Lab 1: Network Commands

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1. tcpdump

```
~ : docker — Konsole
root@opensuse:/code# tcpdump
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on wlp1s0, link-type EN10MB (Ethernet), capture size 262144 bytes
10:56:04.780468 ARP, Request who-has bravo.home.02420.in tell router.home.02420.in, length 46
10:56:04.780488 ARP, Reply bravo.home.02420.in is-at 98:3b:8f:0c:40:4f (oui Unknown), length 28
10:56:04.781169 IP bravo.home.02420.in.42366 > router.home.02420.in.domain: 40984+ PTR? 10.1.168.192.in-addr.arpa. (43)
10:56:04.783420 IP router.home.02420.in.domain > bravo.home.02420.in.42366: 40984 1/0/0 PTR bravo.home.02420.in. (76)
10:56:04.783657 IP bravo.home.02420.in.56874 > router.home.02420.in.domain: 61124+ PTR? 1.1.168.192.in-addr.arpa. (42)
10:56:04.785860 IP router.home.02420.in.domain > bravo.home.02420.in.56874: 61124 1/0/0 PTR router.home.02420.in. (76)
10:56:09.830517 ARP, Request who-has bravo.home.02420.in tell router.home.02420.in, length 46
10:56:09.830531 ARP, Reply bravo.home.02420.in is-at 98:3b:8f:0c:40:4f (oui Unknown), length 28
10:56:13.001181 IP 13.107.42.14.https > bravo.home.02420.in.39956: Flags [P.], seq 1004413253:1004413314, ack 1681721814, win
2050, length 61
10:56:13.001224 IP bravo.home.02420.in.39956 > 13.107.42.14.https: Flags [.], ack 61, win 501, length 0
10:56:13.001365 IP bravo.home.02420.in.43968 > router.home.02420.in.domain: 51710+ PTR? 14.42.107.13.in-addr.arpa. (43)
10:56:13.006968 IP 13.107.42.14.https > bravo.home.02420.in.39956: Flags [P.], seq 61:130, ack 1, win 2050, length 69
10:56:13.006983 IP bravo.home.02420.in.39956 > 13.107.42.14.https: Flags [.], ack 130, win 501, length 0
10:56:13.104889 IP router.home.02420.in.domain > bravo.home.02420.in.43968: 51710 NXDomain 0/1/0 (129)
10:56:13.961499 IP 13.107.42.14.https > bravo.home.02420.in.39956: Flags [P.], seq 130:222, ack 1, win 2050, length 92
10:56:13.961537 IP bravo.home.02420.in.39956 > 13.107.42.14.https: Flags [.], ack 222, win 501, length 0
10:56:13.961566 IP 13.107.42.14.https > bravo.home.02420.in.39956: Flags [P.], seq 222:314, ack 1, win 2050, length 92
10:56:13.961574 IP bravo.home.02420.in.39956 > 13.107.42.14.https: Flags [.], ack 314, win 501, length 0
10:56:13.970476 IP 13.107.42.14.https > bravo.home.02420.in.39956: Flags [P.], seq 314:406, ack 1, win 2050, length 92
10:56:13.970492 IP bravo.home.02420.in.39956 > 13.107.42.14.https: Flags [.], ack 406, win 501, length 0
10:56:13.972237 IP 13.107.42.14.https > bravo.home.02420.in.39956: Flags [P.], seq 406:498, ack 1, win 2050, length 92
10:56:13.972251 IP bravo.home.02420.in.39956 > 13.107.42.14.https: Flags [.], ack 498, win 501, length 0
^C
22 packets captured
22 packets received by filter
0 packets dropped by kernel
```

`tcpdump` - dump traffic on a network

`tcpdump` is a data-network packet analyzer. It reads packets from a network interface card and shows their source/destination addresses, size, protocol etc. It can also be used to intercept unencrypted data sent over HTTP

2. ifconfig

```
~ : docker — Konsole
root@opensuse:/code# ifconfig
docker0: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        inet 172.17.0.1  netmask 255.255.0.0  broadcast 172.17.255.255
        inet6 fe80::42:d9ff:fef5:64c3  prefixlen 64  scopeid 0x20<link>
        ether 02:42:d9:f5:64:c3  txqueuelen 0  (Ethernet)
        RX packets 36051  bytes 2130445 (2.1 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 54295  bytes 215074292 (215.0 MB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 4082  bytes 361871 (361.8 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 4082  bytes 361871 (361.8 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

wlp1s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.1.10  netmask 255.255.255.0  broadcast 192.168.1.255
        inet6 fe80::559e:abf:2d2:c93f  prefixlen 64  scopeid 0x20<link>
        ether 98:3b:8f:0c:40:4f  txqueuelen 1000  (Ethernet)
        RX packets 1307967  bytes 1502116290 (1.5 GB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 428558  bytes 232821828 (232.8 MB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

root@opensuse:/code#
```

`ifconfig` - configure a network interface

`ifconfig` displays the status of the active network interfaces. It is commonly used to find the local IP address and MAC address of the machine. It can also be used to configure a network interface.

