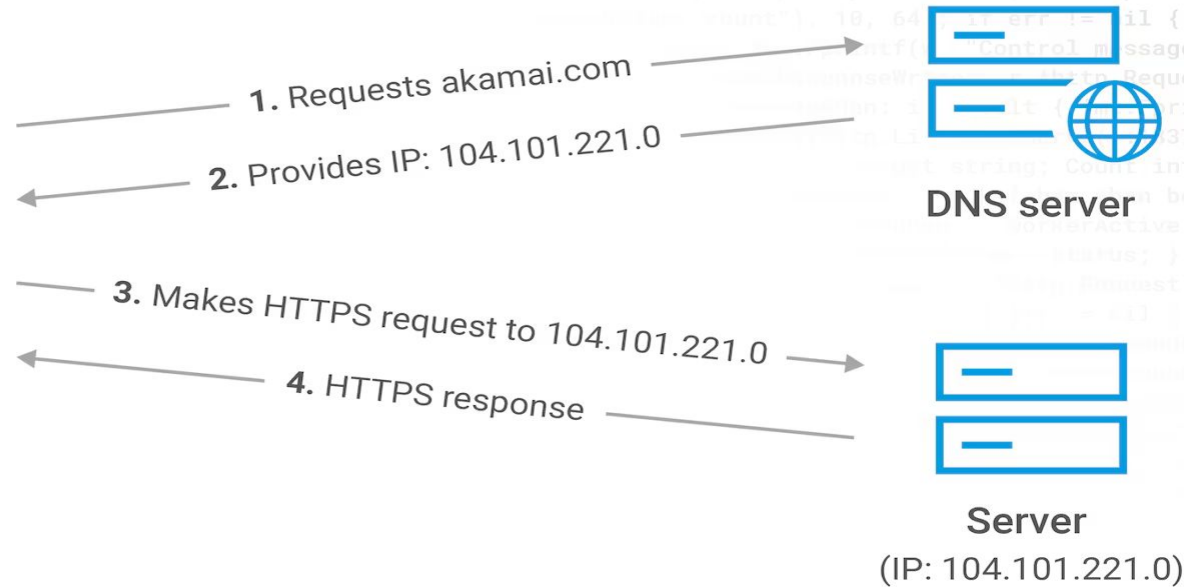
The configuration layout for an Apache2 web server installation on Ubuntu systems is as follows:

```
/etc/apache2/
|-- apache2.conf
| |-- ports.conf
|-- mods-enabled
| |-- *.Load
| |-- *.conf
|-- conf-enabled
| |-- *.conf
|-- sites-enabled
| |-- *.conf
```

# GCP- DNS



User with  
web browser



# CMD- DNS Query Using a Specific Resolver

- You are querying a specific DNS server (1.1.1.1) → which belongs to Cloudflare
- You want to find the IP address of alvaro.diegoayala.com

```
C:\Users\diego>nslookup alvaro.diegoayala.com 1.1.1.1
Servidor: one.one.one.one
Address: 1.1.1.1

Respuesta no autoritativa:
Nombre: alvaro.diegoayala.com
Address: 136.112.16.168
```

