LAPORAN
WORKSHOP SISTEM OPERASI

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Praktikum 15

1. Sudo lshw

```
root@NaylaUbuntu:~# sudo lshw
naylaubuntu
    description: Computer
    product: VirtualBox
    vendor: innotek GmbH
    version: 1.2
    serial: 0
    width: 64 bits
    capabilities: smbios-2.5 dmi-2.5 smp vsyscall32
    configuration: family=Virtual Machine uuid=c34f7e15-d7f5-48ce-8264-4e47ef7
e80
  *-core
       description: Motherboard
       product: VirtualBox
       vendor: Oracle Corporation
       physical id: 0
       version: 1.2
```

2. Sudo lshw | less

```
naylaubuntu devices
    description: Computer
    product: VirtualBox
    vendor: innotek GmbH
    version: 1.2
    serial: 0
    width: 64 bits
    capabilities: smbios-2.5 dmi-2.5 smp vsyscall32
    configuration: family=Virtual Machine uuid=c34f7e15-d7f5-48ce-8264-4e47ef73
  *-core
       description: Motherboard
       product: VirtualBox
       vendor: Oracle Corporation
       physical id: 0
       version: 1.2
       serial: 0
     *-firmware
```

3. Sudo lshw > hardware.txt

```
root@NaylaUbuntu:~# sudo lshw > hardware.txt
root@NaylaUbuntu:~# cat hardware.txt
naylaubuntu
    description: Computer
    product: VirtualBox
    vendor: innotek GmbH
    version: 1.2
    serial: 0
    width: 64 bits
    capabilities: smbios-2.5 dmi-2.5 smp vsyscall32
    configuration: family=Virtual Machine uuid=c34f7e15-d7f5-48ce-8264-4e47ef73
  *-core
       description: Motherboard
       product: VirtualBox
       vendor: Oracle Corporation
       physical id: 0
```

4. Sudo lshw -class processor

```
root@NaylaUbuntu:~# sudo lshw -class processor
  *-cpu
       product: Intel(R) Core(TM) i7-4790 CPU @ 3.60GHz
       vendor: Intel Corp.
       physical id: 2
       bus info: cpu@0
       version: 6.60.3
       width: 64 bits
       capabilities: fpu fpu_exception wp vme de pse tsc msr pae mce cx8 apic s
se2 ht syscall nx rdtscp x86-64 constant_tsc rep_good nopl xtopology nonstop_ts
sse4_1 sse4_2 movbe popcnt aes rdrand hypervisor lahf_lm abm pti fsgsbase bmi1
       configuration: microcode=4294967295
```

5. Lscpu

```
  Model name:            Intel(R) Core(TM) i7-4790 CPU @ 3.60GHz
    CPU family:          6
    Model:               60
    Thread(s) per core:  1
    Core(s) per socket:  2
    Socket(s):           1
    Stepping:            3
    BogoMIPS:            7183.36
    Flags:               fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge
                         ll nx rdtscp lm constant_tsc rep_good nopl xtopology
                         cx16 pcid sse4_1 sse4_2 movbe popcnt aes rdrand hyper
                         lear flush_l1d arch_capabilities
```

6. Sudo lshw -class memory

```
root@NaylaUbuntu:~# sudo lshw -class memory
  *-firmware
       description: BIOS
       vendor: innotek GmbH
       physical id: 0
       version: VirtualBox
       date: 12/01/2006
       size: 128KiB
       capacity: 128KiB
       capabilities: isa pci cdboot bootselect int9keyboard int10video acpi
  *-memory
       description: System memory
       physical id: 1
       size: 2GiB
```

7. Sudo lshw -class disk

```
root@NaylaUbuntu:~# sudo lshw -class disk
  *-cdrom
       description: DVD reader
       product: CD-ROM
       vendor: VBOX
       physical id: 0.0.0
       bus info: scsi@1:0.0.0
       logical name: /dev/cdrom
       logical name: /dev/sr0
       version: 1.0
       capabilities: removable audio dvd
       configuration: ansiversion=5 status=nodisc
```

