



SEDE  
SANTO DOMINGO

# UNIVERSIDAD DE LAS FUERZAS ARMADAS- ESPE

## SEDE SANTO DOMINGO DE LOS TSÁCHILAS

### DEPARTAMENTO DE CIENCIAS DE LA COMPUTACIÓN - DCCO-SS

#### CARRERA DE INGENIERÍA EN TECNOLOGÍAS DE LA INFORMACIÓN



<b>PERIODO</b>	:	202450 Mayo – Septiembre 2024
<b>ASIGNATURA</b>	:	Sistemas Operativos
<b>TEMA</b>	:	Taller 5
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**SANTO DOMINGO – ECUADOR**

## 1. Marco Teórico

### 3.1. Información del hardware

Figura 1. Comando lspci

```
jenni@jenni-VirtualBox: ~  
jenni@jenni-VirtualBox:~$ lspci  
00:00.0 Host bridge: Intel Corporation 440FX - 82441FX PMC [Natoma] (rev 02)  
00:01.0 ISA bridge: Intel Corporation 82371SB PIIX3 ISA [Natoma/Triton II]  
00:01.1 IDE interface: Intel Corporation 82371AB/EB/MB PIIX4 IDE (rev 01)  
00:02.0 VGA compatible controller: VMware SVGA II Adapter  
00:03.0 Ethernet controller: Intel Corporation 82540EM Gigabit Ethernet Controller (rev 02)  
00:04.0 System peripheral: InnoTek Systemberatung GmbH VirtualBox Guest Service  
00:05.0 Multimedia audio controller: Intel Corporation 82801AA AC'97 Audio Controller (rev 01)  
00:06.0 USB controller: Apple Inc. KeyLargo/Intrepid USB  
00:07.0 Bridge: Intel Corporation 82371AB/EB/MB PIIX4 ACPI (rev 08)  
00:0b.0 USB controller: Intel Corporation 82801FB/FBM/FR/FW/FRW (ICH6 Family) USB2 EHCI Controller  
00:0d.0 SATA controller: Intel Corporation 82801HM/HEM (ICH8M/ICH8M-E) SATA Controller [AHCI mode] (rev 02)
```

Nota. Muestra información sobre los buses PCI y los dispositivos conectados

Figura 2. Comando Lspci -v

```
jenni@jenni-VirtualBox:~$ lspci -v  
00:00.0 Host bridge: Intel Corporation 440FX - 82441FX PMC [Natoma] (rev 02)  
    Flags: fast devsel  
  
00:01.0 ISA bridge: Intel Corporation 82371SB PIIX3 ISA [Natoma/Triton II]  
    Flags: bus master, medium devsel, latency 0  
  
00:01.1 IDE interface: Intel Corporation 82371AB/EB/MB PIIX4 IDE (rev 01) (prog-if 8a [ISA Compatibility mode controller], supports both channels switched to PCI native mode, supports bus mastering)  
    Flags: bus master, fast devsel, latency 64  
    I/O ports at 01f0 [size=8]  
    I/O ports at 03f4  
    I/O ports at 0370 [size=8]  
    I/O ports at 0374  
    I/O ports at d000 [size=16]  
    Kernel driver in use: ata_piix  
    Kernel modules: pata_acpi  
  
00:02.0 VGA compatible controller: VMware SVGA II Adapter (prog-if 00 [VGA controller])  
    Subsystem: VMware SVGA II Adapter  
    Flags: bus master, fast devsel, latency 64, IRQ 18  
    I/O ports at d010 [size=16]  
  
00:03.0 Ethernet controller: Intel Corporation 82540EM Gigabit Ethernet Controller (rev 02)  
    Subsystem: Intel Corporation PRO/1000 MT Desktop Adapter  
    Flags: bus master, 66MHz, medium devsel, latency 64, IRQ 19  
    Memory at f0200000 (32-bit, non-prefetchable) [size=128K]  
    I/O ports at d020 [size=8]  
    Capabilities: <access denied>  
    Kernel driver in use: e1000  
    Kernel modules: e1000  
  
00:04.0 System peripheral: InnoTek Systemberatung GmbH VirtualBox Guest Service  
    Flags: fast devsel, IRQ 20  
    I/O ports at d040 [size=32]  
    Memory at f0400000 (32-bit, non-prefetchable) [size=4M]  
    Memory at f0800000 (32-bit, prefetchable) [size=16K]  
    Kernel driver in use: vboxguest  
    Kernel modules: vboxguest  
  
00:0b.0 USB controller: Intel Corporation 82801FB/FBM/FR/FW/FRW (ICH6 Family) USB2 EHCI Controller (prog-if 20 [EHCI])  
    Flags: bus master, fast devsel, latency 64, IRQ 19  
    Memory at f0805000 (32-bit, non-prefetchable) [size=4K]  
    Kernel driver in use: ehci-pci  
  
00:0d.0 SATA controller: Intel Corporation 82801HM/HEM (ICH8M/ICH8M-E) SATA Controller [AHCI mode] (rev 02) (prog-if 01 [AHCI 1.0])  
    Flags: bus master, fast devsel, latency 64, IRQ 21  
    I/O ports at d240 [size=8]  
    I/O ports at d248 [size=4]  
    I/O ports at d250 [size=8]  
    I/O ports at d258 [size=4]  
    I/O ports at d260 [size=16]  
    Memory at f0806000 (32-bit, non-prefetchable) [size=8K]  
    Capabilities: <access denied>  
    Kernel driver in use: ahci  
    Kernel modules: ahci  
  
00:05.0 Multimedia audio controller: Intel Corporation 82801AA AC'97 Audio Controller (rev 01)  
    Subsystem: Dell 82801AA AC'97 Audio Controller  
    Flags: bus master, medium devsel, latency 64, IRQ 21  
    I/O ports at d100 [size=256]  
    I/O ports at d200 [size=64]  
    Kernel driver in use: snd_intel8x0
```

