

# Advanced Linux Commands

Mitrajeet Golsangi

## DF - Report file system disk space usage

```
$ df --all
Filesystem      1K-blocks      Used Available Use% Mounted on
/dev/sdc        263174212    1951160  247784896   1% /
none            4005396        28    4005368   1% /mnt/wslg
none            4005396         4    4005392   1% /mnt/wsl
tools           243367932 120283540 123084392  50% /init
none            4002968         0    4002968   0% /dev
sysfs            0              0          0   - /sys
proc             0              0          0   - /proc
devpts           0              0          0   - /dev/pts
none            4005396         0    4005396   0% /run
none            4005396         0    4005396   0% /run/lock
none            4005396         0    4005396   0% /run/shm
none            4005396         0    4005396   0% /run/user
binfmt_misc      0              0          0   -
/proc/sys/fs/binfmt_misc
tmpfs           4005396         0    4005396   0% /sys/fs/cgroup
cgroup2          0              0          0   - /sys/fs/cgroup/unified
cgroup           0              0          0   - /sys/fs/cgroup/cpuset
cgroup           0              0          0   - /sys/fs/cgroup/cpu
cgroup           0              0          0   - /sys/fs/cgroup/cpuacct
cgroup           0              0          0   - /sys/fs/cgroup/blkio
cgroup           0              0          0   - /sys/fs/cgroup/memory
cgroup           0              0          0   - /sys/fs/cgroup/devices
cgroup           0              0          0   - /sys/fs/cgroup/freezer
cgroup           0              0          0   - /sys/fs/cgroup/net_cls
cgroup           0              0          0   -
/sys/fs/cgroup/perf_event
cgroup           0              0          0   -
/sys/fs/cgroup/net_prio
cgroup           0              0          0   - /sys/fs/cgroup/hugetlb
cgroup           0              0          0   - /sys/fs/cgroup/pids
cgroup           0              0          0   - /sys/fs/cgroup/rdma
drivers          243367932 120283540 123084392  50% /usr/lib/wsl/drivers
lib              243367932 120283540 123084392  50% /usr/lib/wsl/lib
none            4005396         76    4005320   1% /mnt/wslg/versions.txt
none            4005396         76    4005320   1% /mnt/wslg/doc
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```
$ df --human-readable
```

Filesystem	Size	Used	Avail	Use%	Mounted on
/dev/sdc	251G	1.9G	237G	1%	/
none	3.9G	28K	3.9G	1%	/mnt/wslg
none	3.9G	4.0K	3.9G	1%	/mnt/wsl
tools	233G	115G	118G	50%	/init
none	3.9G	0	3.9G	0%	/run
none	3.9G	0	3.9G	0%	/run/lock
none	3.9G	0	3.9G	0%	/run/shm
none	3.9G	0	3.9G	0%	/run/user
tmpfs	3.9G	0	3.9G	0%	/sys/fs/cgroup
drivers	233G	115G	118G	50%	/usr/lib/wsl/drivers
lib	233G	115G	118G	50%	/usr/lib/wsl/lib
none	3.9G	76K	3.9G	1%	/mnt/wslg/versions.txt
none	3.9G	76K	3.9G	1%	/mnt/wslg/doc
drvfs	233G	115G	118G	50%	/mnt/c
drvfs	245G	124G	121G	51%	/mnt/d

```
$ df --block-size=M
```

Filesystem	1M-blocks	Used	Available	Use%	Mounted on
/dev/sdc	257007M	1906M	241978M	1%	/
none	3912M	1M	3912M	1%	/mnt/wslg
none	3912M	1M	3912M	1%	/mnt/wsl
tools	237664M	117464M	120201M	50%	/init
none	3912M	0M	3912M	0%	/run
none	3912M	0M	3912M	0%	/run/lock
none	3912M	0M	3912M	0%	/run/shm
none	3912M	0M	3912M	0%	/run/user
tmpfs	3912M	0M	3912M	0%	/sys/fs/cgroup
drivers	237664M	117464M	120201M	50%	/usr/lib/wsl/drivers
lib	237664M	117464M	120201M	50%	/usr/lib/wsl/lib
none	3912M	1M	3912M	1%	/mnt/wslg/versions.txt
none	3912M	1M	3912M	1%	/mnt/wslg/doc
drvfs	237664M	117464M	120201M	50%	/mnt/c
drvfs	249999M	126386M	123614M	51%	/mnt/d

