

**Shri Govindram Seksaria Institute of Technology  
and Science, Indore**



**CO 24009: COMPUTER ARCHITECTURE**

**Lab Assignment #00**

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**1.lscpu:-** The lscpu command allows you to list information about CPUs that are present in the system, including the number of CPUs, their architecture, vendor, family, model, CPU caches, etc.

```
cndc32@cndc32: ~
cndc32@cndc32:~$ lscpu
Architecture: i686
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 4
On-line CPU(s) list: 0-3
Thread(s) per core: 2
Core(s) per socket: 2
Socket(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 42
Model name: Intel(R) Core(TM) i3-2120 CPU @ 3.30GHz
Stepping: 7
CPU MHz: 1656.832
CPU max MHz: 3300.0000
CPU min MHz: 1600.0000
BogoMIPS: 6585.76
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 256K
L3 cache: 3072K
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe
nx rdtscp lm constant_tsc arch_perfmon pebs bts xtopology nonstop_tsc aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx est tm2 sse3 cx16 xtp
r pdcn sse4_1 sse4_2 popcnt tsc_deadline_timer xsave avx lahf_lm epb ssbd ibrs ibpb stibp tpr_shadow vnmi flexpriority ept vpid xsaveopt dtherm
arat pln pts nd clear flush_lid
arat pln pts nd clear flush_lid
```

**2.cat/proc/cpuinfo :-** The file /proc/cpuinfo displays what type of processor your system is running including the number of CPUs present. Here is an example output from cat /proc/cpuinfo of a system.

```
cndc32@cndc32: ~
cndc32@cndc32:~$ cat /proc/cpuinfo
processor
: 0
vendor_id
: GenuineIntel
cpu family
: 6
model
: 42
model name
: Intel(R) Core(TM) i3-2120 CPU @ 3.30GHz
stepping
: 7
microcode
: 0x2f
cpu MHz
: 1615.066
cache size
: 3072 KB
physical id
: 0
siblings
: 4
core id
: 0
cpu cores
: 2
apicid
: 0
initial apicid
: 0
rdtscp
: no
fpu
: yes
fpu_exception
: yes
cpuid level
: 13
wp
: yes
flags
: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe nx rd
tscp lm constant_tsc arch_perfmon pebs bts xtopology nonstop_tsc aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx est tm2 sse3 cx16 xtp
r pdcn sse4_1 sse4_2 popcnt tsc_deadline_timer xsave avx lahf_lm epb ssbd ibrs ibpb stibp tpr_shadow vnmi flexpriority ept vpid xsaveopt dtherm
arat pln pts nd_clear flush_lid
bugs
: cpu_meltdown spectre_v1 spectre_v2 spec_store_bypass l1tf mds swapgs itlb_multihit
bogomips
: 6585.76
clflush size
: 64
cache alignment
: 64
address sizes
: 36 bits physical, 48 bits virtual
power management:

processor
: 1
vendor_id
: GenuineIntel
cpu family
: 6
model
: 42
model name
: Intel(R) Core(TM) i3-2120 CPU @ 3.30GHz
```

Below is the various items you would see in the output and their respective explanations.

- **processor** – Provides each processor with an identifying number. If you have one processor it will display a 0. If you have more than one processor it will display all processor information separately counting the processors using zero notation.
- **cpu family** – Authoritatively tells you the type of processor you have in the system. If your computer is an Intel-based system, simply place the number in front of “86” to determine the value. This is helpful to determine the

type of architecture of an older system and is helpful in determining which compiled RPM package would best suit that system.

- **model name** – Gives you the common name of the processor, including the project name.
- **cpu MHz** – Shows the processor's precise speed, in megahertz, to the thousandth decimal point.
- **cache size** – Tells you the amount of level 2 memory cache available to the processor.
- **flags** – Defines a number of different processor attributes, such as the presence of a floating-point unit (FPU) and the ability to process MMX instructions.

### 3. nproc --all :-

nproc is a simple Unix command which is used to print the number of processing units available in the system or to the current process. This command could be used in system diagnostics and related purposes. It is part of GNU Core utils, so it comes pre-installed with all modern Linux operating systems.

```
(base) cndc-16@cndc16-OptiPlex-3050-AIO:~$ nproc
8
(base) cndc-16@cndc16-OptiPlex-3050-AIO:~$ nproc --all
8
(base) cndc-16@cndc16-OptiPlex-3050-AIO:~$ |
```

