

Universidad Rafael Landívar  
Facultad de Ingeniería  
Ingeniería Electrónica y Telecomunicaciones  
Tecnologías de Virtualización y Data Centers  
Lic. Juan Carlos Romero

**LABORATORIO**  
**RAID 5 EN UBUNTU SERVER EN CLOUD**

Juan Manuel Barillas – 1334816

Guatemala, 26 de abril del 2024

## Creación de Instancia bajo el proyecto Proyecto-URL

Estado de la prueba gratuita: Te quedan \$299.90 de crédito y 88 días. Con una cuenta completa, obtendrás acceso ilimitado a todas las funciones de Google Cloud Platform.

Nombre \* server-practica-raid5

Estimación mensual USD\$25.46

Administración de etiquetas de instancia y recursos

Configuración de la máquina

Precios de Compute Engine

| Elemento                              | Estimación mensual |
|---------------------------------------|--------------------|
| 2 vCPU / 4 GB memoria                 | USD\$24.46         |
| Disco persistente balanceado de 10 GB | USD\$1.00          |
| Total                                 | USD\$25.46         |

Marketplace

Crear

## Creación de Discos Duros para Configurar Raid 5:

Estado de la prueba gratuita: Te quedan \$299.90 de crédito y 88 días. Con una cuenta completa, obtendrás acceso ilimitado a todas las funciones de Google Cloud Platform.

Nombre \* disk-3

Descripción

Fuente

Configuración del disco

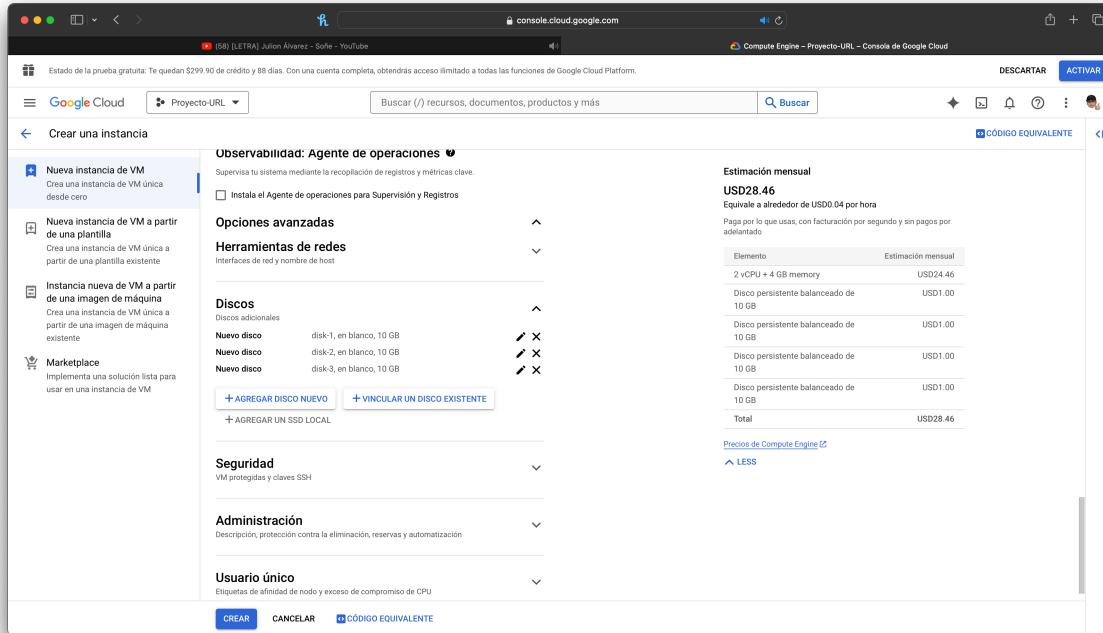
Tamaño \*

Grupo de almacenamiento

Programación de instantáneas (recomendado)

Guardar

## Confirmación Creación Discos Duros:

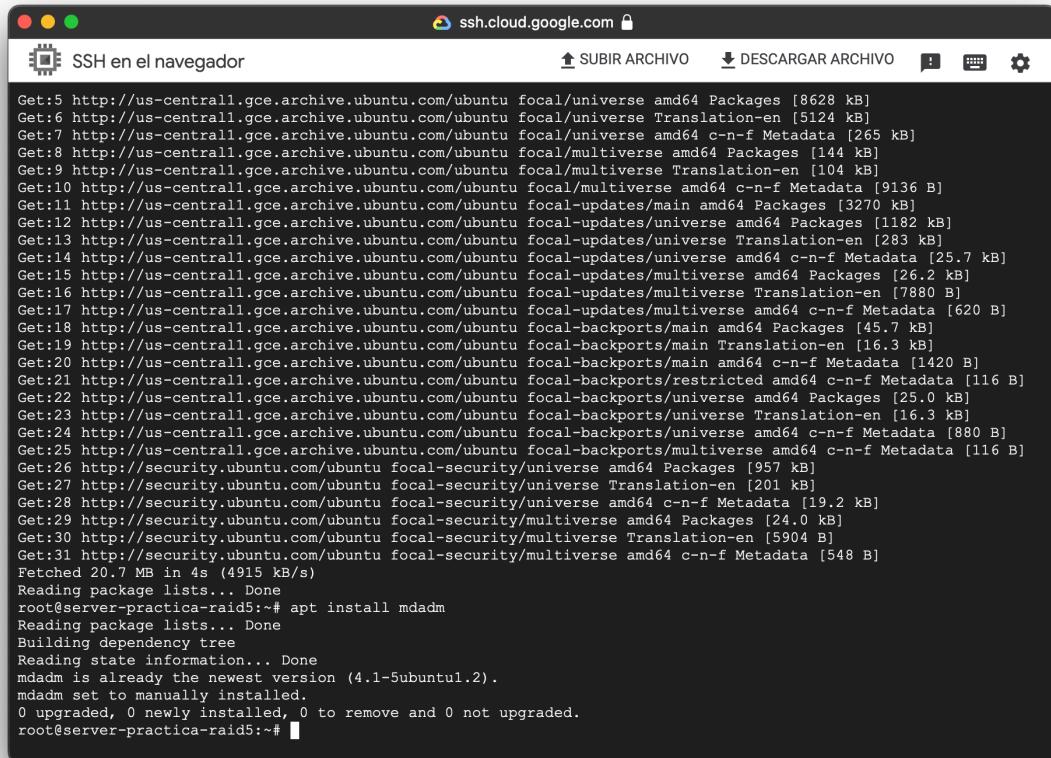


## Actualizando el Sistema Operativo:

The screenshot shows an SSH session on a Google Cloud instance. The user is running the command 'sudo apt-get update'. The output lists numerous package updates from the 'focal' repository, including focal, focal-updates, focal-security, and focal-backports. The session also includes file upload and download buttons at the top.