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```
$ df --inodes
Filesystem      Inodes    IUsed    IFree IUse% Mounted on
/dev/sdc        16777216  54544 16722672    1% /
none            1001349    20 1001329    1% /mnt/wslg
none            1001349     2 1001347    1% /mnt/wsl
tools           999 -999001 1000000    - /init
none            1001349     7 1001342    1% /run
none            1001349     1 1001348    1% /run/lock
none            1001349     1 1001348    1% /run/shm
none            1001349     1 1001348    1% /run/user
tmpfs           1001349    15 1001334    1% /sys/fs/cgroup
drivers          999 -999001 1000000    - /usr/lib/wsl/drivers
lib             999 -999001 1000000    - /usr/lib/wsl/lib
none            1001349    47 1001302    1% /mnt/wslg/versions.txt
none            1001349    47 1001302    1% /mnt/wslg/doc
drvfs           999 -999001 1000000    - /mnt/c
drvfs           999 -999001 1000000    - /mnt/d
```

```
$ df --si
Filesystem      Size  Used Avail Use% Mounted on
/dev/sdc        270G  2.0G  254G   1% /
none            4.2G   29k  4.2G   1% /mnt/wslg
none            4.2G   4.1k  4.2G   1% /mnt/wsl
tools           250G  124G  127G  50% /init
none            4.2G     0  4.2G   0% /run
none            4.2G     0  4.2G   0% /run/lock
none            4.2G     0  4.2G   0% /run/shm
none            4.2G     0  4.2G   0% /run/user
tmpfs           4.2G     0  4.2G   0% /sys/fs/cgroup
drivers          250G  124G  127G  50% /usr/lib/wsl/drivers
lib             250G  124G  127G  50% /usr/lib/wsl/lib
none            4.2G   78k  4.2G   1% /mnt/wslg/versions.txt
none            4.2G   78k  4.2G   1% /mnt/wslg/doc
drvfs           250G  124G  127G  50% /mnt/c
drvfs           263G  133G  130G  51% /mnt/d
```

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NETSTAT – Print network connections, routing tables, interface statistics, masquerade connections, and multicast memberships

```
$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags       Type        State         I-Node    Path
unix  3      [ ]        STREAM     CONNECTED    2077
unix  3      [ ]        STREAM     CONNECTED    2078
unix  3      [ ]        STREAM     CONNECTED    36
unix  2      [ ]        SEQPACKET  CONNECTED    21516
unix  3      [ ]        STREAM     CONNECTED    2114      @/tmp/dbus-IALFhrbJfY
unix  3      [ ]        STREAM     CONNECTED    22534
unix  3      [ ]        STREAM     CONNECTED    22535
unix  3      [ ]        STREAM     CONNECTED    2131      /mnt/wslg/PulseAudioRDPSink
unix  3      [ ]        STREAM     CONNECTED    19535
```

```
$ netstat --route
Kernel IP routing table
Destination      Gateway          Genmask         Flags   MSS Window  irtt Iface
default          mitrajeetpc.msh 0.0.0.0         UG      0  0        0 eth0
172.21.128.0     0.0.0.0         255.255.240.0   U        0  0        0 eth0
```