Figura 3. Lspci -s

# Sistemas Operativos

```
jenni@jenni-VirtualBox: ~  
jenni@jenni-VirtualBox:~$ lspci -v  
00:00:0 Host bridge: Intel Corporation 440FX - 82441FX PMC [Natoma] (rev 02)  
Flags: fast devsel  
  
00:01:0 ISA bridge: Intel Corporation 82371SB PIIX3 ISA [Natoma/Triton II]  
Flags: bus master, medium devsel, latency 0  
  
00:01:1 IDE interface: Intel Corporation 82371AB/EB/MB PIIX4 IDE (rev 01) (prog-  
-if 8a [ISA Compatibility mode controller, supports both channels switched to PCI  
native mode, supports bus mastering])  
Flags: bus master, fast devsel, latency 64  
I/O ports at 01f0 [size=8]  
I/O ports at 03f4  
I/O ports at 0170 [size=8]  
I/O ports at 0374  
I/O ports at d000 [size=16]  
Kernel driver in use: ata_piix  
Kernel modules: pata_acpi  
  
00:02:0 VGA compatible controller: VMware SVGA II Adapter (prog-if 00 [VGA contr  
oller])  
Subsystem: VMware SVGA II Adapter  
Flags: bus master, fast devsel, latency 64, IRQ 18  
I/O ports at d010 [size=16]
```

Nota. Muestra información solo del dispositivo seleccionado

**Figura 4.** lsusb

```
jenni@jenni-VirtualBox: ~  
jenni@jenni-VirtualBox:~$ lspci -s  
lspci: option requires an argument -- 's'  
Usage: lspci [<switches>]  
  
Basic display modes:  
-mm          Produce machine-readable output (single -m for an obsolete forma  
-t)          Show bus tree  
-st          Show bus tree  
  
Display options:  
-v           Be verbose (-vv or -vvv for higher verbosity)  
-k           Show kernel drivers handling each device  
-x           Show hex-dump of the standard part of the config space  
-xxx         Show hex-dump of the whole config space (dangerous; root only)  
-xxxx        Show hex-dump of the 4096-byte extended config space (root only)  
-b           Bus-centric view (addresses and IRQ's as seen by the bus)  
-D           Always show domain numbers  
-P           Display bridge path in addition to bus and device number  
-PP          Display bus path in addition to bus and device number  
  
Resolving of device ID's to names:  
-n           Show numeric ID's  
-nn          Show both textual and numeric ID's (names & numbers)  
-q           Query the PCI ID database for unknown ID's via DNS
```