### 4.cpuinfo :-

cpuinfo dumps detailed information about the CPU(s) gathered from the CPUID instruction, and also determines the exact model of CPU(s) from that information. It dumps all information available from the CPUID instruction.

```

cndc32@cndc32:~$ cpuid
CPU 0:
  vendor_id = "GenuineIntel"
  version information (1/eax):
    processor type = primary processor (0)
    family         = Intel Pentium Pro/II/III/Celeron/Core/Core 2/Atom, AMD Athlon/Duron, Cyrix M2, VIA C3 (6)
    model          = 0xa (10)
    stepping id    = 0x7 (7)
    extended family = 0x0 (0)
    extended model = 0x2 (2)
    (simple synth) = Intel Core i3-2000 / Core i5-2000 / Core i7-2000 / Mobile Core i7-2000 (Sandy Bridge D2/J1/Q0) / Pentium G500/G600/G800
(Sandy Bridge Q0) / Celeron G400/G500/700/800/B800 (Sandy Bridge J1/Q0) / Xeon E3-1200 (Sandy Bridge D2/J1/Q0), 32nm
  miscellaneous (1/ebx):
    process local APIC physical ID = 0x0 (0)
    cpu count                      = 0x10 (16)
    CLFLUSH line size              = 0x8 (8)
    brand index                    = 0x0 (0)
  brand id = 0x00 (0): unknown
  feature information (1/edx):
    x87 FPU on chip                = true
    virtual-8086 mode enhancement = true
    debugging extensions           = true
    page size extensions           = true
    time stamp counter             = true
    RDMSR and WRMSR support        = true
    physical address extensions    = true
    machine check exception        = true
    CMPXCHG8B inst.               = true
    APIC on chip                  = true
    SYSENTER and SYSEXIT           = true
    memory type range registers    = true
    PTE global bit                 = true
    machine check architecture     = true
    conditional move/compare instruction = true
    page attribute table           = true
    page size extension            = true
    processor serial number        = false
    CLFLUSH instruction            = true
    debug store                    = true
    thermal monitor and clock ctrl = true
    MMX Technology                 = true
    FXSAVE/FXRSTOR                 = true
    SSE extensions                  = true

```

## 5.dmiedcode :-

dmidecode also referred as **Desktop Management Interface** table decoder, record data from **DMI** table and produce it in human readable format. *dmidecode* command is used when the user want to retrieve system's hardware related information such as Processor, RAM(DIMMs), BIOS detail, Memory, Serial numbers etc. of Linux system in a readable format.

```

(base) cndc-16@cndc16-OptiPlex-3050-AIO:~$ sudo dmidecode
# dmidecode 3.1
Getting SMBIOS data from sysfs.
SMBIOS 3.0.0 present.
Table at 0x000E0000.

Handle 0x0000, DMI type 0, 24 bytes
BIOS Information
    Vendor: Dell Inc.
    Version: 1.21.0
    Release Date: 03/18/2022
    Address: 0xF0000
    Runtime Size: 64 kB
    ROM Size: 16 MB
    Characteristics:
        PCI is supported
        PNP is supported
        BIOS is upgradeable
        BIOS shadowing is allowed
        Boot from CD is supported
        Selectable boot is supported
        EDD is supported
        5.25"/1.2 MB floppy services are supported (int 13h)
        3.5"/720 kB floppy services are supported (int 13h)
        3.5"/2.88 MB floppy services are supported (int 13h)
        Print screen service is supported (int 5h)
        8042 keyboard services are supported (int 9h)
        Serial services are supported (int 14h)
        Printer services are supported (int 17h)
        ACPI is supported
        USB legacy is supported
        BIOS boot specification is supported
        Function key-initiated network boot is supported
        Targeted content distribution is supported
        UEFI is supported
    BIOS Revision: 1.21

Handle 0x0001, DMI type 1, 27 bytes
System Information
    Manufacturer: Dell Inc.
    Product Name: OptiPlex 3050 AIO
    Version: Not Specified
    Serial Number: 56BD9R2
    UUID: 4C4C4544-0036-4210-8044-B5C04F395232
    Wake-up Type: Power Switch