# Cloudflare- Create subdomains

- Click in our domain → diegoayala.com

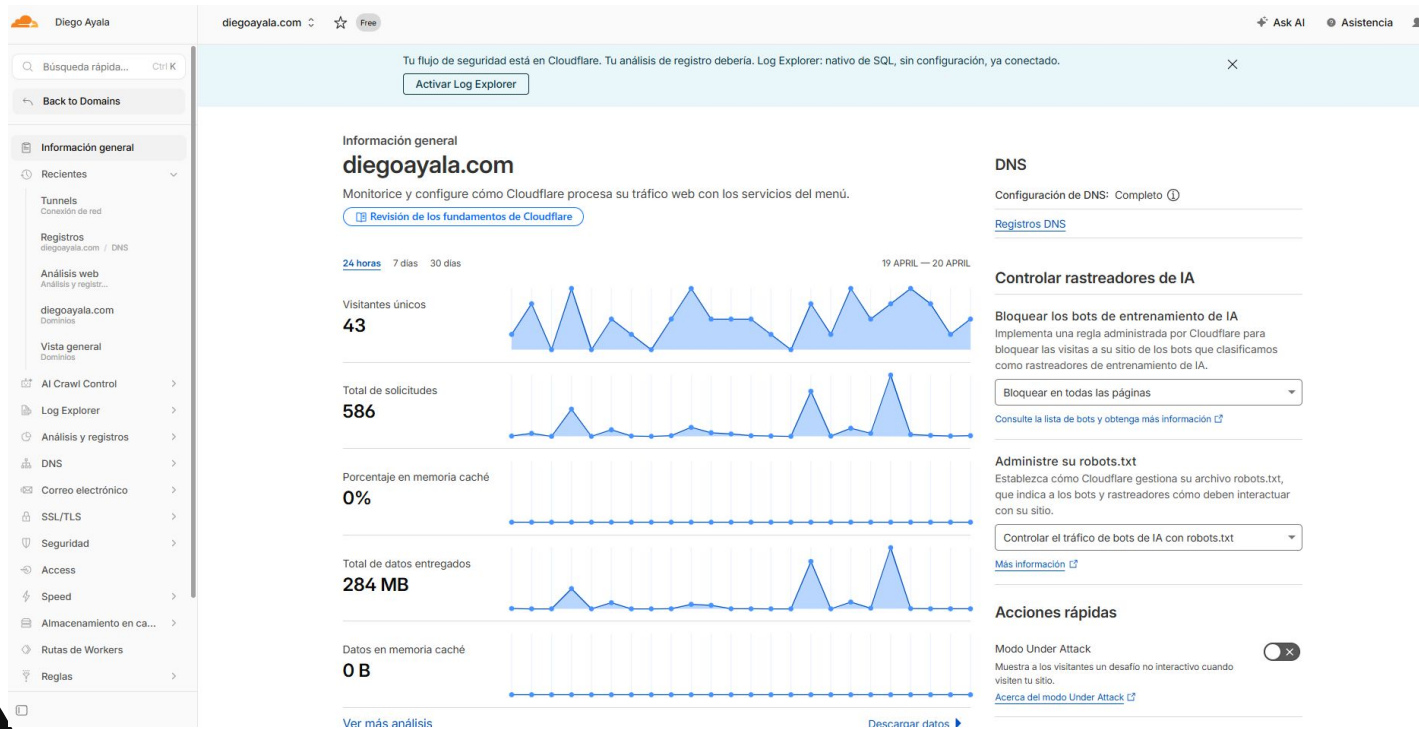
The screenshot shows the Cloudflare dashboard for the domain **diegoayala.com**. The interface is in Spanish and includes a sidebar with navigation options like 'Inicio de la cuenta', 'Recientes', 'Túneles', 'Registros', 'Análisis web', 'Vista general', 'Análisis y registros', 'Dominios', 'Desarrollo', 'Cómputo', 'IA', 'Almacenamiento y bas...', 'Contenido multimedia', 'Proteger y conectar', 'Aplicación de seguridad', 'Zero Trust', 'Conexión de red', 'Entrega y rendimiento', and 'Administrar cuenta'.

The main content area is titled 'Inicio de la cuenta' and 'Diego Ayala'. It features several analytics and management widgets:

- Analytics:**
  - Seguridad:** Información de seguridad (1 low), Inicios de sesión bloqueados (0).
  - Rendimiento:** Tasa de caché (0.0%), Velocidad de conexión (No se pueden cargar los datos).
  - Actividad:** Tráfico web (581, +1.4%), Inicios de sesión de aplicaciones (0).
- Domínios:** A list showing **diegoayala.com** with a status icon and a plus button.
- Workers y Pages:** A section titled 'Construya y escale apps globalmente' with a button 'Comience a construir'.
- Seguridad Zero Trust:** A section showing 'Puestos usados / Puestos totales' (0 / 50), 'Aplicaciones de Access' (0), 'Incidentes de CASB' (0), 'Políticas de DNS de Gateway' (0), and 'Túneles de Cloudflare' (1).
- Registros de auditoría:** A table with columns for action, domain, and time. It includes entries like 'Get a Cloudflare Tunnel manage...', 'Create DNS Record', and 'Update DNS Record'.
- Próximos pasos:** A list of tasks such as 'Habilitar el inicio de sesión único para mejorar la seguridad de los l...', 'Invitar a compañeros de equipo y administradores de respaldo', and 'Comenzar a construir'.