Nota. Muestra información sobre los buses y dispositivos usb conectados

**Figura 5.** lsusb -v

```
jenni@jenni-VirtualBox: ~  
Bus 001 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub  
Couldn't open device, some information will be missing  
Device Descriptor:  
  bLength:             18  
  bDescriptorType:      1  
  bcdUSB:               1.10  
  bDeviceClass:          9 Hub  
  bDeviceSubClass:       0 [unknown]  
  bDeviceProtocol:       0 Full speed (or root) hub  
  bMaxPacketSize0:      64  
  IdVendor:             0x1d6b Linux Foundation  
  IdProduct:            0x0001 1.1 root hub  
  bcdDevice:            6.00  
  iManufacturer:        3 Linux 6.8.0-31-generic ohci_hcd  
  iProduct:              2 OHCI PCI host controller  
  iSerial:               1 0000:00:06.0  
  bNumConfigurations:    1  
Configuration Descriptor:  
  bLength:              9  
  bDescriptorType:       2  
  wTotalLength:          0x0019  
  bNumInterfaces:        1  
  bConfigurationValue:   1  
  iConfiguration:        0
```

Nota. Muestra más información sobre los buses y dispositivos usb conectados

**Figura 6.** lsusb -s

# Sistemas Operativos

```
jenni@jenni-VirtualBox: ~  
Bus 001 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub  
jenni@jenni-VirtualBox:~$ lsusb -v  
  
Bus 001 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub  
Couldn't open device, some information will be missing  
Device Descriptor:  
  bLength                18  
  bDescriptorType         1  
  bcdUSB                  1.10  
  bDeviceClass             9 Hub  
  bDeviceSubClass          0 [unknown]  
  bDeviceProtocol          0 Full speed (or root) hub  
  bMaxPacketSize0          64  
  idVendor                 0x1d6b Linux Foundation  
  idProduct                0x0001 1.1 root hub  
  bcdDevice                6.08  
  iManufacturer           3 Linux 6.8.0-31-generic ohci_hcd  
  iProduct                2 OHCI PCI host controller  
  iSerial                 1 0000:00:06.0  
  bNumConfigurations       1  
Configuration Descriptor:  
  bLength                9  
  bDescriptorType         2  
  wTotalLength             0x0019  
  bNumInterfaces           1
```

Nota. Información de un solo dispositivo

**Figura 7.** lsusb -t

```
Show usage and help  
jenni@jenni-VirtualBox:~$ lsusb -t  
/: Bus 001.Port 001: Dev 001, Class=root_hub, Driver=ohci-pci/12p, 12M  
    |__ Port 001: Dev 002, If 0, Class=Human Interface Device, Driver=usbhid, 12M  
/: Bus 002.Port 001: Dev 001, Class=root_hub, Driver=ehci-pci/12p, 480M
```

Nota.