8. Sudo lshw -class display

```
root@NaylaUbuntu:~# sudo lshw -class display
  *-display
       description: VGA compatible controller
       product: SVGA II Adapter
       vendor: VMware
       physical id: 2
       bus info: pci@0000:00:02.0
       logical name: /dev/fb0
       version: 00
       width: 32 bits
       clock: 33MHz
```

9. Sudo lshw -class network

```
root@NaylaUbuntu:~# sudo lshw -class network
  *-network
       description: Ethernet interface
       product: 82540EM Gigabit Ethernet Controller
       vendor: Intel Corporation
       physical id: 3
       bus info: pci@0000:00:03.0
       logical name: enp0s3
       version: 02
       serial: 08:00:27:6d:13:8a
       size: 1Gbit/s
       capacity: 1Gbit/s
       width: 32 bits
```

10. Lspci

```
root@NaylaUbuntu:~# 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 Contro
00:04.0 System peripheral: InnoTek Systemberatung GmbH VirtualBox Guest Servic
00:05.0 Multimedia audio controller: Intel Corporation 82801AA AC'97 Audio Con
00:06.0 USB controller: Apple Inc. KeyLargo/Intrepid USB
00:07.0 Bridge: Intel Corporation 82371AB/EB/MB PIIX4 ACPI (rev 08)
```

11. lsusb

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

12. untuk mengetahui jenis shell yang dipakai, ketikkan echo $SHELL

```
root@NaylaUbuntu:~# echo $SHELL
/bin/bash
root@NaylaUbuntu:~# echo $TERM
xterm-256color
```

13. Untuk informasi device yang terbaca Linux di mesin kita, ketikkan dmesg | more.

```
root@NaylaUbuntu:~# dmesg | more
[    0.000000] Linux version 6.8.0-87-generic (buildd@lcy02-amd64-060) (x86_64-
3.0, GNU ld (GNU Binutils for Ubuntu) 2.38) #88~22.04.1-Ubuntu SMP PREEMPT_DYNA
04.1-generic 6.8.12)
[    0.000000] Command line: BOOT_IMAGE=/boot/vmlinuz-6.8.0-87-generic root=UUI
h
[    0.000000] KERNEL supported cpus:
[    0.000000]   Intel GenuineIntel
[    0.000000]   AMD AuthenticAMD
[    0.000000]   Hygon HygonGenuine
[    0.000000]   Centaur CentaurHauls
[    0.000000]   zhaoxin   Shanghai
[    0.000000] BIOS-provided physical RAM map:
[    0.000000] BIOS-e820: [mem 0x0000000000000000-0x000000000009fbff] usable
[    0.000000] BIOS-e820: [mem 0x000000000009fc00-0x000000000009ffff] reserved
[    0.000000] BIOS-e820: [mem 0x00000000000f0000-0x00000000000fffff] reserved
[    0.000000] BIOS-e820: [mem 0x0000000000100000-0x000000007ffeffff] usable
[    0.000000] BIOS-e820: [mem 0x000000007fff0000-0x000000007fffffff] ACPI data
[    0.000000] BIOS-e820: [mem 0x00000000fec00000-0x00000000fec00fff] reserved
[    0.000000] BIOS-e820: [mem 0x00000000fee00000-0x00000000fee00fff] reserved
[    0.000000] BIOS-e820: [mem 0x00000000fffc0000-0x00000000ffffffff] reserved
```

14. CPU, gunakan cat /proc/cpuinfo

```
root@NaylaUbuntu:~# cat /proc/cpuinfo
processor       : 0
vendor_id       : GenuineIntel
cpu family      : 6
model           : 60
model name      : Intel(R) Core(TM) i7-4790 CPU @ 3.60GHz
stepping        : 3
microcode       : 0xffffffff
cpu MHz         : 3591.684
cache size      : 8192 KB
physical id     : 0
siblings        : 2
core id         : 0
cpu cores       : 2
apicid          : 0
initial apicid  : 0
fpu             : yes
fpu_exception   : yes
cpuid level     : 13
wp              : yes
```

