```
IRE
/boot/config-5.8.0-55-generic:9474:warning: symbol value 'm' invalid for ANDROI
D_BINDER_IPC
Your display is too small to run Menuconfig!
It must be at least 19 lines by 80 columns.
make[1]: *** [scripts/kconfig/Makefile:29: menuconfig] Error 1
make: *** [Makefile:528: menuconfig] Error 2
ubuntu@ubuntu:/usr/src/linux-4.17.4$ sudo make menuconfig
```

[+]   ubuntu@ubuntu: /usr/src/linux-4.10.13   🔍   ☰   –

root@u... ×   ubuntu... ×   ubuntu... ×   ubuntu... ×   ubuntu...

```
/boot/config-5.8.0-55-generic:4274:warning: symbol value 'm' invalid for
_LANTIQ
/boot/config-5.8.0-55-generic:4630:warning: symbol value 'm' invalid for
B86S7X
/boot/config-5.8.0-55-generic:5763:warning: symbol value 'm' invalid for
SI470X
/boot/config-5.8.0-55-generic:6433:warning: symbol value 'm' invalid for
KLIGHT
/boot/config-5.8.0-55-generic:8467:warning: symbol value 'm' invalid for
/boot/config-5.8.0-55-generic:9474:warning: symbol value 'm' invalid for
D_BINDER_IPC
Your display is too small to run Menuconfig!
It must be at least 19 lines by 80 columns.
make[1]: *** [scripts/kconfig/Makefile:28: menuconfig] Error 1
make: *** [Makefile:546: menuconfig] Error 2
ubuntu@ubuntu:/usr/src/linux-4.10.13$ make menuconfig
 *** Unable to find the ncurses libraries or the
 *** required header files.
 *** 'make menuconfig' requires the ncurses libraries.
 ***
 *** Install ncurses (ncurses-devel) and try again.
 ***
make[1]: *** [scripts/kconfig/Makefile:201: scripts/kconfig/dochecklxdia
ror 1
make: *** [Makefile:546: menuconfig] Error 2
ubuntu@ubuntu:/usr/src/linux-4.10.13$
```

ubuntu@ubuntu: /usr/src/linux-4.10.13

root@u... ×   ubuntu... ×   ubuntu... ×   ubuntu... ×   **ubuntu...**

```
/boot/config-5.8.0-55-generic:1615:warning: symbol value 'm' invalid for
A_TAG_EDSA
/boot/config-5.8.0-55-generic:1619:warning: symbol value 'm' invalid for
A_TAG_QCA
/boot/config-5.8.0-55-generic:1622:warning: symbol value 'm' invalid for
A_TAG_TRAILER
/boot/config-5.8.0-55-generic:3989:warning: symbol value 'm' invalid for
CK_IFORCE_USB
/boot/config-5.8.0-55-generic:3990:warning: symbol value 'm' invalid for
CK_IFORCE_232
/boot/config-5.8.0-55-generic:4274:warning: symbol value 'm' invalid for
_LANTIQ
/boot/config-5.8.0-55-generic:4630:warning: symbol value 'm' invalid for
B86S7X
/boot/config-5.8.0-55-generic:5763:warning: symbol value 'm' invalid for
SI470X
/boot/config-5.8.0-55-generic:6433:warning: symbol value 'm' invalid for
KLIGHT
/boot/config-5.8.0-55-generic:8467:warning: symbol value 'm' invalid for
/boot/config-5.8.0-55-generic:9474:warning: symbol value 'm' invalid for
D_BINDER_IPC
Your display is too small to run Menuconfig!
It must be at least 19 lines by 80 columns.
make[1]: *** [scripts/kconfig/Makefile:28: menuconfig] Error 1
make: *** [Makefile:546: menuconfig] Error 2
ubuntu@ubuntu:/usr/src/linux-4.10.13$
```