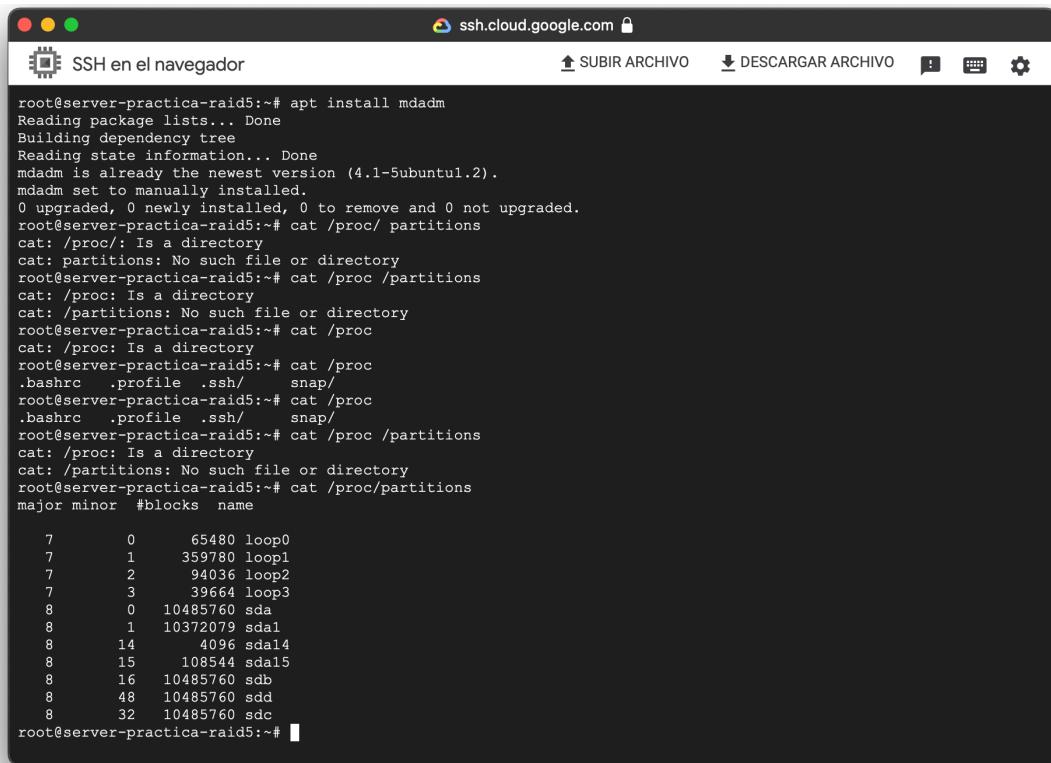
```
jmbarillas97@server-practica-raid5:~$ sudo su -
root@server-practica-raid5:~# apt-get update
Hit:1 http://us-central1.gce.archive.ubuntu.com/ubuntu focal InRelease
Get:2 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:3 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-backports InRelease [108 kB]
Get:4 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:5 http://us-central1.gce.archive.ubuntu.com/ubuntu focal/universe amd64 Packages [8628 kB]
Get:6 http://us-central1.gce.archive.ubuntu.com/ubuntu focal/universe Translation-en [5124 kB]
Get:7 http://us-central1.gce.archive.ubuntu.com/ubuntu focal/universe amd64 c-n-f Metadata [265 kB]
Get:8 http://us-central1.gce.archive.ubuntu.com/ubuntu focal/multiverse amd64 Packages [144 kB]
Get:9 http://us-central1.gce.archive.ubuntu.com/ubuntu focal/multiverse Translation-en [104 kB]
Get:10 http://us-central1.gce.archive.ubuntu.com/ubuntu focal/multiverse amd64 c-n-f Metadata [9136 B]
Get:11 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [3270 kB]
Get:12 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-updates/universe amd64 Packages [1182 kB]
Get:13 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-updates/universe Translation-en [283 kB]
Get:14 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-updates/universe amd64 c-n-f Metadata [25.7 kB]
Get:15 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-updates/multiverse amd64 Packages [26.2 kB]
Get:16 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-updates/multiverse Translation-en [7880 B]
Get:17 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-updates/multiverse amd64 c-n-f Metadata [620 B]
Get:18 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-backports/main amd64 Packages [45.7 kB]
Get:19 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-backports/main amd64 c-n-f Metadata [16.3 kB]
Get:20 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-backports/main amd64 c-n-f Metadata [1420 B]
Get:21 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-backports/restricted amd64 c-n-f Metadata [116 B]
Get:22 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-backports/universe amd64 Packages [25.0 kB]
Get:23 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-backports/universe Translation-en [16.3 kB]
Get:24 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-backports/universe amd64 c-n-f Metadata [880 B]
Get:25 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-backports/multiverse amd64 c-n-f Metadata [116 B]
Get:26 http://security.ubuntu.com/ubuntu focal-security/universe amd64 Packages [957 kB]
Get:27 http://security.ubuntu.com/ubuntu focal-security/universe Translation-en [201 kB]
Get:28 http://security.ubuntu.com/ubuntu focal-security/universe amd64 c-n-f Metadata [19.2 kB]
Get:29 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64 Packages [24.0 kB]
Get:30 http://security.ubuntu.com/ubuntu focal-security/multiverse Translation-en [5904 B]
Get:31 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64 c-n-f Metadata [548 B]
Fetched 20.7 MB in 4 s (4915 kB/s)
```