```

## 6. inxi -c :-

Inxi is a powerful and remarkable command line-system information script designed for both console and IRC (Internet Relay Chat). It can be employed to instantly deduce user system configuration and hardware information, and also functions as a debugging, and forum technical support tool.

```

cndc32@cndc32:~$ inxi -c94
Welcome to inxi! Please select the default console color scheme.

Because there is no way to know your console foreground/background colors, you can set your color preferences
from color scheme option list below. 0 is no colors, 1 neutral. After these, there are 3 sets: 1-dark or light
backgrounds; 2-light backgrounds; 3-dark backgrounds.
Please note that this will set the console preferences only for user: cndc32
-----
0) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
1) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
2) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
3) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
4) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
5) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
6) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
7) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
8) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
9) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
10) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
11) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
12) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
13) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
14) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
15) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
16) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
17) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
18) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
19) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
20) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
21) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
22) Card: nVidia G86 [GeForce 8400 GS] 1.7.7
23) Card: nVidia G86 [GeForce 8400 GS] X.Org
24) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
25) Card: nVidia G86 [GeForce 8400 GS] X.Org
26) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
27) Card: nVidia G86 [GeForce 8400 GS] X.Org
28) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
29) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
30) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
31) Card: nVidia G86 [GeForce 8400 GS] X.Org
32) Card: nVidia G86 [GeForce 8400 GS] X.Org
33) Remove all color settings. Restore inxi default.
34) Continue, no changes or config file setting.

```



```

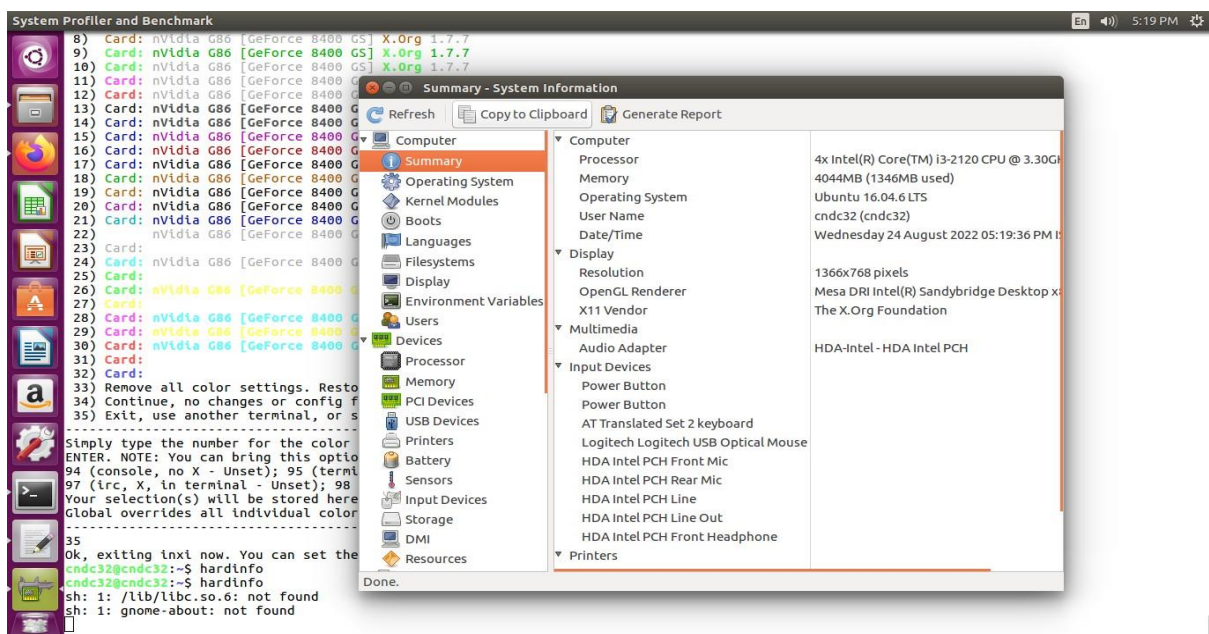
cndc32@cndc32:~$ inxi c
CPU-Dual core Intel Core i3-2120 (-HT-MCP-) speed/nax-1615/3300 MHz Kernel~4.4.0-210-generic i686 Up-54 min Mem-1165.3/3949.9MB HDD-500.1GB(11.
6% used) Procs-267 Client-Shell inxi-2.2.35
cndc32@cndc32:~$ inxi -c94
Welcome to inxi! Please select the default console color scheme.

Because there is no way to know your console foreground/background colors, you can set your color preferences
from color scheme option list below. 0 is no colors, 1 neutral. After these, there are 3 sets: 1-dark or light
backgrounds; 2-light backgrounds; 3-dark backgrounds.
Please note that this will set the console preferences only for user: cndc32
-----
0) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
1) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
2) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
3) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7
4) Card: nVidia G86 [GeForce 8400 GS] X.Org 1.7.7

```

## 7.hardinfo :-

**HardInfo** can show information about these components: CPU, GPU, Motherboard, RAM, Storage, Hard Disk, Printers, Benchmarks, Sound, Network, and USB as well as some system information like the distribution name, version, and Linux Kernel info.