⊞   **ubuntu@ubuntu: /usr/src/linux-4.10.13/arch/x86/entry/sysc...**   🔍   ☰   –

root@u... ✕   ubuntu... ✕   ubuntu... ✕   ubuntu... ✕   **ubuntu...**

```
ubuntu@ubuntu:/usr/src/linux-4.10.13$ cd arch/x86/entry/syscalls
ubuntu@ubuntu:/usr/src/linux-4.10.13/arch/x86/entry/syscalls$ ls
Makefile  syscall_32.tbl  syscall_64.tbl  syscallhdr.sh  syscalltbl.sh
ubuntu@ubuntu:/usr/src/linux-4.10.13/arch/x86/entry/syscalls$ sudo gedi
l_64.tbl
[sudo] password for ubuntu:

(gedit:2996): Tepl-WARNING **: 23:50:17.677: GVfs metadata is not suppo
llback to TeplMetadataManager. Either GVfs is not correctly installed o
etadata are not supported on this platform. In the latter case, you sho
igure Tepl with --disable-gvfs-metadata.
ubuntu@ubuntu:/usr/src/linux-4.10.13/arch/x86/entry/syscalls$ #332 in i
our system call
ubuntu@ubuntu:/usr/src/linux-4.10.13/arch/x86/entry/syscalls$ 
```

*syscall_64.tbl
/usr/src/linux-4.10.13/arch/x86/entry/syscalls

Open ▾   ⨤   Save   ☰   —

```
324 315      common   sched_getattr       sys_sched_getattr
325 316      common   renameat2           sys_renameat2
326 317      common   seccomp                     sys_seccomp
327 318      common   getrandom           sys_getrandom
328 319      common   memfd_create        sys_memfd_create
329 320      common   kexec_file_load             sys_kexec_file_load
330 321      common   bpf                 sys_bpf
331 322      64       execveat            sys_execveat/ptregs
332 323      common   userfaultfd         sys_userfaultfd
333 324      common   membarrier          sys_membarrier
334 325      common   mlock2              sys_mlock2
335 326      common   copy_file_range             sys_copy_file_range
336 327      64       preadv2                     sys_preadv2
337 328      64       pwritev2            sys_pwritev2
338 329      common   pkey_mprotect       sys_pkey_mprotect
339 330      common   pkey_alloc          sys_pkey_alloc
340 331      common   pkey_free           sys_pkey_free
341 332      64       helloworld          sys_helloworld
342
343 #
344 # x32-specific system call numbers start at 512 to avoid cache impac
345 # for native 64-bit operation.
346 #
347 512      x32      rt_sigaction        compat_sys_rt_sigaction
348 513      x32      rt_sigreturn        sys32_x32_rt_sigreturn
349 514      x32      ioctl               compat_sys_ioctl
350 515      x32      readv               compat_sys_readv
351 516      x32      writev              compat_sys_writev
```