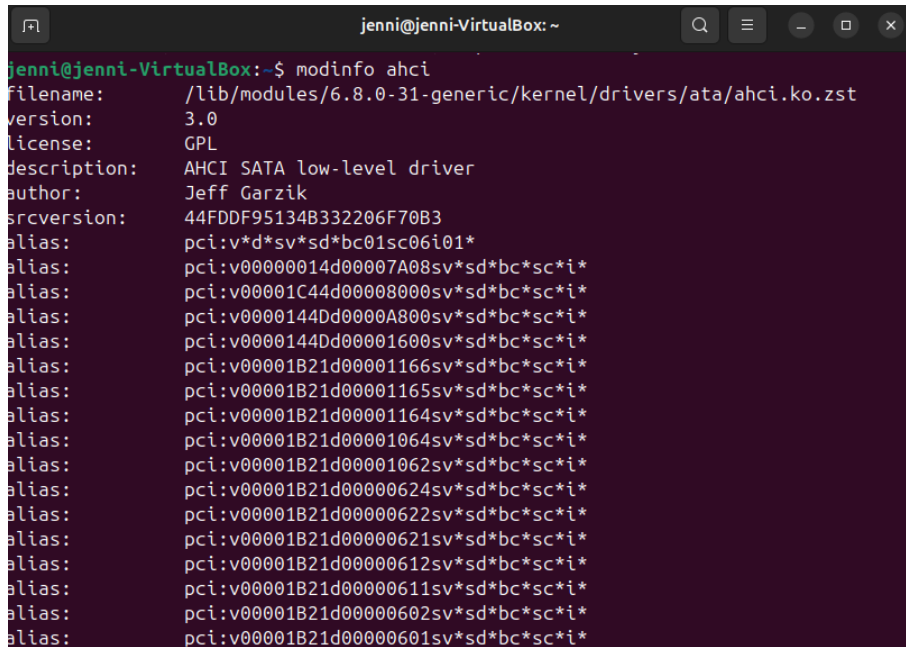
## 2. Módulos de Kernel de Linux

**Figura 8.** lsmod

```
jenni@jenni-VirtualBox: ~  
/: Bus 002.Port 001: Dev 001, Class=root_hub, Driver=ehci-pci/12p, 480M  
jenni@jenni-VirtualBox:~$ lsmod  
Module      Size  Used by  
snd_seq_dummy 12288 0  
snd_hrtimer  12288 1  
snd_intel8x0  53248 1  
snd_ac97_codec 196608 1 snd_intel8x0  
ac97_bus     12288 1 snd_ac97_codec  
snd_pcm      200704 2 snd_intel8x0,snd_ac97_codec  
snd_seq_midi  24576 0  
snd_seq_midi_event 16384 1 snd_seq_midi  
snd_rawmidi  57344 1 snd_seq_midi  
snd_seq      118784 9 snd_seq_midi,snd_seq_midi_event,snd_seq_dummy  
qrtr         53248 4  
intel_rapl_msrm 20480 0  
intel_rapl_common 40960 1 intel_rapl_msrm  
intel_uncore_frequency_common 16384 0  
snd_seq_device 16384 3 snd_seq,snd_seq_midi,snd_rawmidi  
intel_pmc_core 118784 0  
snd_timer    49152 3 snd_seq,snd_hrtimer,snd_pcm  
intel_vsec    20480 1 intel_pmc_core  
pmt_telemetry 16384 1 intel_pmc_core  
pmt_class     16384 1 pmt_telemetry  
crt10dif_pclmul 12288 1
```

Nota. Muestra módulos cargados en el sistema

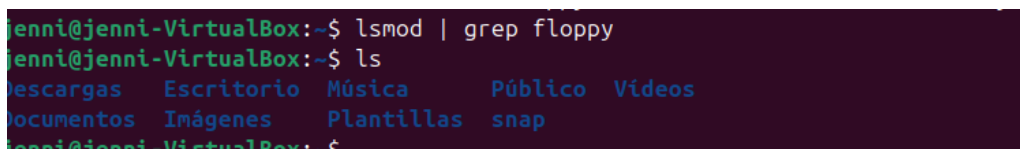
**Figura 9.** Modinfo



```
jenni@jenni-VirtualBox: ~  
jenni@jenni-VirtualBox:~$ modinfo ahci  
filename:      /lib/modules/6.8.0-31-generic/kernel/drivers/ata/ahci.ko.zst  
version:       3.0  
license:       GPL  
description:    AHCI SATA low-level driver  
author:        Jeff Garzik  
srcversion:     44FDDF95134B332206F70B3  
alias:         pci:v*d*sv*sd*bc01sc06i01*  
alias:         pci:v00000014d00007A08sv*sd*bc*sc*i*  
alias:         pci:v00001C44d00008000sv*sd*bc*sc*i*  
alias:         pci:v0000144Dd0000A800sv*sd*bc*sc*i*  
alias:         pci:v0000144Dd00001600sv*sd*bc*sc*i*  
alias:         pci:v00001B21d00001166sv*sd*bc*sc*i*  
alias:         pci:v00001B21d00001165sv*sd*bc*sc*i*  
alias:         pci:v00001B21d00001164sv*sd*bc*sc*i*  
alias:         pci:v00001B21d00001064sv*sd*bc*sc*i*  
alias:         pci:v00001B21d00001062sv*sd*bc*sc*i*  
alias:         pci:v00001B21d00000624sv*sd*bc*sc*i*  
alias:         pci:v00001B21d00000622sv*sd*bc*sc*i*  
alias:         pci:v00001B21d00000621sv*sd*bc*sc*i*  
alias:         pci:v00001B21d00000612sv*sd*bc*sc*i*  
alias:         pci:v00001B21d00000611sv*sd*bc*sc*i*  
alias:         pci:v00001B21d00000602sv*sd*bc*sc*i*  
alias:         pci:v00001B21d00000601sv*sd*bc*sc*i*
```