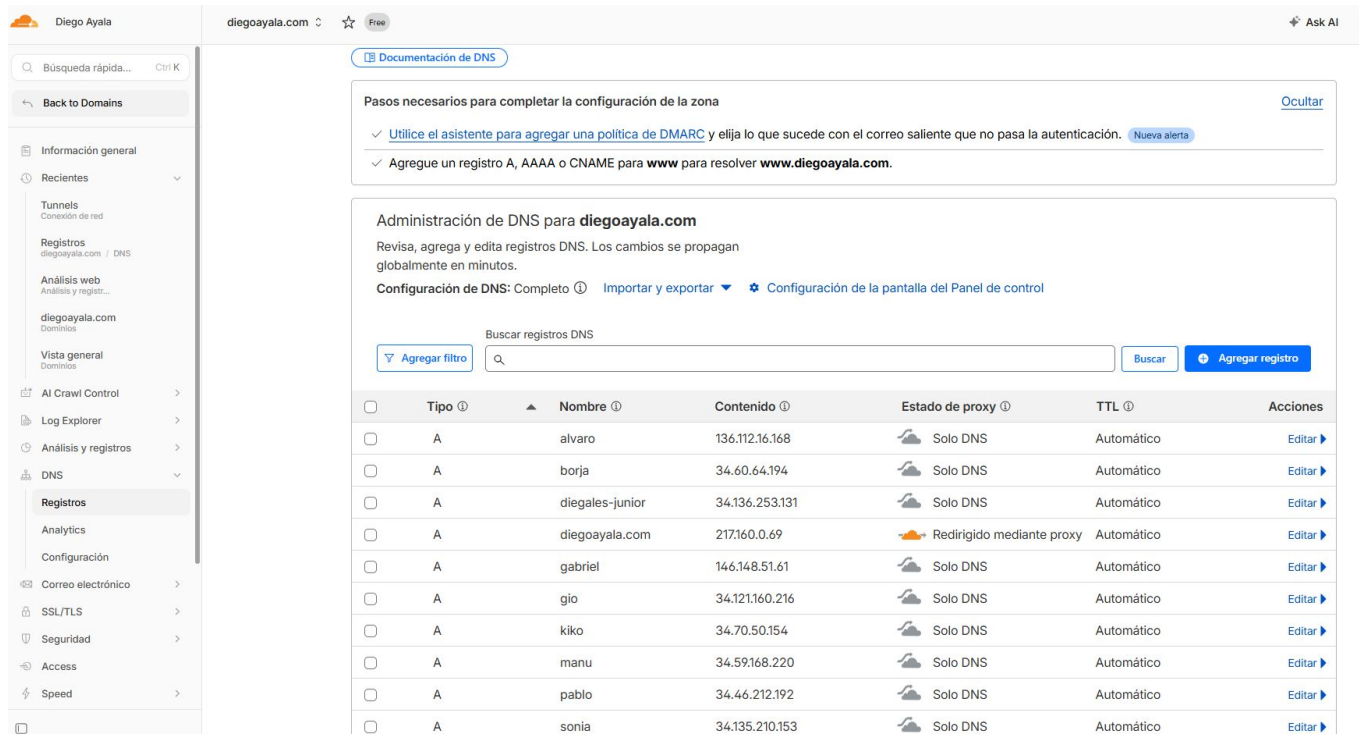
# Cloudflare- Create subdomains

- Select 'Registros DNS' and add new rules A



# Cloudflare- Create subdomains

- Select 'add record'



The screenshot shows the Cloudflare dashboard for the domain **diegoayala.com**. The left sidebar contains navigation options: Información general, Recientes, Tunnels, Registros, Análisis web, diegoayala.com, Vista general, AI Crawl Control, Log Explorer, Análisis y registros, DNS, Registros, Analytics, Configuración, Correo electrónico, SSL/TLS, Seguridad, Access, and Speed. The main content area is titled "Administración de DNS para diegoayala.com" and includes instructions on how to add records. Below the instructions is a search bar for DNS records and a table listing the current DNS records.