## Instalando el aplicativo para la creación del RAID:



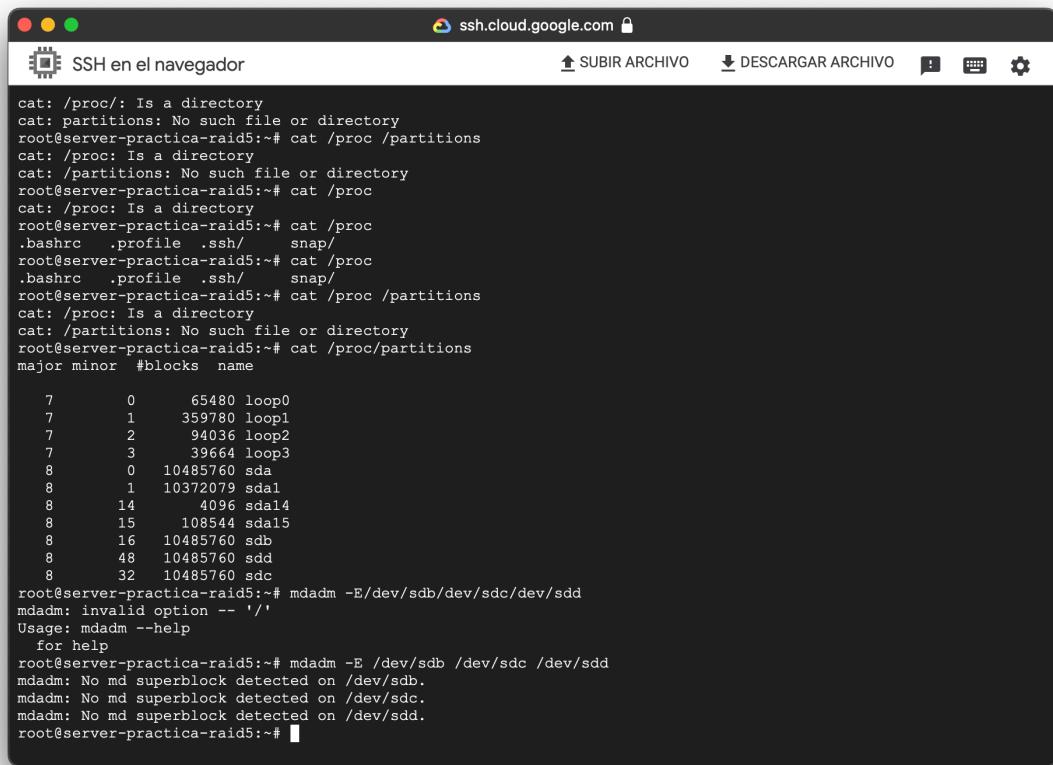
```
Get:5 http://us-central1.gce.archive.ubuntu.com/ubuntu focal/universe amd64 Packages [8628 kB]
Get:6 http://us-central1.gce.archive.ubuntu.com/ubuntu focal/universe Translation-en [5124 kB]
Get:7 http://us-central1.gce.archive.ubuntu.com/ubuntu focal/universe amd64 c-n-f Metadata [265 kB]
Get:8 http://us-central1.gce.archive.ubuntu.com/ubuntu focal/multiverse amd64 Packages [144 kB]
Get:9 http://us-central1.gce.archive.ubuntu.com/ubuntu focal/multiverse Translation-en [104 kB]
Get:10 http://us-central1.gce.archive.ubuntu.com/ubuntu focal/multiverse amd64 c-n-f Metadata [9136 B]
Get:11 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [3270 kB]
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Get:13 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-updates/universe Translation-en [283 kB]
Get:14 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-updates/universe amd64 c-n-f Metadata [25.7 kB]
Get:15 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-updates/multiverse amd64 Packages [26.2 kB]
Get:16 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-updates/multiverse Translation-en [7880 B]
Get:17 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-updates/multiverse amd64 c-n-f Metadata [620 B]
Get:18 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-backports/main amd64 Packages [45.7 kB]
Get:19 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-backports/main Translation-en [16.3 kB]
Get:20 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-backports/main amd64 c-n-f Metadata [1420 B]
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Get:22 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-backports/universe amd64 Packages [25.0 kB]
Get:23 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-backports/universe Translation-en [16.3 kB]
Get:24 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-backports/universe amd64 c-n-f Metadata [880 B]
Get:25 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-backports/multiverse amd64 c-n-f Metadata [116 B]
Get:26 http://security.ubuntu.com/ubuntu focal-security/universe amd64 Packages [957 kB]
Get:27 http://security.ubuntu.com/ubuntu focal-security/universe Translation-en [201 kB]
Get:28 http://security.ubuntu.com/ubuntu focal-security/universe amd64 c-n-f Metadata [19.2 kB]
Get:29 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64 Packages [24.0 kB]
Get:30 http://security.ubuntu.com/ubuntu focal-security/multiverse Translation-en [5904 B]
Get:31 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64 c-n-f Metadata [548 B]
Fetched 20.7 MB in 4s (4915 kB/s)
Reading package lists... Done
root@server-practica-raid5:~# apt install mdadm
Reading package lists... Done
Building dependency tree
Reading state information... Done
mdadm is already the newest version (4.1-5ubuntu1.2).
mdadm set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
root@server-practica-raid5:~#
```

## Verificando los volúmenes instalados en el servidor:



```
root@server-practica-raid5:~# apt install mdadm
Reading package lists... Done
Building dependency tree
Reading state information... Done
mdadm is already the newest version (4.1-5ubuntu1.2).
mdadm set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
root@server-practica-raid5:~# cat /proc/partitions
cat: /proc/: Is a directory
cat: partitions: No such file or directory
root@server-practica-raid5:~# cat /proc/partitions
cat: /proc: Is a directory
cat: /partitions: No such file or directory
root@server-practica-raid5:~# cat /proc/partitions
cat: /proc: Is a directory
cat: /partitions: No such file or directory
root@server-practica-raid5:~# cat /proc
cat: /proc: Is a directory
root@server-practica-raid5:~# cat /proc
.bashrc .ssh/ snap/
root@server-practica-raid5:~# cat /proc
.bashrc .profile .ssh/ snap/
root@server-practica-raid5:~# cat /proc/partitions
cat: /proc: Is a directory
cat: /partitions: No such file or directory
root@server-practica-raid5:~# cat /proc/partitions
major minor #blocks name
    7      0      65480 loop0
    7      1     359780 loop1
    7      2     94036 loop2
    7      3     39664 loop3
    8      0    10485760 sda
    8      1    10372079 sda1
    8     14     4096 sda14
    8     15    108544 sda15
    8     16    10485760 sdb
    8     48    10485760 sdd
    8     32    10485760 sdc
root@server-practica-raid5:~#
```