## 8.dstat :-

**dstat** is a tool that is used to retrieve information or statistics from components of the system such as network connections, IO devices, or CPU, etc. It is generally used by system administrators to retrieve a handful of information about the above-mentioned components of the system.

```
ndc28@cndc18:~$ dstat
You did not select any stats, using -cdngy by default.
--total-cpu-usage-- --dsk/total-- --net/total-- --paging-- --system--
sr sys idl wal hiq siq read writt rcv send in out int csw
5 1 91 3 0 0 384k 238k 0 0 0 94B 21k 1021 3065
1 1 98 0 0 0 0 0 64B 0 0 0 667 1470
1 1 98 0 0 0 0 0 128B 0 0 0 708 1540
1 1 98 0 0 0 0 0 64B 0 0 0 699 1569
2 0 97 0 0 0 0 0 96B 0 0 0 1732 1432
2 1 98 1 0 0 56k 160B 0 0 0 695 1493
1 1 98 0 0 0 0 0 96B 0 0 0 1555 1476
1 1 98 0 0 0 0 0 96B 0 0 0 691 1476
1 1 98 0 0 0 0 0 20k 160B 0 0 1520 1497
2 1 98 0 0 0 0 0 96B 0 0 0 684 1494
1 1 98 0 0 0 0 0 64B 0 0 0 677 1459
2 0 98 0 0 0 0 0 128B 0 0 0 685 1466
1 1 98 0 0 0 0 0 160B 0 0 0 675 1442
2 0 98 0 0 0 0 0 192B 0 0 0 684 1537
1 0 98 1 0 0 24k 64B 0 0 0 684 1474
1 1 98 0 0 0 0 0 64B 0 0 0 670 1449
1 0 99 0 0 0 0 0 224B 0 0 0 684 1490
1 0 99 0 0 0 0 0 320B 0 0 0 668 1423
1 1 98 0 0 0 0 0 192B 0 0 0 673 1479
1 1 98 0 0 0 0 0 96B 0 0 0 657 1459
1 1 98 0 0 0 0 0 64B 0 0 0 657 1402
1 1 99 0 0 0 0 0 0 0 0 0 1231 1443
1 1 98 0 0 0 0 0 206B 330B 0 0 693 1528
1 0 99 0 0 0 0 0 64B 156B 0 0 667 1454
2 0 98 0 0 0 0 0 206B 330B 0 0 710 1560
1 1 98 0 0 0 0 0 64B 312B 0 0 689 1467
1 1 98 0 0 0 0 0 334B 330B 0 0 702 1484
2 1 97 0 0 0 0 16k 160B 312B 0 0 669 1429
1 1 98 0 0 0 0 0 160B 78B 0 0 687 1515
1 1 98 0 0 0 0 256k 96B 312B 0 0 742 1450
1 1 98 0 0 0 0 0 64B 78B 0 0 693 1534
1 1 98 0 0 0 0 0 64B 220B 0 0 670 1442
1 1 98 0 0 0 0 0 64B 78B 0 0 686 1460
1 0 99 0 0 0 0 12k 0 156B 0 0 684 1534
```

## 9.iostat-c :-

The **iostat** command in Linux is used for monitoring system input/output statistics for devices and partitions. It monitors system input/output by observing the time the devices are active in relation to their average transfer rates. **iostat -c** shows only the cpu statistic.

```
(base) cndc-16@cndc16-OptiPlex-3050-AIO:~$ iostat
Linux 4.15.0-188-generic (cndc16-OptiPlex-3050-AIO)   Wednesday 24 August 2022   _x86_64_   (8 CPU)

avg-cpu:  %user   %nice %system %iowait  %steal   %idle
           2.55    0.07   1.01   2.29    0.00   94.07

Device            tps    kB_read/s    kB_wrtn/s    kB_read    kB_wrtn
loop0              0.02         0.39         0.00       1062         0
loop1              0.01         0.12         0.00        330         0
loop2              0.01         0.04         0.00        108         0
loop3              0.01         0.02         0.00         46         0
loop4              0.01         0.12         0.00        332         0
loop5              0.01         0.02         0.00         46         0
loop6              0.00         0.00         0.00          4         0
loop7              0.01         0.12         0.00        334         0
sda                18.92       508.36       329.93    1371342     890013
loop8              0.02         0.40         0.00       1070         0
loop9              0.02         0.13         0.00        342         0
loop10             0.01         0.04         0.00        110         0
loop11             0.02         0.13         0.00        342         0
loop12             0.02         0.40         0.00       1069         0
loop13             0.01         0.04         0.00        111         0
loop14             5.54         5.92         0.00     15957         0
loop15             0.01         0.12         0.00        332         0
loop16             0.01         0.12         0.00        331         0
loop17             0.02         0.39         0.00       1048         0
loop18             0.02         0.38         0.00       1036         0
loop19             0.01         0.04         0.00        114         0
loop20             0.00         0.00         0.00          8         0

(base) cndc-16@cndc16-OptiPlex-3050-AIO:~$ |
```