**Pasos necesarios para completar la configuración de la zona**

- ✓ [Utilice el asistente para agregar una política de DMARC](#) y elija lo que sucede con el correo saliente que no pasa la autenticación. [Nueva alerta](#)
- ✓ Agregue un registro A, AAAA o CNAME para **www** para resolver **www.diegoayala.com**.

**Administración de DNS para diegoayala.com**

Revisa, agrega y edita registros DNS. Los cambios se propagan globalmente en minutos.

**Configuración de DNS:** Completo ⓘ [Importar y exportar](#) ⌵ [Configuración de la pantalla del Panel de control](#)

Buscar registros DNS

[Agregar filtro](#)  [Buscar](#) [Agregar registro](#)

| <input type="checkbox"/> | Tipo ⓘ | Nombre ⓘ        | Contenido ⓘ    | Estado de proxy ⓘ         | TTL ⓘ      | Acciones                 |
|--------------------------|--------|-----------------|----------------|---------------------------|------------|--------------------------|
| <input type="checkbox"/> | A      | alvaro          | 136.112.16.168 | Solo DNS                  | Automático | <a href="#">Editar</a> ➔ |
| <input type="checkbox"/> | A      | borja           | 34.60.64.194   | Solo DNS                  | Automático | <a href="#">Editar</a> ➔ |
| <input type="checkbox"/> | A      | diegales-junior | 34.136.253.131 | Solo DNS                  | Automático | <a href="#">Editar</a> ➔ |
| <input type="checkbox"/> | A      | diegoayala.com  | 217.160.0.69   | Redirigido mediante proxy | Automático | <a href="#">Editar</a> ➔ |
| <input type="checkbox"/> | A      | gabriel         | 146.148.51.61  | Solo DNS                  | Automático | <a href="#">Editar</a> ➔ |
| <input type="checkbox"/> | A      | gio             | 34.121.160.216 | Solo DNS                  | Automático | <a href="#">Editar</a> ➔ |
| <input type="checkbox"/> | A      | kiko            | 34.70.50.154   | Solo DNS                  | Automático | <a href="#">Editar</a> ➔ |
| <input type="checkbox"/> | A      | manu            | 34.59.168.220  | Solo DNS                  | Automático | <a href="#">Editar</a> ➔ |
| <input type="checkbox"/> | A      | pablo           | 34.46.212.192  | Solo DNS                  | Automático | <a href="#">Editar</a> ➔ |
| <input type="checkbox"/> | A      | sonia           | 34.135.210.153 | Solo DNS                  | Automático | <a href="#">Editar</a> ➔ |

# Cloudflare- Create subdomains

- We must create a new rule of type A, add the name of our subdomain inside diegoayala.com, and the ip of our gcp instance → without inverse proxy

Buscar registros DNS

[Agregar filtro](#)  [Buscar](#) [Agregar registro](#)

**newsdomain.diegoayala.com** apunta a **ipofyourgcpinstance** y el tráfico se redirige mediante proxy a través de Cloudflare.

Tipo: A, Nombre (obligatorio): newsdomain, Dirección IPv4 (obligatorio): ipofyourgcpinstance, Estado de proxy: Redirigido mediante proxy, TTL: Automático

Atributos de registro [Documentación](#)

La información proporcionada aquí no afectará a la resolución del registro de DNS y solo está destinada a su referencia.