```
$ netstat --interface
Kernel Interface table
Iface    MTU     RX-OK RX-ERR RX-DRP RX-OVR    TX-OK TX-ERR TX-DRP TX-OVR Flg
eth0     1500    196   0      0  0      16     0      0      0 BMRU
lo       65536   0     0      0  0      0      0      0      0 LRU
```

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```
$ netstat --listening
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
Active UNIX domain sockets (only servers)
Proto RefCnt Flags               Type                   State                   I-Node   Path
unix  2      [ ACC ]              SEQPACKET              LISTENING                1098     /run/WSL/1_interop
unix  2      [ ACC ]              SEQPACKET              LISTENING                19491    /run/WSL/1_interop
unix  2      [ ACC ]              SEQPACKET              LISTENING                19515    /run/WSL/10_interop
unix  2      [ ACC ]              STREAM                 LISTENING                22533
/var/run/dbus/system_bus_socket
unix  2      [ ACC ]              STREAM                 LISTENING                19503
/mnt/wslg/runtime-dir/wayland-0
unix  2      [ ACC ]              STREAM                 LISTENING                2103
/mnt/wslg/runtime-dir/pulse/native
unix  2      [ ACC ]              STREAM                 LISTENING                19504     /tmp/.X11-unix/X0
unix  2      [ ACC ]              STREAM                 LISTENING                 35       /mnt/wslg/PulseServer
unix  2      [ ACC ]              STREAM                 LISTENING                1113
/mnt/wslg/PulseAudioRDPSource
unix  2      [ ACC ]              STREAM                 LISTENING                19533
/mnt/wslg/PulseAudioRDPSSink
unix  2      [ ACC ]              STREAM                 LISTENING                1089     @/tmp/dbus-IALFhrbJfY
```

```
$ netstat --timers
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State       Timer
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags               Type                   State                   I-Node   Path
unix  3      [ ]                STREAM                 CONNECTED                2077
unix  3      [ ]                STREAM                 CONNECTED                2078
unix  3      [ ]                STREAM                 CONNECTED                 36
unix  2      [ ]                SEQPACKET              CONNECTED                21516
unix  3      [ ]                STREAM                 CONNECTED                2114     @/tmp/dbus-IALFhrbJfY
unix  3      [ ]                STREAM                 CONNECTED                22534
unix  3      [ ]                STREAM                 CONNECTED                22535
unix  3      [ ]                STREAM                 CONNECTED                2131     /mnt/wslg/PulseAudioRDPSSink
unix  3      [ ]                STREAM                 CONNECTED                19535
```

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# Advanced Linux Commands

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## TRACEROUTE - Print the route packets trace to network host

```
$ traceroute google.com -4
traceroute to google.com (142.250.77.46), 30 hops max, 60 byte packets
 1 mitrajeetpc.mshome.net (172.21.128.1)  0.490 ms  0.435 ms  0.428 ms
 2 reliance.reliance (192.168.29.1)  6.442 ms  6.438 ms  6.434 ms
 3 10.62.184.1 (10.62.184.1)  8.632 ms  6.363 ms  7.986 ms
 4 172.31.3.60 (172.31.3.60)  6.313 ms 172.31.3.64 (172.31.3.64)  8.800 ms 172.31.3.60
(172.31.3.60)  6.305 ms
 5 192.168.92.242 (192.168.92.242)  8.607 ms 192.168.92.246 (192.168.92.246)  7.667 ms
8.600 ms
 6 172.26.106.117 (172.26.106.117)  7.401 ms  5.983 ms  4.500 ms
 7 172.26.106.99 (172.26.106.99)  5.932 ms 172.26.106.98 (172.26.106.98)  7.057 ms
6.692 ms
 8 192.168.92.162 (192.168.92.162)  6.726 ms 192.168.92.160 (192.168.92.160)  7.039 ms
192.168.92.166 (192.168.92.166)  7.030 ms
 9 * * *
10 * * *
11 209.85.168.26 (209.85.168.26)  12.432 ms 74.125.51.166 (74.125.51.166)  46.217 ms
10.150 ms
12 * * *
13 108.170.248.177 (108.170.248.177)  9.967 ms 142.251.64.12 (142.251.64.12)  9.384 ms
209.85.255.206 (209.85.255.206)  10.922 ms
14 142.250.238.201 (142.250.238.201)  11.982 ms 142.250.238.203 (142.250.238.203)  9.950
ms 142.250.238.201 (142.250.238.201)  11.963 ms
15 bom07s26-in-f14.1e100.net (142.250.77.46)  8.682 ms  9.040 ms  10.578 ms
```

```
$ traceroute google.com --debug
traceroute to google.com (142.251.42.46), 30 hops max, 60 byte packets
setsockopt SO_DEBUG: Permission denied
```

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# Advanced Linux Commands

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```
$ traceroute google.com -UL
traceroute to google.com (142.250.77.46), 30 hops max, 60 byte packets
 1  * * *
 2  * * *
 3  * * *
 4  * * *
 5  * * *
 6  * * *
 7  * * *
 8  * * *
 9  * * *
10  * * *
11  * * *
12  * * *
13  * * *
14  * * *
15  * * *
16  * * *
```