## 10.vmstat:-

Virtual memory statistics reporter, also known as **vmstat** , is a Linux commandline tool that reports various bits of system information. Things like

memory, paging, processes, IO, CPU, and disk scheduling are all included in the array of information provided.

```
(base) cndc-16@cndc16-OptiPlex-3050-AIO:~$ vmstat
procs -----memory----- --swap-- -----io----- -system-- -----cpu-----
 r b swpd free buff cache si so bi bo in cs us sy id wa st
 0 0 0 3702216 137180 2156884 0 0 0 0 39 140 349 2 1 94 2 0
(base) cndc-16@cndc16-OptiPlex-3050-AIO:~$ |
```

**11.mpstat** :-is a command that is used to report processor related statistics. It accurately displays the statistics of the CPU usage of the system. It displays information about CPU utilization and performance. It initializes the first processor with CPU 0, the second one with CPU 1, and so on.

```
(base) cndc-16@cndc16-OptiPlex-3050-AIO:~$ mpstat
Linux 4.15.0-188-generic (cndc16-OptiPlex-3050-AIO)      Wednesday 24 August 2022      _x86_64_      (8 CPU)

05:14:20 IST CPU      %usr  %nice  %sys %iowait  %irq  %soft  %steal  %guest  %gnice  %idle
05:14:20 IST all      2.40   0.07   0.90  2.11   0.00   0.07   0.00   0.00   0.00   94.46
(base) cndc-16@cndc16-OptiPlex-3050-AIO:~$ |
```

**12.top** top command is used to show the Linux processes. It provides a dynamic realtime view of the running system. Usually, this command shows the summary information of the system and the list of processes or threads which are currently managed by the Linux Kernel.

```
cndc18: ~
top - 17:05:35 up 23 min, 1 user, load average: 0.21, 0.41, 0.50
Tasks: 207 total, 1 running, 205 sleeping, 0 stopped, 1 zombie
Cpu(s): 1.0 us, 0.8 sy, 0.0 ni, 98.0 id, 0.3 wa, 0.0 hi, 0.0 si, 0.0 st
MiB Mem : 1962940 total, 305492 free, 718092 used, 939356 buff/cache
MiB Swap: 2001916 total, 1999800 free, 2116 used, 656048 avail Mem

  PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM    TIME+  COMMAND
 1715 cndc28    9  -11  212752   15116  12432 S   4.0   0.8   0:43.28 pulseaudio
  794 root      20   0  219916   74112  63860 S   1.3   3.8   0:26.75 Xorg
2019  cndc28   20   0  122400   32048  26612 S   1.0   1.6   0:02.70 gnome-terminal-
1862  cndc28   20   0  269384   97648  57584 S   0.7   5.0   0:29.02 compiz
3190  cndc28   20   0  529596  162728  122568 S   0.7   8.3   0:06.60 Web Content
  654 root      20   0   51480   7592   7096 S   0.3   0.4   0:00.08 thermald
1115  www-data  20   0  228708   3960   2692 S   0.3   0.2   0:00.35 apache2
1626  cndc28   20   0   29172   4948   4568 S   0.3   0.3   0:00.26 at-spi2-registr
2366  cndc28   20   0  834776  223796  146948 S   0.3  11.4   1:18.50 Web Content
3367  cndc28   20   0    8088   3556   3068 R   0.3   0.2   0:00.01 top
   1 root      20   0   24968   4780   3680 S   0.0   0.2   0:01.03 systemd
   2 root      20   0      0      0      0 S   0.0   0.0   0:00.00 kthreadd
   3 root      20   0      0      0      0 S   0.0   0.0   0:00.00 ksoftirqd/0
   5 root      0 -20      0      0      0 S   0.0   0.0   0:00.00 kworker/0:0H
   7 root      20   0      0      0      0 S   0.0   0.0   0:00.52 rcu_sched
   8 root      20   0      0      0      0 S   0.0   0.0   0:00.00 rcu_bh
   9 root      rt  0  0 0 0 0 S 0.0 0.0 0:00.00 migration/0
  10 root      rt  0  0 0 0 0 S 0.0 0.0 0:00.00 watchdog/0
  11 root      rt  0  0 0 0 0 S 0.0 0.0 0:00.00 watchdog/1
  12 root      rt  0  0 0 0 0 S 0.0 0.0 0:00.00 migration/1
  13 root      20   0      0      0      0 S   0.0   0.0   0:00.00 ksoftirqd/1
  14 root      20   0      0      0      0 S   0.0   0.0   0:00.07 kworker/1:0
  15 root      0 -20      0      0      0 S   0.0   0.0   0:00.00 kworker/1:0H
  16 root      rt  0  0 0 0 0 S 0.0 0.0 0:00.00 watchdog/2
  17 root      rt  0  0 0 0 0 S 0.0 0.0 0:00.00 migration/2
  18 root      20   0      0      0      0 S   0.0   0.0   0:00.00 ksoftirqd/2
  20 root      0 -20      0      0      0 S   0.0   0.0   0:00.00 kworker/2:0H
  21 root      rt  0  0 0 0 0 S 0.0 0.0 0:00.00 watchdog/3
  22 root      rt  0  0 0 0 0 S 0.0 0.0 0:00.00 migration/3
  23 root      20   0      0      0      0 S   0.0   0.0   0:00.00 ksoftirqd/3
  25 root      0 -20      0      0      0 S   0.0   0.0   0:00.00 kworker/3:0H
  26 root      20   0      0      0      0 S   0.0   0.0   0:00.00 kdevtmpfs
```