Plain Text ▾   Tab Width: 8 ▾   Ln 341, Col 41

root@ubunt... ✕	ubuntu@ubu... ✕	ubuntu@ubu... ✕	ubuntu@ubu...

```
hwmon-sysfs.h            pe.h                    win_minmax.h
hwmon-vid.h              percpu_counter.h        wireless.h
hw_random.h              percpu-defs.h           wkup_m3_ipc.h
hwspinlock.h             percpu.h                wl12xx.h
hyperv.h                 percpu_ida.h            wm97xx.h
hypervisor.h             percpu-refcount.h       workqueue.h
i2c                      percpu-rwsem.h          writeback.h
i2c-algo-bit.h           perf                    ww_mutex.h
i2c-algo-pca.h           perf_event.h            xattr.h
i2c-algo-pcf.h           perf_regs.h             xz.h
i2c-dev.h                personality.h           yam.h
i2c-gpio.h               pfn.h                   z2_battery.h
i2c.h                    pfn_t.h                 zbud.h
i2c-mux-gpio.h           phonet.h                zconf.h
i2c-mux.h                phy                     zlib.h
i2c-mux-pinctrl.h        phy_fixed.h             zorro.h
i2c-ocores.h             phy.h                   zpool.h
i2c-omap.h               phy_led_triggers.h      zsmalloc.h
i2c-pca-platform.h       pid.h                   zutil.h
ubuntu@ubuntu:/usr/src/linux-4.10.13/include/linux$ sudo gedit syscalls

(gedit:2965): Tepl-WARNING **: 23:42:43.330: GVfs metadata is not suppo
llback to TeplMetadataManager. Either GVfs is not correctly installed o
etadata are not supported on this platform. In the latter case, you sho
igure Tepl with --disable-gvfs-metadata.
ubuntu@ubuntu:/usr/src/linux-4.10.13/include/linux$
```
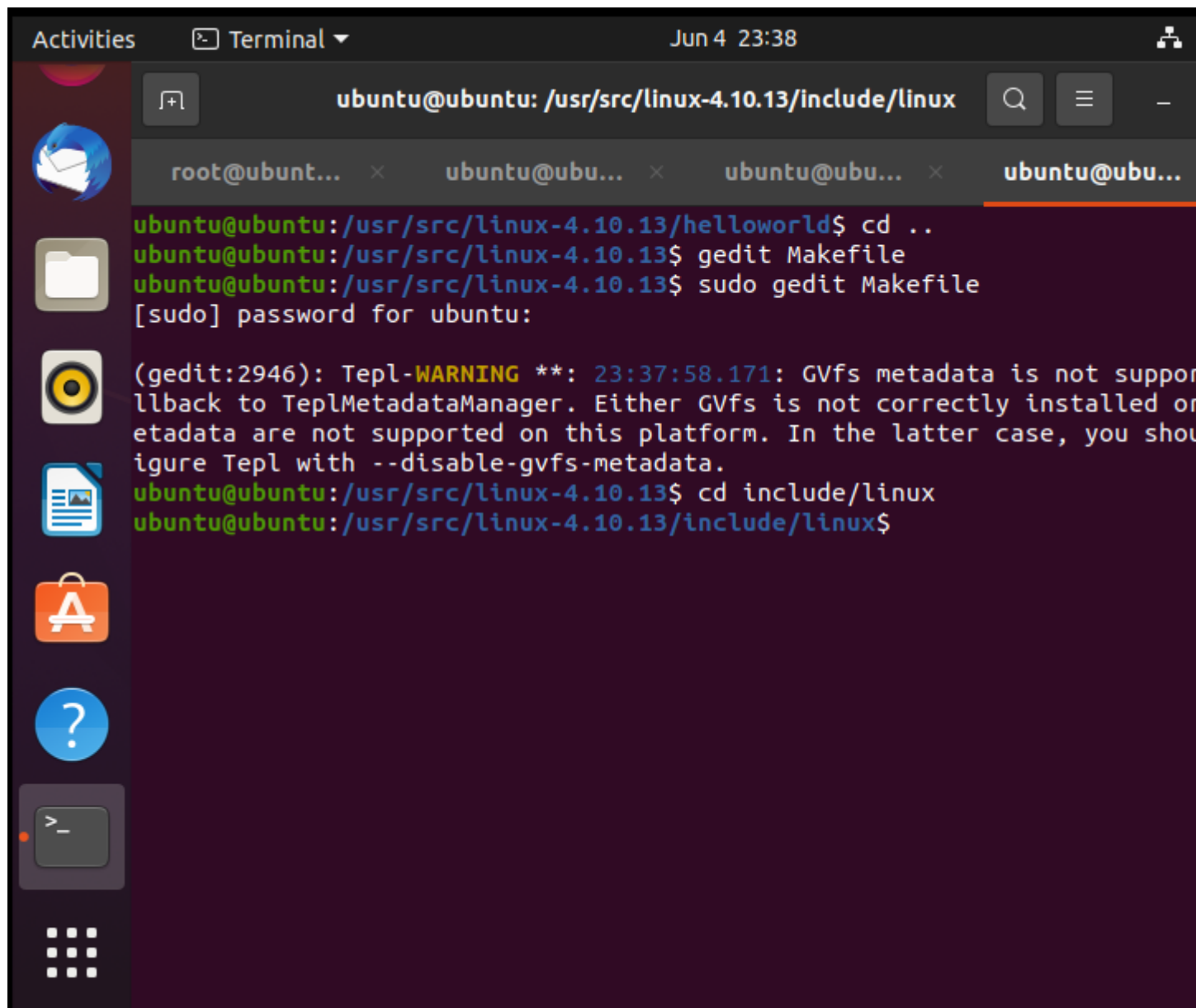
```
882                         unsigned long idx1, unsigned long idx2);
883 asmlinkage long sys_finit_module(int fd, const char __user *uargs, i
    flags);
884 asmlinkage long sys_seccomp(unsigned int op, unsigned int flags,
885                         const char __user *uargs);
886 asmlinkage long sys_getrandom(char __user *buf, size_t count,
887                         unsigned int flags);
888 asmlinkage long sys_bpf(int cmd, union bpf_attr *attr, unsigned int
889
890 asmlinkage long sys_execveat(int dfd, const char __user *filename,
891                     const char __user *const __user *argv,
892                     const char __user *const __user *envp, int f
893
894 asmlinkage long sys_membarrier(int cmd, int flags);
895 asmlinkage long sys_copy_file_range(int fd_in, loff_t __user *off_ir
896                             int fd_out, loff_t __user *off_o
897                             size_t len, unsigned int flags);
898
899 asmlinkage long sys_mlock2(unsigned long start, size_t len, int flag
900
901 asmlinkage long sys_pkey_mprotect(unsigned long start, size_t len,
902                             unsigned long prot, int pkey);
903 asmlinkage long sys_pkey_alloc(unsigned long flags, unsigned long
    init_val);
904 asmlinkage long sys_pkey_free(int pkey);
905
906 asmlinkage long sys_helloworld(void);
907 #endif
```