## Verificando que no exista ningun arreglo RAID:



The screenshot shows a terminal window titled "SSH en el navegador" connected to "ssh.cloud.google.com". The terminal displays the following command-line session:

```
cat: /proc/: Is a directory
cat: partitions: No such file or directory
root@server-practica-raid5:~# cat /proc/partitions
cat: /proc: Is a directory
cat: /partitions: No such file or directory
root@server-practica-raid5:~# cat /proc
cat: /proc: Is a directory
root@server-practica-raid5:~# cat /proc
.bashrc .profile .ssh/ snap/
root@server-practica-raid5:~# cat /proc
.bashrc .profile .ssh/ snap/
root@server-practica-raid5:~# cat /proc/partitions
cat: /proc: Is a directory
cat: /partitions: No such file or directory
root@server-practica-raid5:~# cat /proc/partitions
major minor #blocks name
    7      0      65480 loop0
    7      1      359780 loop1
    7      2      94036 loop2
    7      3      39664 loop3
    8      0     10485760 sda
    8      1    10372079 sdal
    8     14      4096 sda14
    8     15     108544 sda15
    8     16     10485760 sdb
    8     48     10485760 sdd
    8     32     10485760 sdc
root@server-practica-raid5:~# mdadm -E /dev/sdb /dev/sdc /dev/sdd
mdadm: invalid option -- '/'
Usage: mdadm --help
      for help
root@server-practica-raid5:~# mdadm -E /dev/sdb /dev/sdc /dev/sdd
mdadm: No md superblock detected on /dev/sdb.
mdadm: No md superblock detected on /dev/sdc.
mdadm: No md superblock detected on /dev/sdd.
root@server-practica-raid5:~#
```

## Verificando que no exista ningun arreglo RAID:

## Configurando los Discos:

### Disco 1:

```
SSH en el navegador          ssh.cloud.google.com 🔒
                               ↑ SUBIR ARCHIVO   ↓ DESCARGAR ARCHIVO   !   ⌨   🚙
[?] SSH en el navegador

p  print the partition table
t  change a partition type
v  verify the partition table
i  print information about a partition

Misc
m  print this menu
u  change display/entry units
x  extra functionality (experts only)

Script
I  load disk layout from sfdisk script file
O  dump disk layout to sfdisk script file

Save & Exit
w  write table to disk and exit
q  quit without saving changes

Create a new label
g  create a new empty GPT partition table
G  create a new empty SGI (IRIX) partition table
o  create a new empty DOS partition table
s  create a new empty Sun partition table

Command (m for help): n
Partition type
  p  primary (0 primary, 0 extended, 4 free)
  e  extended (container for logical partitions)
Select (default p): p
Partition number (1-4, default 1): 1
First sector (2048-20971519, default 2048):
Last sector, +/-sectors or +/-{K,M,G,T,P} (2048-20971519, default 20971519):
Created a new partition 1 of type 'Linux' and of size 10 GiB.

Command (m for help):
```

```
SSH en el navegador          ssh.cloud.google.com 🔒
                               ↑ SUBIR ARCHIVO   ↓ DESCARGAR ARCHIVO   !   ⌨   🚙
[?] SSH en el navegador

c W95 FAT32 (LBA) 52 CP/M      a0 IBM Thinkpad hi ea Rufus alignment
e W95 FAT16 (LBA) 53 OnTrack DM6 Aux a5 FreeBSD      eb BeOS fs
f W95 Ext'd (LBA) 54 OnTrackDM6    a6 OpenBSD      ee GPT
10 OPUS           55 EZ-Drive     a7 NeXTSTEP      ef EFI (FAT-12/16/
11 Hidden FAT12   56 Golden Bow  a8 Darwin UFS      f0 Linux/PA-RISC b
12 Compaq diagnost 5c Priam Edisk a9 NetBSD      f1 SpeedStor
14 Hidden FAT16 <3 61 SpeedStor   ab Darwin boot    f4 SpeedStor
16 Hidden FAT16   63 GNU HURD or Sys af HFS / HFS+   f2 DOS secondary
17 Hidden HPFS/NTF 64 Novell Netware b7 BSDI fs      fb VMware VMFS
18 AST SmartSleep 65 Novell Netware b8 BSDI swap    fc VMware VMKCORE
1b Hidden W95 FAT3 70 DiskSecure Mult bb Boot Wizard hid fd Linux raid auto
1c Hidden W95 FAT3 75 PC/IX       bc Acronis FAT32 L fe LANstep
1e Hidden W95 FAT1 80 Old Minix   be Solaris boot   ff BBT

Command (m for help): FD
Unpartitioned space /dev/sdb: 0 B, 0 bytes, 0 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes

Command (m for help): t
Selected partition 1
Hex code (type L to list all codes): fd
Changed type of partition 'Linux' to 'Linux raid autodetect'.

Command (m for help): p
Disk /dev/sdb: 10 GiB, 10737418240 bytes, 20971520 sectors
Disk model: PersistentDisk
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes
Disklabel type: dos
Disk identifier: 0xeaea2252

Device      Boot Start      End  Sectors Size Id Type
/dev/sdb1        2048 20971519 20969472  10G fd Linux raid autodetect

Command (m for help):
```