## 13. htop

htop is a ncurses based program for viewing processes in a system running Linux. htop is quite similar to the top command. However, since htop is a newer program compared to top, it offers many improvements. htop supports mouse operation, uses color in its output and gives visual indications about processor, memory and swap usage. htop also prints full command lines for processes and allows one to scroll both vertically and horizontally for processes and command lines respectively.

```

1 [ 0.0%] 5 [ 0.7%]
2 [ 0.7%] 6 [ 0.0%]
3 [ 0.0%] 7 [ 0.7%]
4 [ 8.5%] 8 [ 0.0%]
Mem [ 2.38G/7.52G] Tasks: 178, 1094 thr: 1 running
Swp [ 0K/2.00G] Load average: 0.33 0.34 0.47
Uptime: 01:02:35

PID USER      PRI  NI  VIRT   RES   SHR  S CPU% MEM%   TIME+  Command
3414 cncd-16     -6    0 2327M 21492 17200s 7.2  0.3 3:36.98 /usr/bin/pulseaudio --start --log-target=syslog
3413 cncd-16    -9 -11 2327M 21492 17200s 7.2  0.3 3:38.37 /usr/bin/pulseaudio --start --log-target=syslog
12802 cncd-16    20    0 34496   5696   3868  R 1.3  0.1 0:00.12 http
1928 root       20    0 13950M 90156 50668  s 0.7  1.1 0:01.76 /usr/bin/dockerd -H fd:// --containerd=/run/containerd/containerd.sock
5628 cncd-16    20    0 3302M   3526   171M  s 0.7  4.6 0:07.87 /usr/lib/firefox/firefox --new-window
6170 cncd-16    20    0 413M   4716   4116  s 0.7  0.1 0:00.36 /usr/lib/speech-dispatcher-modules/sd_generic /etc/speech-dispatcher/modules/generic.conf
700 cncd-16    20    0 2636M   1736   9406  s 0.7  2.2 0:12.59 /usr/lib/firefox/firefox contentproc -childid 23 -isFirefox -preflen 40032 -prefMapsize 221028 -js1n
9013 cncd-16   100    0 2636M   1736   9406  s 0.7  2.2 0:04.64 /usr/lib/firefox/firefox contentproc -childid 36 -isFirefox -preflen 40032 -prefMapsize 221028 -js1n
3241 cncd-16    20    0 999M   79132 58800  s 0.0  1.0 1:17.57 /usr/lib/xorg/Xorg vt2 -displayfd 3 -auth /run/user/1000/gdm/Xauthority --background none --noreset -keeptt
1 root       20    0 220M   9588   6684  s 0.0  0.1 0:04.69 /sbin/init splash
295 root      19 -1 100M   23012 21932  s 0.0  0.3 0:00.52 /lib/systemd/systemd-journald
324 root       20    0 36908   6840   2872  s 0.0  0.1 0:03.45 /lib/systemd/systemd-udev
898 systemd-t 20    0 142M   3168   2696  s 0.0  0.0 0:00.00 /lib/systemd/systemd-timesyncd
845 systemd-t 20    0 142M   3168   2696  s 0.0  0.0 0:00.00 /lib/systemd/systemd-timesyncd
846 systemd-r 20    0 70528   9808   4524  s 0.0  0.1 0:00.22 /lib/systemd/systemd-resolved
107 messagebus 20    0 51800   6404   1984  s 0.0  0.1 0:01.50 /usr/bin/dbus-daemon --system --address=systemd: --nofork --nopidfile --systemd-activation --syslog-only
1511 root       20    0 473M   16848   1368  s 0.0  0.2 0:00.05 /usr/sbin/NetworkManager --no-daemon
1515 root       20    0 473M   16848   1368  s 0.0  0.2 0:00.06 /usr/sbin/NetworkManager --no-daemon
1094 root       20    0 473M   16848   1368  s 0.0  0.2 0:00.35 /usr/sbin/NetworkManager --no-daemon
1101 root       20    0 31324   3240   2916  s 0.0  0.0 0:00.00 /usr/sbin/cron -f
1122 syslog     20    0 256M   4640   3608  s 0.0  0.1 0:00.06 /usr/sbin/rsyslogd -n
1123 syslog     20    0 256M   4640   3608  s 0.0  0.1 0:00.00 /usr/sbin/rsyslogd -n
1125 syslog     20    0 256M   4640   3608  s 0.0  0.1 0:00.05 /usr/sbin/rsyslogd -n
1127 syslog     20    0 256M   4640   3608  s 0.0  0.1 0:00.13 /usr/sbin/rsyslogd -n
1387 root       20    0 175M   9388   588  s 0.0  0.1 0:00.36 /usr/sbin/thermald --no-daemon --dbus-enable
1109 root       20    0 175M   9388   588  s 0.0  0.1 0:00.40 /usr/sbin/thermald --no-daemon --dbus-enable
1129 root       20    0 4560   808   744  s 0.0  0.0 0:00.31 /usr/sbin/acpid
1133 avahi       20    0 47264   3304   2960  s 0.0  0.0 0:01.07 avahi-daemon: running [cncd16-optiplex-3050-A10.local]
1315 root       20    0 491M   17744   8744  s 0.0  0.1 0:00.00 /usr/lib/udisks2/udisksd
1373 root       20    0 491M   17744   8744  s 0.0  0.1 0:00.01 /usr/lib/udisks2/udisksd
1431 root       20    0 491M   17744   8744  s 0.0  0.1 0:00.00 /usr/lib/udisks2/udisksd
1437 root       20    0 491M   17744   8744  s 0.0  0.1 0:00.00 /usr/lib/udisks2/udisksd
1135 root       20    0 491M   17744   8744  s 0.0  0.1 0:00.44 /usr/lib/udisks2/udisksd
1320 root       20    0 424M   9648   8236  s 0.0  0.0 0:00.00 /usr/sbin/ModemManager --filter-policy=strict