3. dig

```
~ : docker — Konsole
root@opensuse:/code# dig alfa.home.02420.in

; <<>> DiG 9.16.1-Ubuntu <<>> alfa.home.02420.in
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 28701
;; flags: qr rd ra ad; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;alfa.home.02420.in.            IN      A

;; ANSWER SECTION:
alfa.home.02420.in.     0       IN      A       192.168.1.32

;; Query time: 4 msec
;; SERVER: 192.168.1.1#53(192.168.1.1)
;; WHEN: Sun Jan 23 11:07:39 UTC 2022
;; MSG SIZE  rcvd: 52

root@opensuse:/code#
```

`dig` - DNS lookup utility

`dig` is a network administration tool for querying the Domain Name System. It displays all DNS records associated with a given domain (A, AAAA, CNAME, MX, etc) and the IP address of the server. It should not be used to test the connection since DNS lookups are often cached.

4. arp

```
~ : docker — Konsole
root@opensuse:/code# arp
Address                  HWtype  HWaddress           Flags Mask            Iface
alfa.home.02420.in       ether   80:c1:6e:57:16:f3   C                     wlp1s0
router.home.02420.in     ether   dc:d9:ae:1e:36:b0   C                     wlp1s0
root@opensuse:/code#
```

`arp` - manipulate the system ARP cache

ARP stands for Address Resolution Protocol, which is used to find the MAC address of device from a given IPv4 Address. `arp` prints the content of the ARP table. It can also be used to modify the ARP cache.

5. netstat

```
~ : docker — Konsole
root@opensuse:/code# netstat | head -n 25
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 bravo.home.02420.:39970 13.107.42.14:https      ESTABLISHED
tcp        0      0 bravo.home.02420.:53786 lb-140-82-112-26-:https ESTABLISHED
udp        0      0 bravo.home.02420.:34769 router.home.0242:domain ESTABLISHED
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags       Type       State         I-Node   Path
unix  2      [ ]         DGRAM      CONNECTED     20245    /var/run/chrony/chronyd.sock
unix  2      [ ]         DGRAM                    29924    /run/user/1000/systemd/notify
unix  4      [ ]         DGRAM      CONNECTED     11422    /run/systemd/notify
unix  21     [ ]         DGRAM      CONNECTED     11432    /run/systemd/journal/dev-log
unix  7      [ ]         DGRAM      CONNECTED     11434    /run/systemd/journal/socket
unix  3      [ ]         SEQPACKET  CONNECTED     181833   @0005c
unix  3      [ ]         SEQPACKET  CONNECTED     181831   @0005b
unix  3      [ ]         SEQPACKET  CONNECTED     31144    @0000a
unix  3      [ ]         SEQPACKET  CONNECTED     169933   @0004f
unix  2      [ ]         DGRAM                    29806    public/postlog
unix  3      [ ]         SEQPACKET  CONNECTED     174307   @00053
unix  2      [ ]         DGRAM                    33114    @00010
unix  3      [ ]         SEQPACKET  CONNECTED     169935   @00050
unix  3      [ ]         SEQPACKET  CONNECTED     174309   @00054
unix  3      [ ]         SEQPACKET  CONNECTED     31142    @00009
unix  3      [ ]         STREAM     CONNECTED     187504
unix  3      [ ]         STREAM     CONNECTED     186492
unix  3      [ ]         STREAM     CONNECTED     170812
root@opensuse:/code#
```

`netstat` - Print network connections, routing tables, interface statistics, masquerade connections, and multicast memberships

`netstat` displays a list of all open ports, the applications servicing those ports and the protocol used.

6. telnet

```
~ : docker — Konsole
root@opensuse:/code# telnet telehack.com
Trying 64.13.139.230...
Connected to telehack.com.
Escape character is '^]'.

Connected to TELEHACK port 40

It is 6:05 am on Sunday, January 23, 2022 in Mountain View, California, USA.
There are 64 local users. There are 26641 hosts on the network.

  Type HELP for a detailed command list.
  Type NEWUSER to create an account.

May the command line live forever.

Command, one of the following:
  2048       ?          a2         ac         advent     aquarium
  basic      bf         c8         cal        calc       ching
  clear      clock      cowsay     echo       eliza      factor
  figlet     finger     fnord      geoip      help       hosts
  ipaddr     joke       login      mac        md5        newuser
  notes      octopus    phoon      pig        ping       primes
  privacy    qr         rain       rand       rfc        rig
  roll       rot13      sleep      starwars   traceroute typespeed
  units      uptime     usenet     users      uumap      uupath
  uuplot     weather    when       zc         zork       zrun

.
telnet> quit
Connection closed.
root@opensuse:/code#
```