The screenshot shows an SSH session on a Mac OS X interface. The title bar says "SSH en el navegador" and the address bar shows "ssh.cloud.google.com". The terminal window displays the following command-line session:

```
12 Compaq diagnost 5c Priam Edisk      a9 NetBSD          f1 SpeedStor
14 Hidden FAT16 <3 61 SpeedStor        ab Darwin boot    f4 SpeedStor
16 Hidden FAT16   63 GNU HURD or Sys af HFS / HFS+       f2 DOS secondary
17 Hidden HPFS/NTF 64 Novell Netware   b7 BSDI fs         fb VMware VMFS
18 AST SmartSleep 65 Novell Netware   b8 BSDI swap       fc VMware VMKCORE
1b Hidden W95 FAT3 70 DiskSecure Mult bb Boot Wizard hid fd Linux raid auto
1c Hidden W95 FAT3 75 PC/IX            bc Acronis FAT32 L fe LANstep
le Hidden W95 FAT1 80 Old Minix       be Solaris boot    ff BBT

Command (m for help): FD
Unpartitioned space /dev/sdb: 0 B, 0 bytes, 0 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes

Command (m for help): t
Selected partition 1
Hex code (type L to list all codes): fd
Changed type of partition 'Linux' to 'Linux raid autodetect'.

Command (m for help): p
Disk /dev/sdb: 10 GiB, 10737418240 bytes, 20971520 sectors
Disk model: PersistentDisk
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes
Disklabel type: dos
Disk identifier: 0xeaea2252

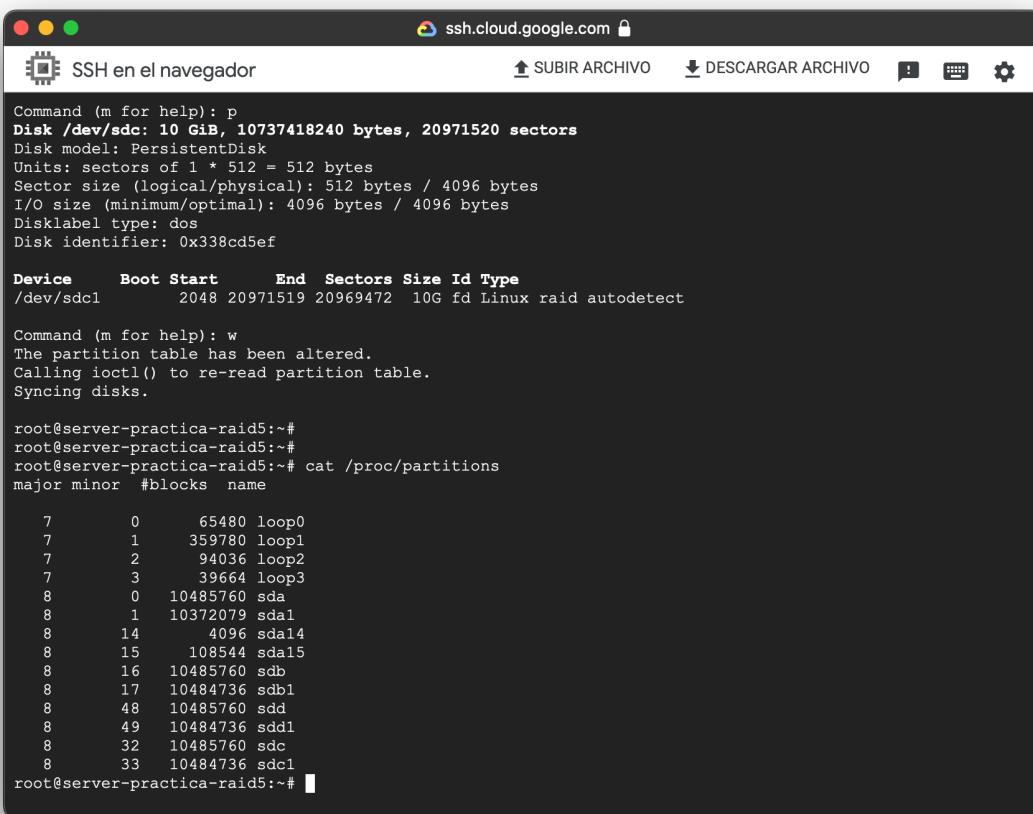
Device     Boot Start      End  Sectors Size Id Type
/dev/sdb1        2048 20971519 20969472  10G fd Linux raid autodetect

Command (m for help): w
The partition table has been altered.
Calling ioctl() to re-read partition table.
Syncing disks.

root@server-practica-raid5:~#
```

Se repitió este paso para los 3 discos creados anteriormente.

## Verificando que los tres discos hayan sido configurados correctamente: Crean



The screenshot shows an SSH session on a Google Cloud terminal window titled "SSH en el navegador". The session is connected to "ssh.cloud.google.com". The terminal displays the following command-line output:

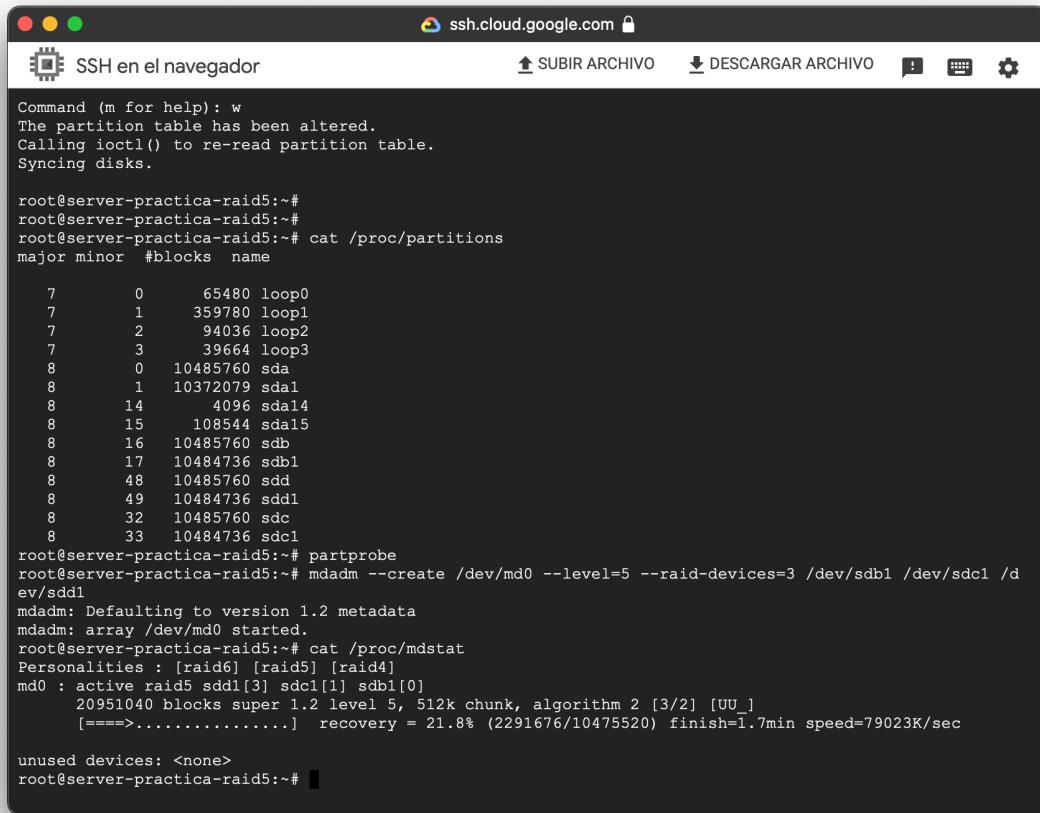
```
Command (m for help): p
Disk /dev/sdc: 10 GiB, 10737418240 bytes, 20971520 sectors
Disk model: PersistentDisk
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes
Disklabel type: dos
Disk identifier: 0x338cd5ef

Device      Boot Start     End Sectors Size Id Type
/dev/sdc1        2048 20971519 20969472  10G fd Linux raid autodetect

Command (m for help): w
The partition table has been altered.
Calling ioctl() to re-read partition table.
Syncing disks.

root@server-practica-raid5:~#
root@server-practica-raid5:~#
root@server-practica-raid5:~# cat /proc/partitions
major minor #blocks name
    7      0      65480 loop0
    7      1      359780 loop1
    7      2      94036 loop2
    7      3      39664 loop3
    8      0   10485760 sda
    8      1   10372079 sda1
    8     14      4096 sda14
    8     15     108544 sda15
    8     16   10485760 sdb
    8     17   10484736 sdb1
    8     48   10485760 sdd
    8     49   10484736 sdd1
    8     32   10485760 sdc
    8     33   10484736 sdc1
root@server-practica-raid5:~#
```