Nota. Amplia la información de un modulo

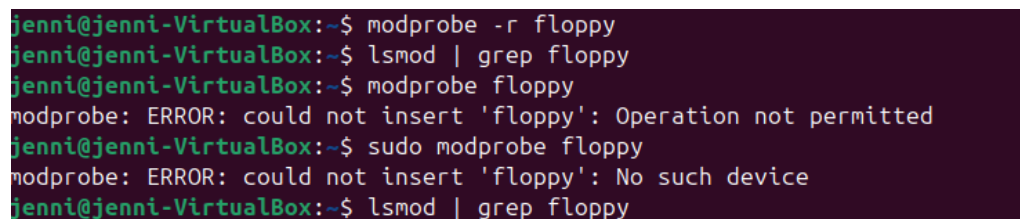
**Figura 10.** lsmod



```
jenni@jenni-VirtualBox:~$ lsmod | grep floppy  
jenni@jenni-VirtualBox:~$ ls  
Descargas  Escritorio  Música      Público  Videos  
documentos Imágenes   Plantillas  snap
```

Nota. : Amplia la información de un modulo

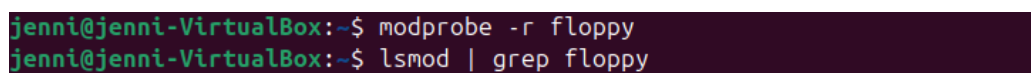
**Figura 11.** modprobe



```
jenni@jenni-VirtualBox:~$ modprobe -r floppy  
jenni@jenni-VirtualBox:~$ lsmod | grep floppy  
jenni@jenni-VirtualBox:~$ modprobe floppy  
modprobe: ERROR: could not insert 'floppy': Operation not permitted  
jenni@jenni-VirtualBox:~$ sudo modprobe floppy  
modprobe: ERROR: could not insert 'floppy': No such device  
jenni@jenni-VirtualBox:~$ lsmod | grep floppy
```

Nota. Carga o borra módulos

**Figura 12.** modprobe -r



```
jenni@jenni-VirtualBox:~$ modprobe -r floppy  
jenni@jenni-VirtualBox:~$ lsmod | grep floppy
```

## 3. Pendrive USB

**Figura 13.** Ls -l sd

```
jenni@jenni-VirtualBox:~$ ls -l /dev/sd*
drw-rw---- 1 root disk 8, 0 may 28 11:31 /dev/sda
drw-rw---- 1 root disk 8, 1 may 28 11:31 /dev/sda1
drw-rw---- 1 root disk 8, 2 may 28 11:31 /dev/sda2
```

Nota. Disco duro y sus particiones (Sin pendrive). En este caso se busca en el directorio actual primero en /dev.

**Figura 14.** cd /sys/class/ ; ls ; cd block/ ; ls ; ls -l

```
jenni@jenni-VirtualBox:~$ cd /sys/class/
bash: cd /sys/class/: No existe el archivo o el directorio
jenni@jenni-VirtualBox:~$ ls
Descargas  Escritorio  Música      Público  Videos
Documentos Imágenes    Plantillas  snap
jenni@jenni-VirtualBox:~$ cd /block/
bash: cd: /block/: No existe el archivo o el directorio
jenni@jenni-VirtualBox:~$ ls -l
No se ha encontrado la orden «ld», pero se puede instalar con:
sudo apt install binutils
jenni@jenni-VirtualBox:~$ ls -l
total 36
drwxr-xr-x 2 jenni jenni 4096 may 16 10:48 Descargas
drwxr-xr-x 2 jenni jenni 4096 may 16 10:48 Documentos
drwxr-xr-x 2 jenni jenni 4096 may 16 10:48 Escritorio
drwxr-xr-x 3 jenni jenni 4096 may 22 17:18 Imágenes
drwxr-xr-x 2 jenni jenni 4096 may 16 10:48 Música
drwxr-xr-x 2 jenni jenni 4096 may 16 10:48 Plantillas
drwxr-xr-x 2 jenni jenni 4096 may 16 10:48 Público
drwx----- 5 jenni jenni 4096 may 23 12:00 snap
drwxr-xr-x 2 jenni jenni 4096 may 16 10:48 Videos
```