`telnet` - user interface to the TELNET protocol

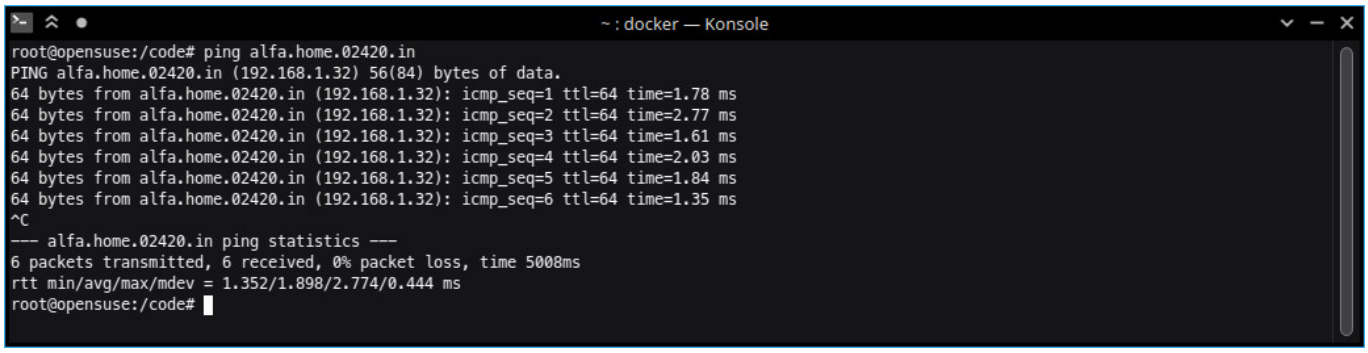
`telnet` command is used to communicate over the TELNET protocol (like browser is used for HTTP). TELNET is used for bidirectional communication between the host and the client. SSH should always be preferred over TELNET since it uses encryption.

7. traceroute

`traceroute` - print the route packets trace to network host

`traceroute` tracks the route packets taken from a client to a given host and displays the (round-trip) transit delays between each network hop. It is similar to `ping` but also displays intermediate delays. It can be used over a local network to find congested nodes.