ubuntu@ubuntu: /usr/src/linux-4.10.13/include/linux   🔍 ☰   –

root@ubunt... ✕   ubuntu@ubu... ✕   ubuntu@ubu... ✕   **ubuntu@ubu...**

```
ubuntu@ubuntu:/usr/src/linux-4.10.13/helloworld$ cd ..
ubuntu@ubuntu:/usr/src/linux-4.10.13$ gedit Makefile
ubuntu@ubuntu:/usr/src/linux-4.10.13$ sudo gedit Makefile
[sudo] password for ubuntu:

(gedit:2946): Tepl-WARNING **: 23:37:58.171: GVfs metadata is not suppor
llback to TeplMetadataManager. Either GVfs is not correctly installed or
etadata are not supported on this platform. In the latter case, you shou
igure Tepl with --disable-gvfs-metadata.
ubuntu@ubuntu:/usr/src/linux-4.10.13$ cd include/linux
ubuntu@ubuntu:/usr/src/linux-4.10.13/include/linux$
```
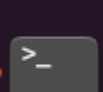
```
906 else
907 mod_sign_cmd = true
908 endif
909 export mod_sign_cmd
910
911
912 ifeq ($(KBUILD_EXTMOD),)
913 core-y          += kernel/ certs/ mm/ fs/ ipc/ security/ crypto/ bl
    helloworld/|
914
915 vmlinux-dirs    := $(patsubst %/,%,$(filter %/, $(init-y) $(init-m)
916                    $(core-y) $(core-m) $(drivers-y) $(drivers-m)
917                    $(net-y) $(net-m) $(libs-y) $(libs-m) $(virt-y
918
919 vmlinux-alldirs       := $(sort $(vmlinux-dirs) $(patsubst %/,%,$
    %/, \
920                    $(init-) $(core-) $(drivers-) $(net-) $(libs-)
    (virt-))))
921
922 init-y          := $(patsubst %/, %/built-in.o, $(init-y))
923 core-y          := $(patsubst %/, %/built-in.o, $(core-y))
924 drivers-y       := $(patsubst %/, %/built-in.o, $(drivers-y))
925 net-y           := $(patsubst %/, %/built-in.o, $(net-y))
926 libs-y1              := $(patsubst %/, %/lib.a, $(libs-y))
927 libs-y2              := $(patsubst %/, %/built-in.o, $(libs-y))
928 libs-y          := $(libs-y1) $(libs-y2)
929 virt-y          := $(patsubst %/, %/built-in.o, $(virt-y))
020
```

```
1 obj-y:=helloworld.o
```