15. RAM, cat /proc/meminfo

```
root@NaylaUbuntu:~# cat /proc/meminfo
MemTotal:        2015384 kB
MemFree:          266564 kB
MemAvailable:    1019596 kB
Buffers:           16492 kB
Cached:           865904 kB
SwapCached:        15332 kB
Active:           653664 kB
Inactive:         821756 kB
Active(anon):     329088 kB
Inactive(anon):   285140 kB
Active(file):     324576 kB
Inactive(file):   536616 kB
Unevictable:           0 kB
Mlocked:               0 kB
SwapTotal:       2744316 kB
```

16. Paralel Port, kode parportn (ganti n dengan 0 atau 1)

```
root@NaylaUbuntu:~# dmesg | grep -i parallel
[    2.349768] ahci 0000:00:0d.0: SSS flag set, parallel bus scan disabled
[    6.269463] ppdev: user-space parallel port driver
root@NaylaUbuntu:~# sudo lshw -class serial
root@NaylaUbuntu:~#
```

17. Versi kernel: cat /proc/version

```
root@NaylaUbuntu:~# cat /proc/version
Linux version 6.8.0-87-generic (buildd@lcy02-amd64-060) (x86_64-linux-gnu-gcc-1
U Binutils for Ubuntu) 2.38) #88~22.04.1-Ubuntu SMP PREEMPT_DYNAMIC Tue Oct 14
root@NaylaUbuntu:~#
```

18. Informasi I/O Port address: cat /proc/ioports

```
root@NaylaUbuntu:~# cat /proc/ioports
0000-0cf7 : PCI Bus 0000:00
  0000-001f : dma1
  0020-0021 : pic1
  0040-0043 : timer0
  0050-0053 : timer1
  0060-0060 : keyboard
  0064-0064 : keyboard
  0070-0071 : rtc_cmos
    0070-0071 : rtc0
  0080-008f : dma page reg
  00a0-00a1 : pic2
  00c0-00df : dma2
```

19. Informasi Mem tiap device: cat /proc/iomem

```
root@NaylaUbuntu:~# cat /proc/iomem
00000000-00000fff : Reserved
00001000-0009fbff : System RAM
0009fc00-0009ffff : Reserved
000a0000-000bffff : PCI Bus 0000:00
000c0000-000c7fff : Video ROM
000e2000-000effff : Adapter ROM
000f0000-000fffff : Reserved
  000f0000-000fffff : System ROM
00100000-7ffeffff : System RAM
  49200000-4a7fffff : Kernel code
```

20. Informasi device PCI: cat /proc/pci

```
root@NaylaUbuntu:~# cat /proc/pci
cat: /proc/pci: No such file or directory
root@NaylaUbuntu:~#
```

21. Informasi no. interrupt: pada file /proc/interrupts

```
root@NaylaUbuntu:~# ls /proc/interrupts
/proc/interrupts
root@NaylaUbuntu:~#
```

22. Hostname:

```
UNAME(1)                                                    User Commands

NAME
       uname - print system information

SYNOPSIS
       uname [OPTION]...

DESCRIPTION
       Print certain system information.  With no OPTION, same as -s.

       -a, --all
              print all information, in the following order, except omit -p and
```

23. Versi Kernel

```
root@NaylaUbuntu:~# uptime
 14:26:15 up  1:09,  1 user,  load average: 0.24, 0.30, 0.23
root@NaylaUbuntu:~#
```

Praktikum 16

1. Pada prompt shell, ketikkan perintah df -T.

```
root@NaylaUbuntu:~# df -T
Filesystem     Type  1K-blocks     Used Available Use% Mounted on
tmpfs          tmpfs    201540     1544    199996   1% /run
/dev/sda3      ext4   25106692 15492436   8313572  66% /
tmpfs          tmpfs   1007692        0   1007692   0% /dev/shm
tmpfs          tmpfs      5120        4      5116   1% /run/lock
/dev/sda2      vfat     524252     6232    518020   2% /boot/efi
tmpfs          tmpfs    201536      104    201432   1% /run/user/1000
root@NaylaUbuntu:~#
```