## Creando el arreglo RAID:



The screenshot shows an SSH session on a Google Cloud terminal window titled "SSH en el navegador". The session is running as root on a server named "practica-raid5". The terminal displays the following command sequence to create a RAID 5 array:

```
Command (m for help): w
The partition table has been altered.
Calling ioctl() to re-read partition table.
Syncing disks.

root@server-practica-raid5:~#
root@server-practica-raid5:~#
root@server-practica-raid5:~# cat /proc/partitions
major minor #blocks name

    7          0      65480 loop0
    7          1      359780 loop1
    7          2      94036 loop2
    7          3      39664 loop3
    8          0     10485760 sda
    8          1     10372079 sda1
    8          14      4096 sda14
    8          15     108544 sda15
    8          16     10485760 sdb
    8          17     10484736 sdb1
    8          48     10485760 sdd
    8          49     10484736 sdd1
    8          32     10485760 sdc
    8          33     10484736 sdc1

root@server-practica-raid5:~# partprobe
root@server-practica-raid5:~# mdadm --create /dev/md0 --level=5 --raid-devices=3 /dev/sdb1 /dev/sdc1 /dev/sdd1
mdadm: Defaulting to version 1.2 metadata
mdadm: array /dev/md0 started.
root@server-practica-raid5:~# cat /proc/mdstat
Personalities : [raid6] [raid5] [raid4]
md0 : active raid5 sdd1[3] sdc1[1] sdb1[0]
      20951040 blocks super 1.2 level 5, 512k chunk, algorithm 2 [3/2] [_UU_]
      [=====>.....] recovery = 21.8% (2291676/10475520) finish=1.7min speed=79023K/sec

unused devices: <none>
root@server-practica-raid5:~#
```

## Confirmando la creación del Arreglo:

SSH en el navegador

```
root@server-practica-raid5:~# cat /proc/partitions
major minor #blocks name
 7        0      65480 loop0
 7        1     359780 loop1
 7        2     94036 loop2
 7        3     39664 loop3
 8        0    10485760 sda
 8        1   10372079 sda1
 8       14      4096 sda14
 8       15    108544 sda15
 8       16    10485760 sdb
 8       17   10484736 sdb1
 8       48    10485760 sdd
 8       49   10484736 sdd1
 8       32    10485760 sdc
 8       33   10484736 sdc1
root@server-practica-raid5:~# partprobe
root@server-practica-raid5:~# mdadm --create /dev/md0 --level=5 --raid-devices=3 /dev/sdb1 /dev/sdc1 /dev/sdd1
mdadm: Defaulting to version 1.2 metadata
mdadm: array /dev/md0 started.
root@server-practica-raid5:~# cat /proc/mdstat
Personalities : [raid6] [raid5] [raid4]
md0 : active raid5 sdd1[3] sdc1[1] sdb1[0]
      20951040 blocks super 1.2 level 5, 512k chunk, algorithm 2 [3/2] [UU_]
      [=====.....] recovery = 21.8% (2291676/10475520) finish=1.7min speed=79023K/sec

unused devices: <none>
root@server-practica-raid5:~# cat /proc/mdstat
Personalities : [raid6] [raid5] [raid4]
md0 : active raid5 sdd1[3] sdc1[1] sdb1[0]
      20951040 blocks super 1.2 level 5, 512k chunk, algorithm 2 [3/3] [UUU]

unused devices: <none>
root@server-practica-raid5:~#
```

SSH en el navegador

```
Personalities : [raid6] [raid5] [raid4]
md0 : active raid5 sdd1[3] sdc1[1] sdb1[0]
      20951040 blocks super 1.2 level 5, 512k chunk, algorithm 2 [3/3] [UUU]

unused devices: <none>
root@server-practica-raid5:~# mdadm --detail /dev/md0
/dev/md0:
      Version : 1.2
      Creation Time : Sat Apr 27 04:41:16 2024
      Raid Level : raid5
      Array Size : 20951040 (19.98 GiB 21.45 GB)
      Used Dev Size : 10475520 (9.99 GiB 10.73 GB)
      Raid Devices : 3
      Total Devices : 3
      Persistence : Superblock is persistent

      Update Time : Sat Apr 27 04:43:33 2024
      State : clean
      Active Devices : 3
      Working Devices : 3
      Failed Devices : 0
      Spare Devices : 0

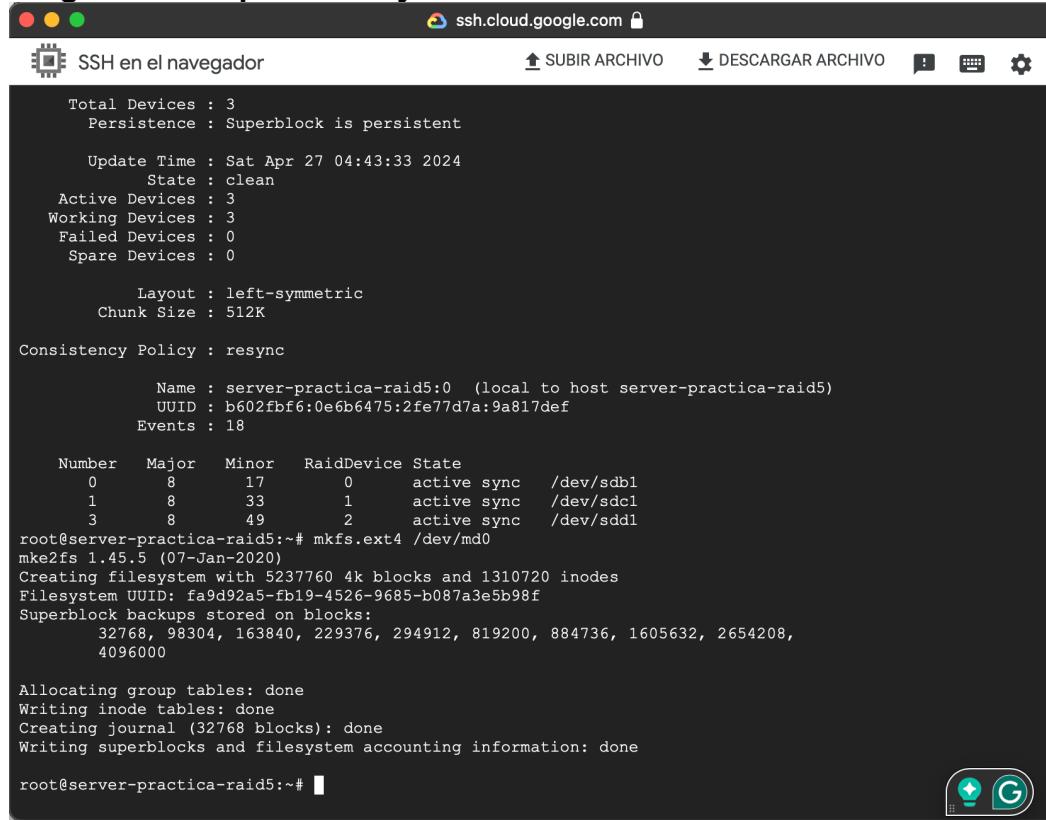
      Layout : left-symmetric
      Chunk Size : 512K

Consistency Policy : resync

      Name : server-practica-raid5:0  (local to host server-practica-raid5)
      UUID : b602fbf6:0e6b6475:2fe77d7a:9a817def
      Events : 18

      Number  Major  Minor  RaidDevice State
          0      8      17        0    active sync   /dev/sdb1
          1      8      33        1    active sync   /dev/sdc1
          3      8      49        2    active sync   /dev/sdd1
root@server-practica-raid5:~#
```