Comentario

Introduzca aquí su comentario (hasta 100caracteres).

| <input type="checkbox"/> | Tipo ① | Nombre ①        | Contenido ①    | Estado de proxy ①         | TTL ①      | Acciones               |
|--------------------------|--------|-----------------|----------------|---------------------------|------------|------------------------|
| <input type="checkbox"/> | A      | alvaro          | 136.112.16.168 | Solo DNS                  | Automático | <a href="#">Editar</a> |
| <input type="checkbox"/> | A      | borja           | 34.60.64.194   | Solo DNS                  | Automático | <a href="#">Editar</a> |
| <input type="checkbox"/> | A      | diegales-junior | 34.136.253.131 | Solo DNS                  | Automático | <a href="#">Editar</a> |
| <input type="checkbox"/> | A      | diegoayala.com  | 217.160.0.69   | Redirigido mediante proxy | Automático | <a href="#">Editar</a> |

# GCP HTTPS- CERTBOT

- sudo apt update  
sudo apt install -y snapd  
sudo snap install core  
sudo snap refresh core  
sudo snap install --classic certbot  
sudo ln -sf /snap/bin/certbot /usr/bin/certbot

# GCP HTTPS- Generate certificate

● `sudo certbot --apache -d oursubdomain.diegoayala.com`

1. Checks that you control test.diegoayala.com.
2. Requests a certificate from Let's Encrypt.
3. Configures Apache to use HTTPS.
4. It may create the 443 VirtualHost.
5. It may add a redirect from HTTP to HTTPS.

# Cloudflare HTTPS- SSL/TLS

- Check config over SSL/TLS

The screenshot shows the Cloudflare dashboard for the domain **diegoayala.com**. The left sidebar contains navigation options: AI Crawl Control, Log Explorer, Análisis y registros, DNS, Correo electrónico, and SSL/TLS. The SSL/TLS section is expanded, showing 'Información general' as the selected option. The main content area is titled 'SSL/TLS Información general' and includes a sub-header 'Cifrado SSL/TLS'. It states the current encryption mode is 'Completo' (Complete) and provides a link to the 'Documentación de SSL/TLS'. A diagram illustrates the traffic flow: 'Navegador' (Browser) → Cloudflare → 'Servidor de origen' (Origin Server). A 'Configurar' button is visible on the right. Below the diagram, a section titled 'Tráfico entregado mediante TLS' (Traffic delivered via TLS) shows data for the last 24 hours: 560 'Unknown' connections and 26 'TLS v1.3' connections, represented by a green bar chart.

diegoayala.com

diegoayala.com

SSL/TLS

## SSL/TLS Información general

Elija cómo Cloudflare encripta el tráfico entre sus visitantes y Cloudflare, y entre Cloudflare y su servidor de origen, para evitar el robo de datos y otras manipulaciones.

[Documentación de SSL/TLS](#)

### Cifrado SSL/TLS

Modo de cifrado actual: **Completo**  
Modo automático deshabilitado hace un mes.

Navegador → Cloudflare → Servidor de origen

[Configurar](#)

### Tráfico entregado mediante TLS

Últimas 24 horas

| Protocolo | Contador |
|-----------|----------|
| Unknown   | 560      |
| TLS v1.3  | 26       |

# Cloudflare HTTPS- SSL/TLS

- Change to Full Strict.

## FULL

Encrypts the connection, but trusts the server too much.

## FULL STRICT

Encrypts the connection and verifies that the server proves it is who it claims to be.

Seleccione el modo de cifrado

### SSL/TLS automático (predeterminado)

Cloudflare comprueba si su tráfico necesita un modo de cifrado más seguro y actualiza su configuración automáticamente.

Seleccionar

### SSL/TLS personalizado

Seleccione el modo de cifrado que Cloudflare utiliza para conectarse a su servidor de origen

✓ Seleccionado

#### Completo (estricto)

- ☐ Habilitar cifrado de extremo a extremo y hacer cumplir la validación de los certificados de origen. Utilice la CA de origen de Cloudflare para generar certificados para su origen.

#### Completo

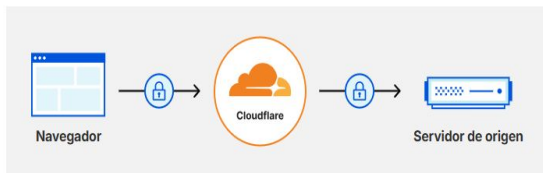
- ☒ Habilitar el cifrado de extremo a extremo. Utilice este modo cuando su servidor de origen admita la certificación SSL pero no utiliza un certificado válido y de confianza pública.