2. Apa fungsi perintah df? (gunakan man df atau df --help)

```
root@NaylaUbuntu:~# df --help
Usage: df [OPTION]... [FILE]...
Show information about the file system on which each FILE resides,
or all file systems by default.

Mandatory arguments to long options are mandatory for short options too.
  -a, --all             include pseudo, duplicate, inaccessible file systems
  -B, --block-size=SIZE  scale sizes by SIZE before printing them; e.g.,
                           '-BM' prints sizes in units of 1,048,576 bytes;
                           see SIZE format below
  -h, --human-readable  print sizes in powers of 1024 (e.g., 1023M)
  -H, --si              print sizes in powers of 1000 (e.g., 1.1G)
  -i, --inodes          list inode information instead of block usage
  -k                    like --block-size=1K
```

3. Dari output yang diberikan oleh df, tulis partisi yang ada.
4. /Mount options for <nama sistem file>

```
MOUNT(8)                                                System Administration

NAME
       mount - mount a filesystem

SYNOPSIS
       mount [-h|-V]

       mount [-l] [-t fstype]

       mount -a [-fFnrsvw] [-t fstype] [-O optlist]

       mount [-fnrsvw] [-o options] device|mountpoint

       mount [-fnrsvw] [-t fstype] [-o options] device mountpoint

       mount --bind|--rbind|--move olddir newdir

       mount --make-[shared|slave|private|unbindable|rshared|rslave|rprivate|ru
```

5. Anda sekarang berada di dalam direktori mana? Ketikkan perintah pwd dan tulis direktori anda sekarang berada. Sekarang pastikan bahwa anda berada di dalam direktori /home/studentX. Jika tidak ketikkan cd.

```
root@NaylaUbuntu:~# pwd
/root
root@NaylaUbuntu:~# cd /home/nayla
root@NaylaUbuntu:/home/nayla#
```

6. Ketikkan du untuk mengetahui informasi daftar direktori dan subdirektorinya dalam direktori aktif anda. Berapa total space yang telah digunakan dalam direktori anda sekarang? Ada 29048

```
4       ./arsip/restore-tes/etc/xdg/systemd
240     ./arsip/restore-tes/etc/xdg
12      ./arsip/restore-tes/etc/sane.d/dll.d
356     ./arsip/restore-tes/etc/sane.d
4       ./arsip/restore-tes/etc/vulkan/implicit_layer.d
4       ./arsip/restore-tes/etc/vulkan/icd.d
4       ./arsip/restore-tes/etc/vulkan/explicit_layer.d
16      ./arsip/restore-tes/etc/vulkan
4       ./arsip/restore-tes/etc/dbus-1/session.d
112     ./arsip/restore-tes/etc/dbus-1/system.d
```

7. /sbin/badblocks /dev/fd0.

```
root@NaylaUbuntu:~# /sbin/badblocks /dev/fd
/sbin/badblocks: invalid starting block (0): must be less than 0
root@NaylaUbuntu:~#
```

8. /sbin/mkfs.msdos /dev/fd0.

```
root@NaylaUbuntu:~# /sbin/mkfs.msdos /dev/fd
mkfs.fat 4.2 (2021-01-31)
mkfs.msdos: unable to open /dev/fd: Is a directory
root@NaylaUbuntu:~#
```

9. Lakukan mounting floppy disk tersebut, dengan cara: mount /dev/fd0.

```
root@NaylaUbuntu:~# mount /dev/fd
mount: /dev/fd: can't find in /etc/fstab.
root@NaylaUbuntu:~#
```

10. Jadikan floppy disk tersebut memiliki sistem file ext2 untuk dikenal di Linux. Ketikkan perintah /sbin/mkfs.ext2 /dev/fd0.

```
root@NaylaUbuntu:~# /sbin/mkfs.ext2 /dev/fd
mke2fs 1.46.5 (30-Dec-2021)
mkfs.ext2: Device size reported to be zero.  Invalid partition specified, or
       partition table wasn't reread after running fdisk, due to
       a modified partition being busy and in use.  You may need to reboot
       to re-read your partition table.
```

11. Lakukan mounting floppy disk tersebut.

```
root@NaylaUbuntu:~# umount /mnt/floppy
umount: /mnt/floppy: no mount point specified.
root@NaylaUbuntu:~#
```