## Asignando el tipo de filesystem al volumen md0:



```
Total Devices : 3
 Persistence : Superblock is persistent

 Update Time : Sat Apr 27 04:43:33 2024
           State : clean
 Active Devices : 3
Working Devices : 3
 Failed Devices : 0
 Spare Devices : 0

           Layout : left-symmetric
     Chunk Size : 512K

Consistency Policy : resync

      Name : server-practica-raid5:0  (local to host server-practica-raid5)
        UUID : b602fbf6:0e6b6475:2fe77d7a:9a817def
      Events : 18

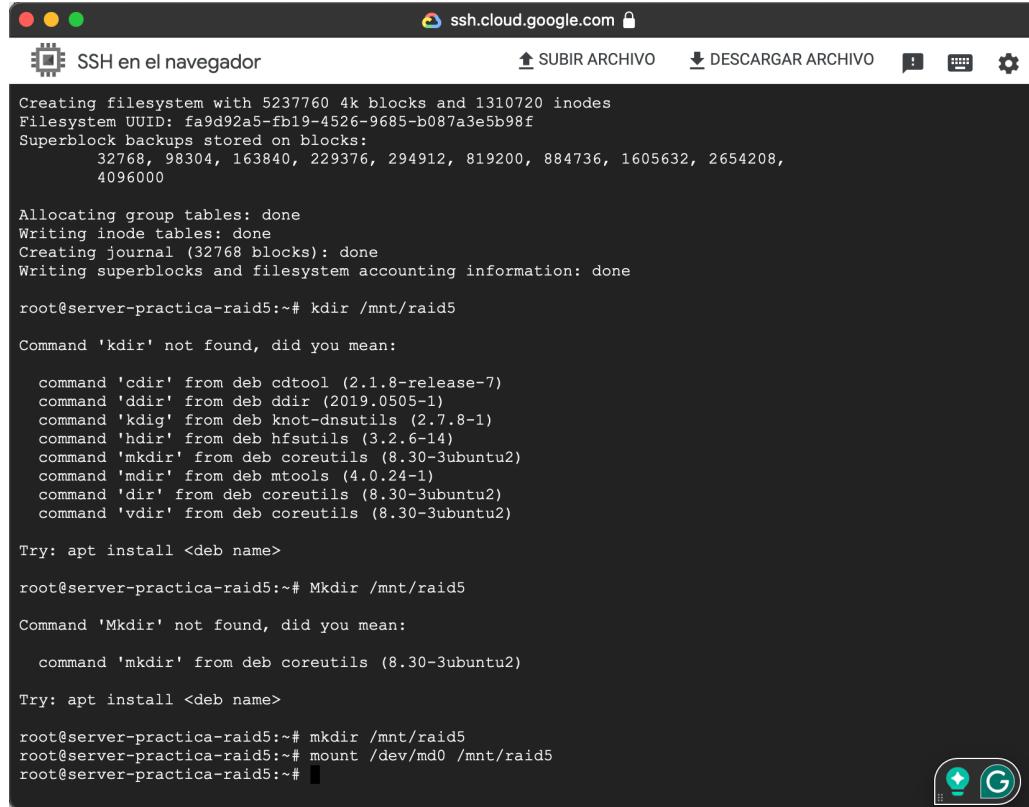
      Number  Major  Minor  RaidDevice State
         0      8       17       0     active sync   /dev/sdb1
         1      8       33       1     active sync   /dev/sdc1
         3      8       49       2     active sync   /dev/sdd1

root@server-practica-raid5:~# mkfs.ext4 /dev/md0
mke2fs 1.45.5 (07-Jan-2020)
Creating filesystem with 5237760 4k blocks and 1310720 inodes
Filesystem UUID: fa9d92a5-fb19-4526-9685-b087a3e5b98f
Superblock backups stored on blocks:
 32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208,
 4096000

Allocating group tables: done
Writing inode tables: done
Creating journal (32768 blocks): done
Writing superblocks and filesystem accounting information: done

root@server-practica-raid5:~#
```

## Creando el directorio Raid5:



```
Creating filesystem with 5237760 4k blocks and 1310720 inodes
Filesystem UUID: fa9d92a5-fb19-4526-9685-b087a3e5b98f
Superblock backups stored on blocks:
 32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208,
 4096000

Allocating group tables: done
Writing inode tables: done
Creating journal (32768 blocks): done
Writing superblocks and filesystem accounting information: done

root@server-practica-raid5:~# mkdir /mnt/raid5
Command 'mkdir' not found, did you mean:

  command 'cdir' from deb cdtool (2.1.8-release-7)
  command 'ddir' from deb ddir (2019.0505-1)
  command 'kdig' from deb knot-dnsutils (2.7.8-1)
  command 'hdig' from deb hfsutils (3.2.6-14)
  command 'mkdir' from deb coreutils (8.30-3ubuntu2)
  command 'mdir' from deb mtools (4.0.24-1)
  command 'dir' from deb coreutils (8.30-3ubuntu2)
  command 'vdir' from deb coreutils (8.30-3ubuntu2)

Try: apt install <deb name>

root@server-practica-raid5:~# Mkdir /mnt/raid5
Command 'Mkdir' not found, did you mean:

  command 'mkdir' from deb coreutils (8.30-3ubuntu2)

Try: apt install <deb name>

root@server-practica-raid5:~# mkdir /mnt/raid5
root@server-practica-raid5:~# mount /dev/md0 /mnt/raid5
root@server-practica-raid5:~#
```