```

## 14.sar : System Activity Report

It can be used to monitor Linux system's resources like CPU usage, Memory utilization, I/O devices consumption, Network monitoring, Disk usage, process and thread allocation, battery performance, Plug and play devices, Processor performance, file system and more.

```

cndc28@cndc18:~$ sor
sorcerer - A simple tree-parser generator Version 13333 1992-2001 vms1at.png
sor [options] f1.sor ... fn.sor
  -CPP                Generate C++ output
  -def-tokens          Define ref'd tokens w/unique integer (C++ interface)
  -def-tokens-file ____ Define ref'd tokens w/unique integer (put in file)
  -funcs ____         Gen 'ANSI', 'KR', or 'both' style function headers
  -guts                Print out a bunch of internal data structures
  -inline             Gen only actions and functions for given rules
  -noctor              Do not generate a blank constructor
  -prefix             Prefix all globally visible symbols
  -proto-file ____    Put all prototypes for rule functions in this file
  -out-dir            Directory where all output files go (default=".")
  -transform          Transformation mode; read/write to different pointers
  -                  take input from stdin
cndc28@cndc18:~$

```

## 15. perf

CoreFreq is a tool to collect CPU performance data on Linux systems. its core is established on a kernel module which helps to retrieve internal performance counters from each CPU core, and works in relation with a daemon which gathers the data and a small console client links to the daemon and displays collected data.