12. Coba berikan perintah df -T. Apakah terlihat informasi tentang floppy disk? Mengapa?

```
root@NaylaUbuntu:~# df -T
Filesystem     Type  1K-blocks     Used Available Use% Mounted on
tmpfs          tmpfs    201540     1544    199996   1% /run
/dev/sda3      ext4   25106692 15492448   8313560  66% /
tmpfs          tmpfs   1007692        0   1007692   0% /dev/shm
tmpfs          tmpfs      5120        4      5116   1% /run/lock
/dev/sda2      vfat     524252     6232    518020   2% /boot/efi
tmpfs          tmpfs    201536      104    201432   1% /run/user/1000
root@NaylaUbuntu:~#
```

Praktikum 17

1. Melihat PID

```
root@NaylaUbuntu:~# ps
    PID TTY          TIME CMD
   2744 pts/0    00:00:00 su
   2745 pts/0    00:00:00 bash
   4696 pts/0    00:00:00 ps
root@NaylaUbuntu:~# kill -l
 1) SIGHUP       2) SIGINT       3) SIGQUIT      4) SIGILL       5) SIGTRAP
 6) SIGABRT      7) SIGBUS       8) SIGFPE       9) SIGKILL     10) SIGUSR1
11) SIGSEGV     12) SIGUSR2     13) SIGPIPE     14) SIGALRM     15) SIGTERM
16) SIGSTKFLT   17) SIGCHLD     18) SIGCONT     19) SIGSTOP     20) SIGTSTP
21) SIGTTIN     22) SIGTTOU     23) SIGURG      24) SIGXCPU     25) SIGXFSZ
26) SIGVTALRM   27) SIGPROF     28) SIGWINCH    29) SIGIO       30) SIGPWR
31) SIGSYS      34) SIGRTMIN    35) SIGRTMIN+1  36) SIGRTMIN+2  37) SIGRTMIN+3
38) SIGRTMIN+4  39) SIGRTMIN+5  40) SIGRTMIN+6  41) SIGRTMIN+7  42) SIGRTMIN+8
43) SIGRTMIN+9  44) SIGRTMIN+10 45) SIGRTMIN+11 46) SIGRTMIN+12 47) SIGRTMIN+13
48) SIGRTMIN+14 49) SIGRTMIN+15 50) SIGRTMAX-14 51) SIGRTMAX-13 52) SIGRTMAX-12
53) SIGRTMAX-11 54) SIGRTMAX-10 55) SIGRTMAX-9  56) SIGRTMAX-8  57) SIGRTMAX-7
58) SIGRTMAX-6  59) SIGRTMAX-5  60) SIGRTMAX-4  61) SIGRTMAX-3  62) SIGRTMAX-2
63) SIGRTMAX-1  64) SIGRTMAX
root@NaylaUbuntu:~#
```

2. mengetahui berapa jumlah memori yang tersisa dan yang terpakai

```
root@NaylaUbuntu:~# free -okt
free: invalid option -- 'o'

Usage:
 free [options]

Options:
 -b, --bytes         show output in bytes
     --kilo          show output in kilobytes
     --mega          show output in megabytes
     --giga          show output in gigabytes
     --tera          show output in terabytes
     --peta          show output in petabytes
```

3. Ketikkan perintah top.

```
top - 14:58:28 up  1:41,  1 user,  load average: 0.12, 0.15, 0.17
Tasks: 192 total,   1 running, 191 sleeping,   0 stopped,   0 zombie
%Cpu(s):  2.7 us,  1.6 sy,  0.0 ni, 90.9 id,  0.0 wa,  0.0 hi,  4.8 si,  0.0 st
MiB Mem :   1968.1 total,    222.9 free,    802.5 used,    942.7 buff/cache
MiB Swap:   2680.0 total,   2315.2 free,    364.8 used.    991.2 avail Mem

    PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
   2162 nayla     20   0 4278180 337712  95548 S  10.3  16.8   2:59.58 gnome-sh
    577 avahi     20   0   11268   7552   3712 S   5.6   0.4   4:33.63 avahi-da
    874 mysql     20   0 1784176  78480   9216 S   1.7   3.9   1:42.41 mysqld
   2687 nayla     20   0  557000  49980  36312 S   0.7   2.5   0:16.64 gnome-te
     17 root      20   0       0      0      0 I   0.3   0.0   0:11.48 rcu_pree
    582 root      20   0  261528  16460  13772 S   0.3   0.8   0:26.72 NetworkM
      1 root      20   0  168144  13276   8284 S   0.0   0.7   0:03.40 systemd
      2 root      20   0       0      0      0 S   0.0   0.0   0:00.01 kthreadd
```