#### Flexible

- ☐ Habilitar el cifrado solo entre sus visitantes y Cloudflare. Esto evitará las advertencias de seguridad del navegador, pero todas las conexiones entre Cloudflare y su origen se realizan a través de HTTP.

#### Desactivado (inseguro)

- ☐ No se aplicó cifrado. Al desactivar SSL se deshabilita HTTPS y hace que los navegadores muestren una advertencia de que su sitio web no es seguro.



# CMD- DNS Query Using a Specific Resolver

- What's happening now? if we replicate the command

```
C:\Users\diego>nslookup alvaro.diegoayala.com 1.1.1.1
```

# CMD- DNS Query Using a Specific Resolver

- <https://developers.cloudflare.com/fundamentals/concepts/how-cloudflare-works>

<https://developers.cloudflare.com/dns/proxy-status/>

# Github- Pages

- Web Project Setup:

```
git add .
git commit -m "Initial project setup"
git push origin main
```



# Github- Pages

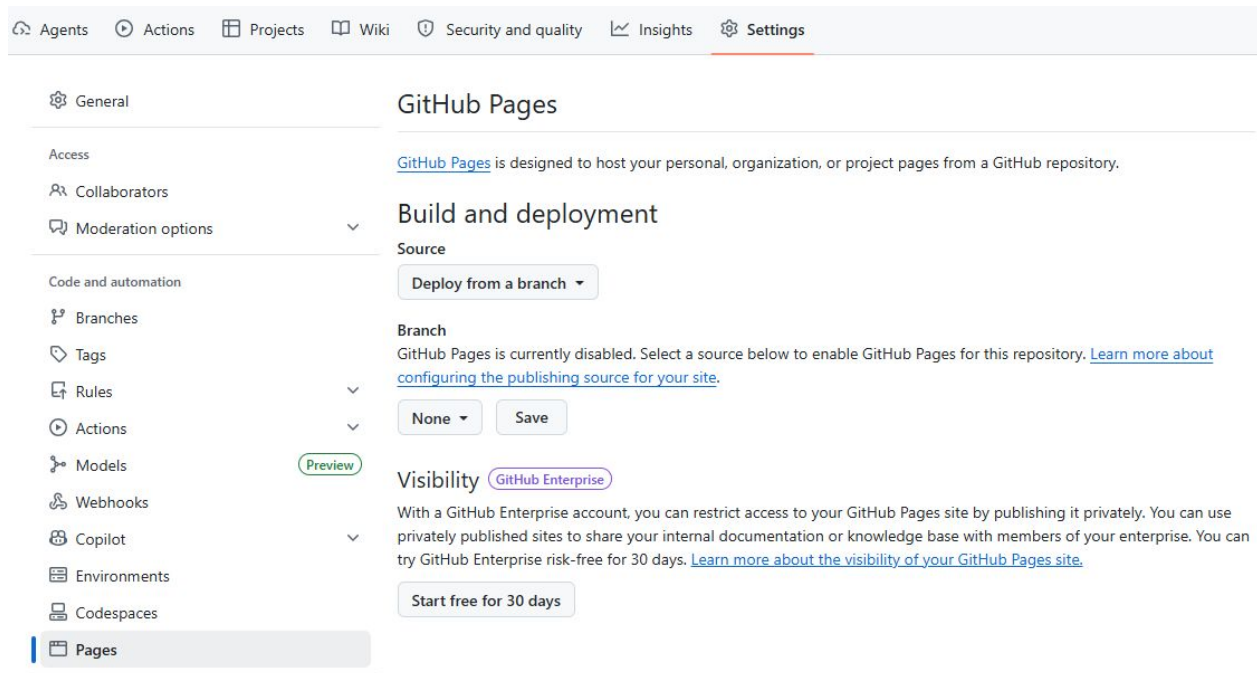
- Activamos GitHub Pages desde el repo:

Settings > Pages

Deploy from a branch

Branch: main

Folder: / root



The screenshot shows the GitHub repository settings interface. The top navigation bar includes links for Agents, Actions, Projects, Wiki, Security and quality, Insights, and Settings (which is highlighted). The left sidebar contains a list of settings categories: General, Access, Collaborators, Moderation options, Code and automation, Branches, Tags, Rules, Actions, Models, Webhooks, Copilot, Environments, Codespaces, and Pages (which is selected and highlighted). The main content area is titled 'GitHub Pages' and contains the following information:

- A description: [GitHub Pages](#) is designed to host your personal, organization, or project pages from a GitHub repository.
- A section titled 'Build and deployment' with a 'Source' dropdown menu set to 'Deploy from a branch'.
- A 'Branch' section stating that GitHub Pages is currently disabled and providing a link to [Learn more about configuring the publishing source for your site.](#) Below this are 'None' and 'Save' buttons.
- A 'Visibility' section with a 'GitHub Enterprise' badge. It explains that with a GitHub Enterprise account, users can restrict access to their GitHub Pages site by publishing it privately. It also includes a link to [Learn more about the visibility of your GitHub Pages site.](#) and a 'Start free for 30 days' button.

# Github- Pages

- Enforce https

## GitHub Pages

[GitHub Pages](#) is designed to host your personal, organization, or project pages from a GitHub repository.

## Build and deployment

### Source

Deploy from a branch ▾

### Branch

Your GitHub Pages site is currently being built from the main branch. [Learn more about configuring the publishing source for your site.](#)

 main ▾

 / (root) ▾

Save

Learn how to [add a Jekyll theme](#) to your site.

## Custom domain

Custom domains allow you to serve your site from a domain other than `diegoaya1a.com`. [Learn more about configuring custom domains.](#)

Save

Remove

### ☒ Enforce HTTPS ✓

HTTPS provides a layer of encryption that prevents others from snooping on or tampering with traffic to your site.

When HTTPS is enforced, your site will only be served over HTTPS. [Learn more about securing your GitHub Pages site with HTTPS.](#)

# Github- Pages

- F5 and our site is already published

## GitHub Pages

[GitHub Pages](#) is designed to host your personal, organization, or project pages from a GitHub repository.

Your site is live at <https://diegoayala.com/pages-caps-demo/>  
Last [deployed](#) by  [diegaless](#) 2 minutes ago

[Visit site](#)[Unpublish site](#)

## Build and deployment

### Source

Deploy from a branch ▾

### Branch

Your GitHub Pages site is currently being built from the `main` branch. [Learn more about configuring the publishing source for your site.](#)

 `main` ▾

 `/ (root)` ▾

Save

Learn how to [add a Jekyll theme](#) to your site.

Your site was last deployed to the [github-pages](#) environment by the [pages build and deployment](#) workflow. [Learn more about deploying to GitHub Pages using custom workflows](#)

## Custom domain

Custom domains allow you to serve your site from a domain other than `diegoayala.com`. [Learn more about configuring custom domains.](#)

Save

Remove

### ☒ Enforce HTTPS

HTTPS provides a layer of encryption that prevents others from snooping on or tampering with traffic to your site. When HTTPS is enforced, your site will only be served over HTTPS. [Learn more about securing your GitHub Pages site with HTTPS.](#)

# VM- Dynamic VDI Disk

A **dynamic VDI disk** is a virtual hard disk that **grows gradually as it is used**.

VDI of **50 GB**, the .vdi file will not take up 50 GB from the beginning.

If the virtual machine is only using **10 GB**, the .vdi file will take up approximately **10 GB** on the real computer disk.

As we install programs, updates, or save files inside the virtual machine, the .vdi file will increase in size.

Maximum VDI size: 50 GB

Space used in the VM: 10 GB

Space used on the real PC: approximately 10 GB

**A dynamic VDI disk saves space because it only takes up on the real computer the space that the virtual machine is actually using.**



HIDD 1GTB\*