Nota. Formas distintas de ver directorios

## 4. Sistema Real

**Figura 15.** Cat /proc/interrupts

```

jenni@jenni-VirtualBox:~$ cat /proc/interrupts
CPU0
0: 116 IO-APIC 2-edge timer
1: 1222 IO-APIC 1-edge i8042
8: 0 IO-APIC 8-edge rtc0
9: 0 IO-APIC 9-fasteoi acpi
12: 430 IO-APIC 12-edge i8042
14: 0 IO-APIC 14-edge ata_piix
15: 2536 IO-APIC 15-edge ata_piix
18: 1 IO-APIC 18-fasteoi vmwgfx
19: 1756 IO-APIC 19-fasteoi ehci_hcd:usb2, enp0s3
20: 8327 IO-APIC 20-fasteoi vboxguest
21: 16346 IO-APIC 21-fasteoi ahci[0000:00:0d:0], snd_intel8x0
22: 26 IO-APIC 22-fasteoi ohci_hcd:usb1
NMI: 0 Non-maskable interrupts
LOC: 3312482 Local timer interrupts
SPU: 0 Spurious interrupts
PMI: 0 Performance monitoring interrupts
IWI: 0 IRQ work interrupts
RTR: 0 APIC ICR read retries
RES: 0 Rescheduling interrupts
CAL: 0 Function call interrupts
TAP: 0 TAP interrupts

```

```

jenni@jenni-VirtualBox:~$ cat /proc/dms
cat: /proc/dms: No existe el archivo o el directorio
jenni@jenni-VirtualBox:~$ ls /proc
1 1003 1074 2274 35 55 cmdline misc
1013 1034 1078 2279 350 557 consoles modules
1025 1052 1079 2331 36 56 cpuinfo mounts
1035 1093 1000 2346 361 561 crypto mtrr
1048 1094 1081 2352 364 575 devices net
1064 17 19 2384 37 577 diskstats pagetypeinfo
11 1701 1902 2391 38 578 dma partitions
111 1711 1909 24 39 579 driver pressure
12 1722 1991 242 4 58 dynamic_debug schedstat:
1308 175 2 2456 40 583 execdomains scsi
1342 1756 20 25 41 590 fb self
134 1758 2041 2501 42 6 filesystems slabinfo
134 176 2046 2507 43 603 fs softirq:
135 1776 2067 26 44 610 interrupts stat
136 18 2074 2636 447 625 iomem swaps
1329 1824 2098 27 45 628 ioports sys
13 1838 21 2720 46 64 irq sysrq-trigger
1312 1840 2101 2736 47 64 kallsyms sysvipc
1328 1856 2111 2737 48 648 kcore thread-self

```



## Sistemas Operativos

Nota. Muestra las interrupciones asociadas, en este caso no sirvió el `/dms` ya que no existe, sin embargo al listar `ls /proc` me muestra todos los archivos y directorios.

**Figura 16.** `cat /proc/ioprocs`

```
jenni@jenni-VirtualBox:~$ cat /proc/ioprocs
0000-0000 : PCI Bus 0000:00
    0000-0000 : dma1
    0000-0000 : pic1
    0000-0000 : timer0
    0000-0000 : timer1
    0000-0000 : keyboard
    0000-0000 : keyboard
    0000-0000 : rtc_cmos
    0000-0000 : rtc0
    0000-0000 : dma page reg
    0000-0000 : pic2
    0000-0000 : dma2
    0000-0000 : fpu
    0000-0000 : 0000:00:01.1
    0000-0000 : ata_piix
    0000-0000 : 0000:00:01.1
    0000-0000 : ata_piix
    0000-0000 : 0000:00:01.1
    0000-0000 : ata_piix
```

Nota. Muestra dispositivos

**Figura 17.** `Lspci`

```
jenni@jenni-VirtualBox:~$ lspci
00:00.0 Host bridge: Intel Corporation 440FX - 82441FX PMC [Natoma] (rev 02)
00:01.0 ISA bridge: Intel Corporation 82371SB PIIX3 ISA [Natoma/Triton II]
00:01.1 IDE interface: Intel Corporation 82371AB/EB/MB PIIX4 IDE (rev 01)
00:02.0 VGA compatible controller: VMware SVGA II Adapter
00:03.0 Ethernet controller: Intel Corporation 82540EM Gigabit Ethernet Controller (rev 02)
00:04.0 System peripheral: InnoTek Systemberatung GmbH VirtualBox Guest Service
00:05.0 Multimedia audio controller: Intel Corporation 82801AA AC'97 Audio Controller (rev 01)
00:06.0 USB controller: Apple Inc. KeyLargo/Intrepid USB
00:07.0 Bridge: Intel Corporation 82371AB/EB/MB PIIX4 ACPI (rev 08)
00:0b.0 USB controller: Intel Corporation 82801FB/FBM/FR/FW/FRW (ICH6 Family) USB2 EHCI Controller
00:0d.0 SATA controller: Intel Corporation 82801HM/HEM (ICH8M/ICH8M-E) SATA Controller [AHCI mode] (rev 02)
```