Makefile ▾   Tab Width: 8 ▾   Ln 1, Col 20

ubuntu@ubuntu: /usr/src/linux-4.10.13/helloworld　🔍　☰　–

root@ubuntu: /hom...　✕　　　ubuntu@ubuntu: ~　✕　　ubuntu@ubuntu: /us...

```
CREDITS   fs              Kconfig   mm              security
ubuntu@ubuntu:/usr/src/linux-4.10.13$ mikdir helloworld

Command 'mikdir' not found, did you mean:

  command 'mkdir' from deb coreutils (8.30-3ubuntu2)
  command 'mmkdir' from deb mblaze (0.6-1)

Try: sudo apt install <deb name>

ubuntu@ubuntu:/usr/src/linux-4.10.13$ sudo mikdir helloworld
[sudo] password for ubuntu:
sudo: mikdir: command not found
ubuntu@ubuntu:/usr/src/linux-4.10.13$ mkdir helloworld
mkdir: cannot create directory 'helloworld': Permission denied
ubuntu@ubuntu:/usr/src/linux-4.10.13$ sudo mkdir helloworld
ubuntu@ubuntu:/usr/src/linux-4.10.13$ cd helloworld
ubuntu@ubuntu:/usr/src/linux-4.10.13/helloworld$ gedit helloworld
ubuntu@ubuntu:/usr/src/linux-4.10.13/helloworld$ gedit helloworld.c
ubuntu@ubuntu:/usr/src/linux-4.10.13/helloworld$ sudo gedit helloworld.c

(gedit:2836): Tepl-WARNING **: 23:30:35.388: GVfs metadata is not suppor
llback to TeplMetadataManager. Either GVfs is not correctly installed or
etadata are not supported on this platform. In the latter case, you shou
igure Tepl with --disable-gvfs-metadata.
ubuntu@ubuntu:/usr/src/linux-4.10.13/helloworld$
```

Open   ▾   ⊞   ***helloworld.c**   Save   ☰   —
/usr/src/linux-4.10.13/helloworld

```c
 1 #include <linux/kernel.h>
 2
 3 asmlinkage long sys_helloworld(void)
 4
 5 {
 6              printk("hello world\n");
 7              return 0;
 8
 9
10 }
```