4. Apakah sama informasi yang disediakan oleh top dengan free tentang RAM Free anda ataupun Swap Free anda? Apa manfaat dari perintah top?
5. Apakah sekarang anda memiliki proses yang sedang dijalankan secara background atau suspend? Untuk mengetahui hal tersebut, ketiklah jobs. Adakah? Jika tidak ada, mari kita coba!
6. DSD
7. Di dalam home direktori anda, buatlah sebuah file dengan nama makebg.sh yang berisi baris perintah shell berikut:

```
#!/bin/sh
i=0
while [ true ];
do
i=$?(($i+1))
echo $i
done
```

8. Tekan CTRL-Z akan membuat proses makebg.sh akan disuspend. Ketik perintah ps. Apakah anda melihat proses makebg.sh? PID-nya berapa?

```
root@NaylaUbuntu:~# ps -f
UID          PID    PPID  C STIME TTY          TIME CMD
root        2744    2706  0 13:17 pts/0    00:00:00 su -
root        2745    2744  0 13:17 pts/0    00:00:00 -bash
root        4701    2745  0 14:58 pts/0    00:00:00 top
root        4769    2745  0 15:13 pts/0    00:00:00 ps -f
root@NaylaUbuntu:~#
```

9. Sekarang, kita akan "membunuh" proses makebg.sh tersebut berdasar PID-nya. Ketikkan kill <noPIDmakebg.sh>. Misal PID makebg.sh 3684, maka ketikkan kill 3684.

```
nayla@NaylaUbuntu:~$ su -
Password:
root@NaylaUbuntu:~# ps
    PID TTY          TIME CMD
   4825 pts/2    00:00:00 su
   4826 pts/2    00:00:00 bash
   4839 pts/2    00:00:00 ps
root@NaylaUbuntu:~# kill 4825
root@NaylaUbuntu:~#
Session terminated, killing shell... ...killed.
Terminated
nayla@NaylaUbuntu:~$
```

10. Menggunakan perintah at

```
root@NaylaUbuntu:~# at 09:20
warning: commands will be executed using /bin/sh
at Tue Nov 25 09:20:00 2025
at> du -a
at> /tmpp/du.out
at> /tmp/du.out
at>
at> <EOT>
at>
at> /tmp/du.out
at> <EOT>
at> <EOT>
job 1 at Tue Nov 25 09:20:00 2025
root@NaylaUbuntu:~# at -ll
at: invalid option -- 'l'
Usage: at [-V] [-q x] [-f file] [-u username] [-mMlbv] timespec ...
       at [-V] [-q x] [-f file] [-u username] [-mMlbv] -t time
       at -c job ...
       at [-V] -l [-o timeformat] [job ...]
       atq [-V] [-q x] [-o timeformat] [job ...]
       at [ -rd ] job ...
       atrm [-V] job ...
       batch
root@NaylaUbuntu:~# at -l
1       Tue Nov 25 09:20:00 2025 a root
root@NaylaUbuntu:~# less /tmp/du.out
/tmp/du.out: No such file or directory
```

11. Simpanlah! Dari prompt shell anda, ketikkan crontab mycrontab Lihatlah daftar yang harus dikerjakan crontab dengan cara crontab -l

```
root@NaylaUbuntu:~# crontab mycrontab
root@NaylaUbuntu:~# crontab -l
30 12 * * * nayla /usr/bin/du -a > /tmp/ducron.out artinya kerjakan du -a > /tm
root@NaylaUbuntu:~#
```

12.