Nota. Información sobre los dispositivos conectados

**Figura 18.** `Lspci -s`

```
jenni@jenni-VirtualBox:~$ lspci -s
lspci: option requires an argument -- 's'
Usage: lspci [<switches>]

Basic display modes:
-m      Produce machine-readable output (single -m for an obsolete format)
-t      Show bus tree

Display options:
-v      Be verbose (-vv or -vvv for higher verbosity)
-k      Show kernel drivers handling each device
-x      Show hex-dump of the standard part of the config space
-xxx    Show hex-dump of the whole config space (dangerous; root only)
-xxxx   Show hex-dump of the 4096-byte extended config space (root only)
-b      Bus-centric view (addresses and IRQ's as seen by the bus)
-D      Always show domain numbers
-P      Display bridge path in addition to bus and device number
-PP     Display bus path in addition to bus and device number
```

## Sistemas Operativos

**Figura 19.** Lspci -tv

```
jenni@jenni-VirtualBox:~$ lspci -tv
-[0000:00]-+-.00.0 Intel Corporation 440FX - 82441FX PMC [Natoma]
          +-01.0 Intel Corporation 82371SB PIIX3 ISA [Natoma/Triton II]
          +-01.1 Intel Corporation 82371AB/EB/MB PIIX4 IDE
          +-02.0 VMware SVGA II Adapter
          +-03.0 Intel Corporation 82540EM Gigabit Ethernet Controller
          +-04.0 InnoTek Systemberatung GmbH VirtualBox Guest Service
          +-05.0 Intel Corporation 82801AA AC'97 Audio Controller
          +-06.0 Apple Inc. KeyLargo/Intrepid USB
          +-07.0 Intel Corporation 82371AB/EB/MB PIIX4 ACPI
          +-0b.0 Intel Corporation 82801FB/FBM/FR/FW/FRW (ICH6 Family) USB2 EHCI Controller
          \-0d.0 Intel Corporation 82801HM/HEM (ICH8M/ICH8M-E) SATA Controller [AHCI mode]
```

Nota. Muestra un árbol de dispositivos

**Figura 20.** Lsusb

```
jenni@jenni-VirtualBox:~$ lsusb
Bus 001 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub
Bus 001 Device 002: ID 80ee:0021 VirtualBox USB Tablet
Bus 002 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
```

Nota. Información de buses y dispositivos conectados

**Figura 21.** Lsmod | less

```
jenni@jenni-VirtualBox: ~
Module      Size  Used by
snd_seq_dummy 12288 0
snd_hrtimer  12288 1
snd_intel8x0  53248 1
snd_ac97_codec 196608 1 snd_intel8x0
ac97_bus     12288 1 snd_ac97_codec
snd_pcm      200704 2 snd_intel8x0,snd_ac97_codec
snd_seq_midi  24576 0
snd_seq_midi_event 16384 1 snd_seq_midi
snd_rawmidi   57344 1 snd_seq_midi
snd_seq       118784 9 snd_seq_midi,snd_seq_midi_event,snd_seq_dummy
qrtr          53248 4
intel_rapl_msr 20480 0
intel_rapl_common 40960 1 intel_rapl_msr
intel_uncore_frequency_common 16384 0
snd_seq_device 16384 3 snd_seq,snd_seq_midi,snd_rawmidi
intel_pmc_core 118784 0
snd_timer     49152 3 snd_seq,snd_hrtimer,snd_pcm
intel_vsec    20480 1 intel_pmc_core
pmt_telemetry 16384 1 intel_pmc_core
pmt_class     16384 1 pmt_telemetry
crt10dif_pclmul 12288 1
polyval_generic 12288 0
```

Nota. Para ver módulos