C ▾   Tab Width: 8 ▾   Ln 7, Col 23

⊞　　　　　　　ubuntu@ubuntu: /usr/src/linux-4.10.13　　　　🔍　☰　–

```
root@ubuntu: /hom...   ×        ubuntu@ubuntu: ~   ×        ubuntu@ubuntu: /us...

ubuntu@ubuntu:~$ ls
Desktop     Downloads                    linux-4.17.4.tar.xz   Pictures   Template
Documents   linux-4.10.13.tar.gz   Music                       Public     Videos
ubuntu@ubuntu:~$ cd /usr/src/
ubuntu@ubuntu:/usr/src$ ls
linux-4.10.13   linux-headers-5.8.0-43-generic   linux-hwe-5.8-headers-5.8
linux-4.17.4    linux-headers-5.8.0-55-generic   linux-hwe-5.8-headers-5.8
ubuntu@ubuntu:/usr/src$ cd linux-4.10.13
ubuntu@ubuntu:/usr/src/linux-4.10.13$ ls
arch        crypto           include   kernel        net        sound
block       Documentation    init      lib           README     tools
certs       drivers          ipc       MAINTAINERS   samples    usr
COPYING     firmware         Kbuild    Makefile      scripts    virt
CREDITS     fs               Kconfig   mm            security
ubuntu@ubuntu:/usr/src/linux-4.10.13$ mikdir helloworld

Command 'mikdir' not found, did you mean:

  command 'mkdir' from deb coreutils (8.30-3ubuntu2)
  command 'mmkdir' from deb mblaze (0.6-1)

Try: sudo apt install <deb name>

ubuntu@ubuntu:/usr/src/linux-4.10.13$ sudo mikdir helloworld
[sudo] password for ubuntu:
sudo: mikdir: command not found
ubuntu@ubuntu:/usr/src/linux-4.10.13$ mkdir helloworld
```
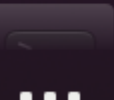
```
ubuntu@ubuntu:~$ wget https://www.kernel.org/pub/linux/kernel/v4.x/linux-
3.tar.gz
--2021-06-04 23:07:12--  https://www.kernel.org/pub/linux/kernel/v4.x/li
0.13.tar.gz
Resolving www.kernel.org (www.kernel.org)... 136.144.49.103, 2604:1380:40
0::1
Connecting to www.kernel.org (www.kernel.org)|136.144.49.103|:443... con
HTTP request sent, awaiting response... 301 Moved Permanently
Location: https://mirrors.edge.kernel.org/pub/linux/kernel/v4.x/linux-4.
ar.gz [following]
--2021-06-04 23:07:13--  https://mirrors.edge.kernel.org/pub/linux/kerne
linux-4.10.13.tar.gz
Resolving mirrors.edge.kernel.org (mirrors.edge.kernel.org)... 147.75.10
04:1380:2001:3900::1
Connecting to mirrors.edge.kernel.org (mirrors.edge.kernel.org)|147.75.1
43... connected.
HTTP request sent, awaiting response... 200 OK
Length: 143967305 (137M) [application/x-gzip]
Saving to: 'linux-4.10.13.tar.gz'

linux-4.10.13.tar.g 100%[===================>] 137.30M  3.16MB/s    in 51

2021-06-04 23:08:04 (2.71 MB/s) - 'linux-4.10.13.tar.gz' saved [14396730
7305]

ubuntu@ubuntu:~$ ls
Desktop     Downloads              linux-4.17.4.tar.xz  Pictures  Templates
Documents   linux-4.10.13.tar.gz   Music                Public    Videos
```

ubuntu@ubuntu: ~

2021-06-04 22:44:17 (1.83 MB/s) - 'linux-4.17.4.tar.xz' saved [102176828
828]

ubuntu@ubuntu:~$ wget https://www.kernel.org/pub/linux/kernel/v4.x/linux
3.tar.gz
--2021-06-04 23:07:12-- https://www.kernel.org/pub/linux/kernel/v4.x/li
0.13.tar.gz
Resolving www.kernel.org (www.kernel.org)... 136.144.49.103, 2604:1380:4
0::1
Connecting to www.kernel.org (www.kernel.org)|136.144.49.103|:443... con
HTTP request sent, awaiting response... 301 Moved Permanently
Location: https://mirrors.edge.kernel.org/pub/linux/kernel/v4.x/linux-4.
ar.gz [following]
--2021-06-04 23:07:13-- https://mirrors.edge.kernel.org/pub/linux/kerne
linux-4.10.13.tar.gz
Resolving mirrors.edge.kernel.org (mirrors.edge.kernel.org)... 147.75.10
04:1380:2001:3900::1
Connecting to mirrors.edge.kernel.org (mirrors.edge.kernel.org)|147.75.1
43... connected.
HTTP request sent, awaiting response... 200 OK
Length: 143967305 (137M) [application/x-gzip]
Saving to: 'linux-4.10.13.tar.gz'

linux-4.10.13.tar.g 100%[===================>] 137.30M 3.16MB/s   in 51

2021-06-04 23:08:04 (2.71 MB/s) - 'linux-4.10.13.tar.gz' saved [14396730
7305]