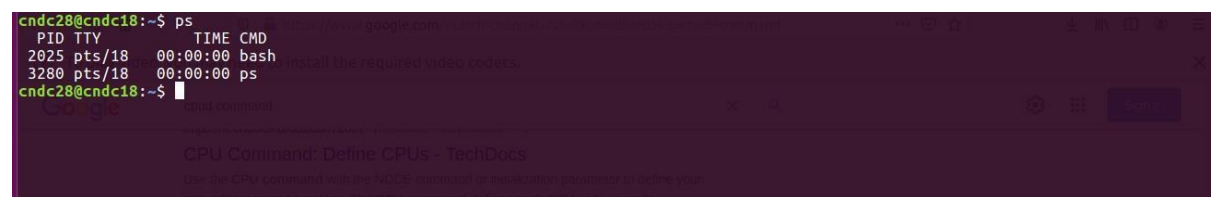
```
cndc32@cndc32:~$ perf
usage: perf [--version] [--help] [OPTIONS] COMMAND [ARGS]

The most commonly used perf commands are:
  annotate      Read perf.data (created by perf record) and display annotated code
  archive       Create archive with object files with build-ids found in perf.data file
  bench         General framework for benchmark suites
  buildid-cache Manage build-id cache.
  buildid-list  List the buildids in a perf.data file
  data          Data file related processing
  diff          Read perf.data files and display the differential profile
  evlist        List the event names in a perf.data file
  inject        Filter to augment the events stream with additional information
  kmem          Tool to trace/measure kernel memory properties
  kvm           Tool to trace/measure kvm guest os
  list          List all symbolic event types
  lock          Analyze lock events
  mem           Profile memory accesses
  record        Run a command and record its profile into perf.data
  report        Read perf.data (created by perf record) and display the profile
  sched         Tool to trace/measure scheduler properties (latencies)
  script        Read perf.data (created by perf record) and display trace output
  stat          Run a command and gather performance counter statistics
  test          Runs sanity tests.
  timechart     Tool to visualize total system behavior during a workload
  top           System profiling tool.
  trace         strace inspired tool
  probe         Define new dynamic tracepoints

See 'perf help COMMAND' for more information on a specific command.
```

## 16. ps

The ps command, short for Process Status, is a command line utility that is used to display or view information related to the processes running in a Linux system. As we all know, Linux is a multitasking and multiprocessing system. Therefore, multiple processes can run concurrently without affecting each other. The ps command lists current running processes alongside their PIDs and other attributes. In this guide, we are going to focus on ps command usage. It retrieves information about the processes from virtual files which are located in the /proc file system.



```
cndc28@cndc18:~$ ps
  PID TTY          TIME CMD
 2025 pts/18    00:00:00 bash
 3280 pts/18    00:00:00 ps
```

## 17. collectd

Collectd, a Unix daemon that collects statistics related to system performance and also provides means for storing the values in different formats like RRD (Round Robin Database) files. The statistics gathered by Collectd help to detect the current performance blocks and predict system load in future.

## 18. ping

PING (Packet Internet Groper) command is used to check the network connectivity between host and server/host. This command takes as input the IP address or the URL and sends a data packet to the specified address with the message "PING" and get a response from the server/host this time is recorded which is called latency. Fast ping low latency means faster connection. Ping uses ICMP(Internet Control Message Protocol) to send an ICMP echo message to the specified host if that host is available then it sends ICMP reply message. Ping is generally measured in millisecond every modern operating system has this ping pre-installed.

```
cndc28@cndc18:~$ ping
Usage: ping [-aAbBdDfhLnOqrRUvV] [-c count] [-i interval] [-I interface]
          [-m mark] [-M pmtudisc_option] [-l preload] [-p pattern] [-Q tos]
          [-s packetsize] [-S sndbuf] [-t ttl] [-T timestamp_option]
          [-w deadline] [-W timeout] [hop1 ...] destination
cndc28@cndc18:~$
```

## 19. ifconfig

ifconfig(interface configuration) command is used to configure the kernelresident network interfaces. It is used at the boot time to set up the interfaces as necessary. After that, it is usually used when needed during debugging or when you need system tuning. Also, this command is used to assign the IP address and netmask to an interface or to enable or disable a given interface.

```
cndc32@cndc32:~$ ifconfig
eno1    Link encap:Ethernet HWaddr 38:60:77:86:fc:ea
        inet addr:10.1.100.35 Bcast:10.1.255.255 Mask:255.255.0.0
        inet6 addr: fe80::7d14:591d:37f6:5d67/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:57313 errors:0 dropped:0 overruns:0 frame:0
        TX packets:20383 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:34862925 (34.8 MB)  TX bytes:2560296 (2.5 MB)
        Interrupt:20 Memory:fe400000-fe420000

lo       Link encap:Local Loopback
        inet addr:127.0.0.1 Mask:255.0.0.0
        inet6 addr: ::1/128 Scope:Host
        UP LOOPBACK RUNNING  MTU:65536  Metric:1
        RX packets:754 errors:0 dropped:0 overruns:0 frame:0
        TX packets:754 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1
        RX bytes:79860 (79.8 KB)  TX bytes:79860 (79.8 KB)

cndc32@cndc32:~$
```