```
$ sudo traceroute google.com --tcp
[sudo] password for mitrajeet:
traceroute to google.com (172.217.166.78), 30 hops max, 60 byte packets
 1  mitrajeetpc.mshome.net (172.30.144.1)  0.388 ms  0.378 ms  0.376 ms
 2  reliance.reliance (192.168.29.1)  3.186 ms  3.184 ms  3.318 ms
 3  10.62.184.1 (10.62.184.1)  4.587 ms  4.817 ms  5.193 ms
 4  172.31.3.60 (172.31.3.60)  5.894 ms  172.31.3.64 (172.31.3.64)  7.049 ms  7.047 ms
 5  * * *
 6  * * *
 7  * * *
 8  * * *
 9  * * *
10  * * *
11  209.85.168.26 (209.85.168.26)  9.301 ms  9.294 ms  7.046 ms
12  172.253.69.227 (172.253.69.227)  7.868 ms  216.239.57.17 (216.239.57.17)  9.928 ms
72.14.238.215 (72.14.238.215)  10.545 ms
13  209.85.242.111 (209.85.242.111)  8.769 ms  209.85.241.227 (209.85.241.227)  8.739
ms  10.921 ms
14  bom05s15-in-f14.1e100.net (172.217.166.78)  9.704 ms  10.951 ms  10.510 ms
```

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```
$ sudo traceroute google.com --extensions
traceroute to google.com (172.217.166.78), 30 hops max, 60 byte packets
 1 mitrajeetpc.mshome.net (172.30.144.1)  0.266 ms  0.239 ms  0.218 ms
 2 reliance.reliance (192.168.29.1)  4.071 ms  4.067 ms  4.116 ms
 3 10.62.184.1 (10.62.184.1)  7.479 ms  7.474 ms  7.472 ms
 4 172.31.3.60 (172.31.3.60)  7.403 ms  7.399 ms 172.31.3.64 (172.31.3.64)  7.895 ms
 5 192.168.92.240 (192.168.92.240)  7.460 ms 192.168.92.242 (192.168.92.242)  7.456 ms
192.168.92.246 (192.168.92.246)  7.453 ms
 6 172.26.106.117 (172.26.106.117)  5.264 ms  6.142 ms  6.209 ms
 7 172.26.106.99 (172.26.106.99)  7.760 ms  7.063 ms  7.041 ms
 8 192.168.92.160 (192.168.92.160)  4.457 ms 192.168.92.164 (192.168.92.164)  5.282 ms
192.168.92.160 (192.168.92.160)  5.120 ms
 9 * * *
10 * * *
11 74.125.51.166 (74.125.51.166)  8.841 ms  11.558 ms 209.85.168.26 (209.85.168.26)  9.980
ms
12 * * *
13 142.250.227.72 (142.250.227.72)  10.147 ms bom05s15-in-f14.1e100.net (172.217.166.78)
9.858 ms 108.170.248.209 (108.170.248.209)  7.269 ms
```

## APT - Ubuntu Package manager

```
$ apt list
r-cran-gargle/jammy 1.2.0-2 all
r-cran-gb2/jammy 2.1-2 all
r-cran-gbm/jammy 2.1.8-1 amd64
r-cran-gbrd/jammy 0.4-11-2 amd64
r-cran-gclus/jammy 1.3.2-2build1 all
r-cran-gdata/jammy 2.18.0-3build1 all
r-cran-gdtools/jammy 0.2.4-1 amd64
r-cran-gee/jammy 4.13-20-2 amd64
r-cran-geepack/jammy 1.3.3-1 amd64
r-cran-genabel.data/jammy 1.0.0-4build1 all
r-cran-genabel/jammy 1.8-0-5 amd64
r-cran-generics/jammy 0.1.2-1 all
r-cran-genetics/jammy 1.3.8.1.3-1 all
...
```

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```
$ apt search command-not-found
Sorting... Done
Full Text Search... Done
command-not-found/jammy,now 22.04.0 all [installed]
  Suggest installation of packages in interactive bash sessions

packagekit-command-not-found/jammy 1.2.5-2ubuntu2 amd64
  Offer to install missing programs automatically

python3-commandnotfound/jammy,now 22.04.0 all [installed,automatic]
  Python 3 bindings for command-not-found.
```