ubuntu@ubuntu:~$

```
                        version: 1.00
                        capabilities: usb-1.10
                        configuration: driver=hub slots=7 speed=12Mbit/s
             *-network
                    description: Ethernet interface
                    product: 82545EM Gigabit Ethernet Controller (Copper)
                    vendor: Intel Corporation
                    physical id: 1
                    bus info: pci@0000:02:01.0
                    logical name: ens33
                    version: 01
                    serial: 00:0c:29:0f:1a:a2
                    size: 1Gbit/s
                    capacity: 1Gbit/s
                    width: 64 bits
                    clock: 66MHz
                    capabilities: pm pcix bus_master cap_list rom ethernet p
 logical tp 10bt 10bt-fd 100bt 100bt-fd 1000bt-fd autonegotiation
                    configuration: autonegotiation=on broadcast=yes driver=e
iverversion=7.3.21-k8-NAPI duplex=full ip=192.168.52.128 latency=0 link=
gnt=255 multicast=yes port=twisted pair speed=1Gbit/s
                    resources: irq:19 memory:fd5c0000-fd5dffff memory:fdff00
ffff ioport:2000(size=64) memory:fd500000-fd50ffff
             *-multimedia
                    description: Multimedia audio controller
                    product: ES1371/ES1373 / Creative Labs CT2518
                    vendor: Ensoniq
                    physical id: 2
                    bus info: pci@0000:02:02.0
```

```
          capabilities: vga_controller bus_master cap_list rom
          configuration: driver=vmwgfx latency=64
          resources: irq:16 ioport:1070(size=16) memory:e8000000-eff
mory:fe000000-fe7fffff memory:c0000-dffff
     *-scsi
          description: SCSI storage controller
          product: 53c1030 PCI-X Fusion-MPT Dual Ultra320 SCSI
          vendor: Broadcom / LSI
          physical id: 10
          bus info: pci@0000:00:10.0
          version: 01
          width: 64 bits
          clock: 33MHz
          capabilities: scsi bus_master cap_list rom
          configuration: driver=mptspi latency=64 maxlatency=255 ming
          resources: irq:17 ioport:1400(size=256) memory:feba0000-feb
emory:febc0000-febdffff memory:c0008000-c000bfff
     *-pci:1
          description: PCI bridge
          product: PCI bridge
          vendor: VMware
          physical id: 11
          bus info: pci@0000:00:11.0
          version: 02
          width: 32 bits
          clock: 33MHz
          capabilities: pci subtractive_decode bus_master cap_list
          resources: ioport:2000(size=8192) memory:fd500000-fdffffff
e7b00000(size=5242880)
        *-usb:0
```

ubuntu@ubuntu: ~

```
ubuntu@ubuntu:~$ uname
Linux
ubuntu@ubuntu:~$ uname -n
ubuntu
ubuntu@ubuntu:~$ uname -v
#56~20.04.1-Ubuntu SMP Mon Apr 12 21:46:35 UTC 2021
ubuntu@ubuntu:~$ uname -r
5.8.0-50-generic
ubuntu@ubuntu:~$ uname -m
x86_64
ubuntu@ubuntu:~$ uname -a
Linux ubuntu 5.8.0-50-generic #56~20.04.1-Ubuntu SMP Mon Apr 12 21:46:35
21 x86_64 x86_64 x86_64 GNU/Linux
ubuntu@ubuntu:~$ sudo 1shw
[sudo] password for ubuntu:
sudo: 1shw: command not found
ubuntu@ubuntu:~$ sudo lshw
ubuntu
    description: Computer
    product: VMware Virtual Platform
    vendor: VMware, Inc.
    version: None
    serial: VMware-56 4d 10 af b6 6c 33 80-24 1a dc 09 16 0f 1a a2
    width: 64 bits
    capabilities: smbios-2.7 dmi-2.7 vsyscall32
    configuration: administrator_password=enabled boot=normal frontpanel_
rd=unknown keyboard_password=unknown power-on_password=disabled uuid=564
66C-3380-241A-DC09160F1AA2
  *-core
```