## Verificando que el volumen con el RAID 5 MD0 ha sido montado en el directorio:

```
# ls -l /mnt/raid5
total 0
drwxr-xr-x 2 root root 0 Jan 19 14:45 .
drwxr-xr-x 1001 root root 0 Jan 19 14:45 ..
drwxr-xr-x 2 root root 0 Jan 19 14:45 .config
drwxr-xr-x 2 root root 0 Jan 19 14:45 .local
drwxr-xr-x 2 root root 0 Jan 19 14:45 .nvidia
drwxr-xr-x 2 root root 0 Jan 19 14:45 .pulse
drwxr-xr-x 2 root root 0 Jan 19 14:45 .pulse-cookie
drwxr-xr-x 2 root root 0 Jan 19 14:45 .Xauthority
```

```
ssh: connect to host 192.168.1.10 port 22: Connection refused
Last login: Mon Jan 19 14:45:12 2015 from 192.168.1.10
root@192.168.1.10:~# cd /mnt/raid5
root@192.168.1.10:/mnt/raid5# touch prueba.txt
root@192.168.1.10:/mnt/raid5# nano prueba.txt
GNU nano 4.8
Prueba de mi primer RAID 5
```

## Apagando el Server:

The screenshot shows the Google Cloud Platform Compute Engine Instances page. On the left sidebar, under 'Máquinas virtuales', there are sections for 'Instancias de VM', 'Plantillas de instancia', 'Nodos de usuario único', 'Imágenes de máquina', 'TPU', 'Reservas', and 'Migrar to Virtual Machine...'. Under 'Almacenamiento', there are sections for 'Discos' and 'Grupos de almacenamiento'. The main area displays two VM instances:

| Estado | Nombre                | Zona          | Recomendaciones | En uso por | IP Interna        | IP externa | Conectar |
|--------|-----------------------|---------------|-----------------|------------|-------------------|------------|----------|
| ON     | server-practica-raid5 | us-central1-a |                 |            | 10.128.0.3 (nic0) | SSH        | ⋮        |
| ON     | serversubuntu         | us-central1-c |                 |            | 10.128.0.2 (nic0) | SSH        | ⋮        |

Below the table, there is a section titled 'Acciones relacionadas' with several options:

- Explorar copias de seguridad y DR**: Crea una copia de seguridad de tus VMs y configura la recuperación ante desastres.
- Consulta el informe de facturación**: Visualiza y administra tu facturación de Compute Engine.
- Supervisa VMs**: Visualiza los valores atípicos de VMs en métricas como CPU y red.
- Explora los registros de VM**: Visualiza, busca, analiza y descarga los registros de las instancias de VM.
- Configura reglas de firewall**: Controla el tráfico hacia y desde una instancia de VM.
- Administración de parches**: Programa actualizaciones de parches y verifica su cumplimiento en las instancias de VM.
- Balanceo de cargas entre VMs**: Configura el balanceo de carga para tus aplicaciones a medida que aumentan el tráfico y los usuarios.

On the right side, there is a sidebar titled 'Comienza a usar Compute Engine' with several learning modules:

- Crea un sitio web o una aplicación**: Implementa un sitio web o una aplicación, crea copias de seguridad de las VMs y los discos, y restaurablelos, configura el acceso seguro y diseña para conseguir escalabilidad.
- Crea un sitio web de "Hello World" en IIS**: Crea una VM de servidor web IIS con Compute Engine. (Instructivo: 25 min)
- Crea un sitio web de "Hello World" en Apache**: Crea un servidor web Apache en una VM de Linux. (Instructivo: 10 min)
- Transfiere archivos a una VM de Windows**: Sube archivos al bucket de Cloud Storage y descarga archivos del bucket a la VM de Windows. (Instructivo: 10 min)
- Transfiere archivos a una VM de Linux**: Sube archivos al bucket de Cloud Storage y descarga archivos del bucket a la VM de Linux. (Instructivo: 5 min)
- Habilitar el tráfico de entrada**: Documento de ayuda. Configura una política de firewall de red global para habilitar el tráfico de entrada.

The screenshot shows an SSH session in a browser window titled 'SSH en el navegador'. The user is running the 'su' command to become root. The terminal output shows the help documentation for the 'su' command:

```

-m, -p, --preserve-environment      do not reset environment variables
-w, --whitelist-environment <list>  don't reset specified variables

-g, --group <group>                specify the primary group
-G, --supp-group <group>            specify a supplemental group

-, -l, --login                      make the shell a login shell
-c, --command <command>             pass a single command to the shell with -c
--session-command <command>         pass a single command to the shell with -c
                                         and do not create a new session
-f, --fast                           pass -f to the shell (for csh or tcsh)
-s, --shell <shell>                 run <shell> if /etc/shells allows it
-P, --pty                            create a new pseudo-terminal

-h, --help                           display this help
-V, --version                        display version

For more details see su(1).
jbarillas97@server-practica-raid5:~$ sudo su -
root@server-practica-raid5:~# df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/root      9.6G  2.0G  7.5G  22% /
devtmpfs       2.0G   0    2.0G  0% /dev
tmpfs          2.0G   0    2.0G  0% /dev/shm
tmpfs          391M  988K  390M  1% /run
tmpfs          5.0M   0    5.0M  0% /run/lock
tmpfs          2.0G   0    2.0G  0% /sys/fs/cgroup
/dev/md0        20G   28K  19G  1% /mnt/raid5
/dev/loop0      64M   64M   0  100% /snap/core20/2264
/dev/loop1     352M  352M   0  100% /snap/google-cloud-cli/233
/dev/loop2      92M   92M   0  100% /snap/1xd/24061
/dev/loop3      39M   39M   0  100% /snap/snapd/21465
/dev/sda15    105M  6.1M   99M   6% /boot/efi
tmpfs          391M   0    391M  0% /run/user/1001
root@server-practica-raid5:~#

```