```
$ sudo apt autoremove command-not-found -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages will be REMOVED
  command-not-found python3-commandnotfound
0 to upgrade, 0 to newly install, 2 to remove and 0 not to upgrade.
After this operation, 98.3 kB disk space will be freed.
(Reading database ... 40297 files and directories currently installed.)
Removing command-not-found (22.04.0) ...
Removing python3-commandnotfound (22.04.0) ...
```

```
$ sudo apt install command-not-found
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  python3-commandnotfound
The following NEW packages will be installed
  command-not-found python3-commandnotfound
0 to upgrade, 2 to newly install, 0 to remove and 0 not to upgrade.
Need to get 16.4 kB of archives.
After this operation, 98.3 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://archive.ubuntu.com/ubuntu jammy/main amd64
```

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```
python3-commandnotfound all 22.04.0 [11.3 kB]
Get:2 http://archive.ubuntu.com/ubuntu jammy/main amd64
command-not-found all 22.04.0 [5,114 B]
Fetched 16.4 kB in 1s (17.9 kB/s)
Selecting previously unselected package python3-commandnotfound.
(Reading database ... 40279 files and directories currently installed.)
Preparing to unpack .../python3-commandnotfound_22.04.0_all.deb ...
Unpacking python3-commandnotfound (22.04.0) ...
Selecting previously unselected package command-not-found.
Preparing to unpack .../command-not-found_22.04.0_all.deb ...
Unpacking command-not-found (22.04.0) ...
Setting up python3-commandnotfound (22.04.0) ...
Setting up command-not-found (22.04.0) ...
Scanning processes...
Scanning processor microcode...
Scanning linux images...

Failed to retrieve available kernel versions.

Failed to check for processor microcode upgrades.

No services need to be restarted.

No containers need to be restarted.

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this
host.
```

```
$ sudo apt upgrade
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
0 to upgrade, 0 to newly install, 0 to remove and 0 not to upgrade.
```

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## NSLOOKUP - Query Internet name servers interactively

```
$ nslookup
> google.com
Server:          172.30.144.1
Address:         172.30.144.1#53

Non-authoritative answer:
Name:   google.com
Address: 142.250.183.110
Name:   google.com
Address: 2404:6800:4009:809::200e
```

```
$ nslookup
> set type=ns
> google.com
Server:          172.30.144.1
Address:         172.30.144.1#53

Non-authoritative answer:
google.com       nameserver = ns3.google.com.
google.com       nameserver = ns2.google.com.
google.com       nameserver = ns1.google.com.
google.com       nameserver = ns4.google.com.
Name:   ns4.google.com
Address: 216.239.38.10
Name:   ns4.google.com
Address: 2001:4860:4802:38::a
Name:   ns3.google.com
Address: 216.239.36.10
Name:   ns3.google.com
Address: 2001:4860:4802:36::a
Name:   ns2.google.com
Address: 216.239.34.10
Name:   ns2.google.com
Address: 2001:4860:4802:34::a
Name:   ns1.google.com
Address: 216.239.32.10
>
```

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```
$ nslookup google.com ns1.google.com
Server:          ns1.google.com
Address:         216.239.32.10#53

Name:   google.com
Address: 142.250.183.78
Name:   google.com
Address: 2404:6800:4009:81e::200e
```

```
$ nslookup -debug google.com
Server:          172.30.144.1
Address:         172.30.144.1#53

-----
QUESTIONS:
    google.com, type = A, class = IN
ANSWERS:
-> google.com
    internet address = 142.250.182.206
    ttl = 0
AUTHORITY RECORDS:
ADDITIONAL RECORDS:
-----
Non-authoritative answer:
Name:   google.com
Address: 142.250.182.206
-----
QUESTIONS:
    google.com, type = AAAA, class = IN
ANSWERS:
-> google.com
    has AAAA address 2404:6800:4009:832::200e
    ttl = 0
AUTHORITY RECORDS:
ADDITIONAL RECORDS:
-----
Name:   google.com
Address: 2404:6800:4009:832::200e
```

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```
$ nslookup -querytype=mx google.com
Server:          172.30.144.1
Address:         172.30.144.1#53

Non-authoritative answer:
google.com      mail exchanger = 10 smtp.google.com.

Authoritative answers can be found from:
```

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