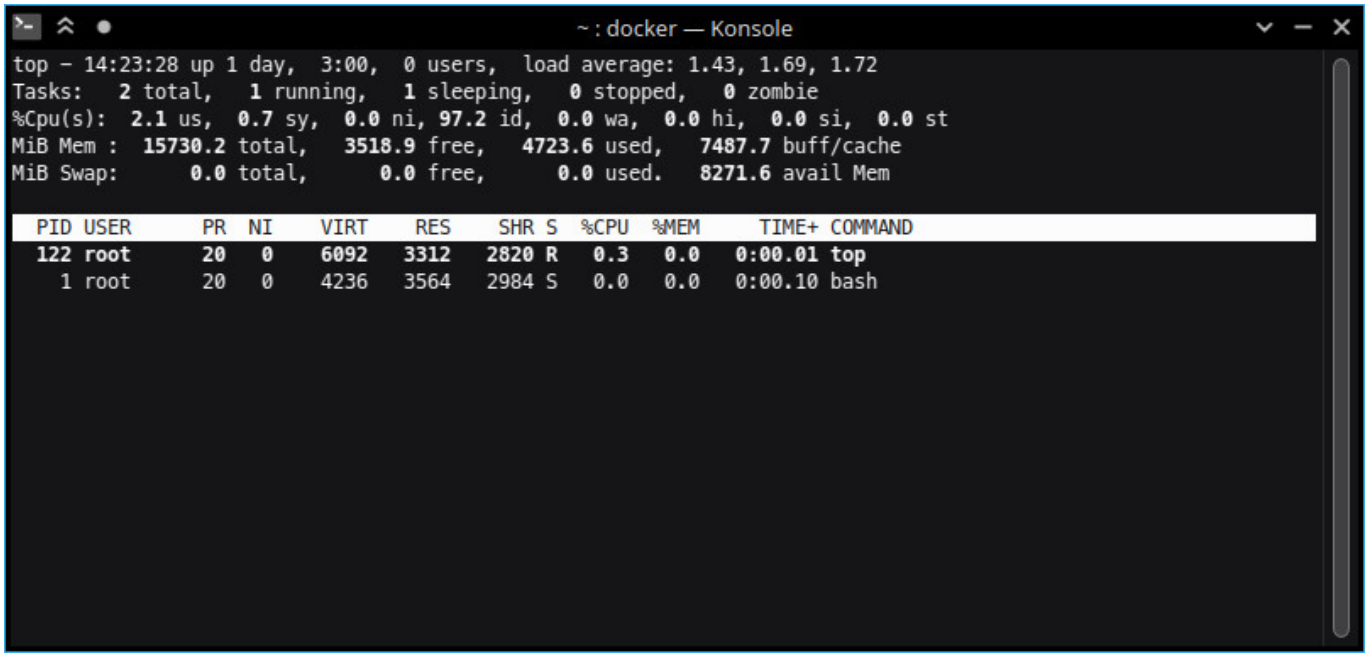
8. ping



`ping` - send ICMP ECHO_REQUEST to network hosts

`ping` command is commonly used to check the reachability of a host. It continuously sends fixed sized packets to the host at regular intervals and measured the round-trip time of the when it receives a reply. It also displays the packet loss and min/max/avg rt time.

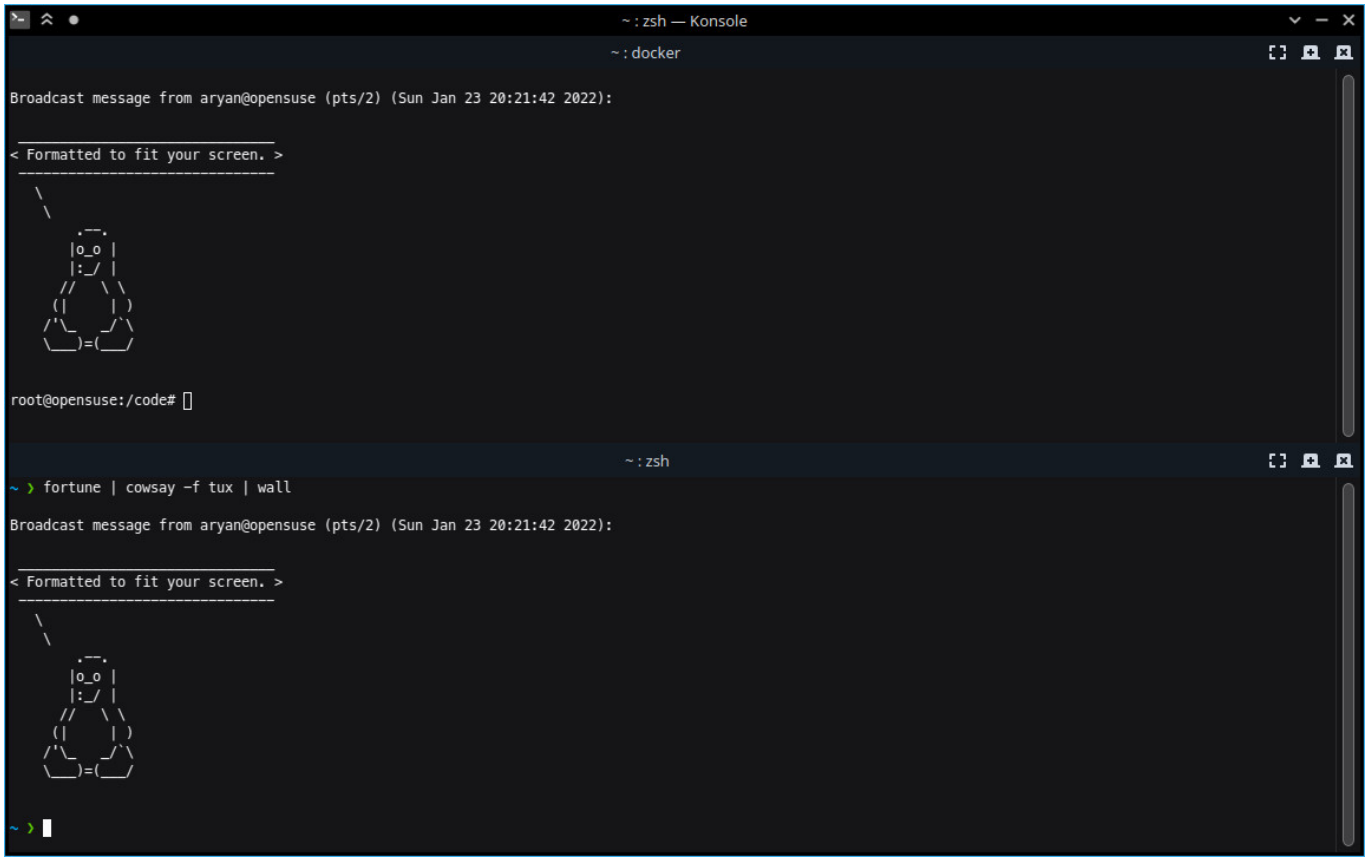
9. top



`top` - display Linux processes

top displays a dynamic real-time view of a running system. It displays system summary information (CPU, RAM) as well as a list of processes/threads, their types (running/waiting), size, and resource usage.

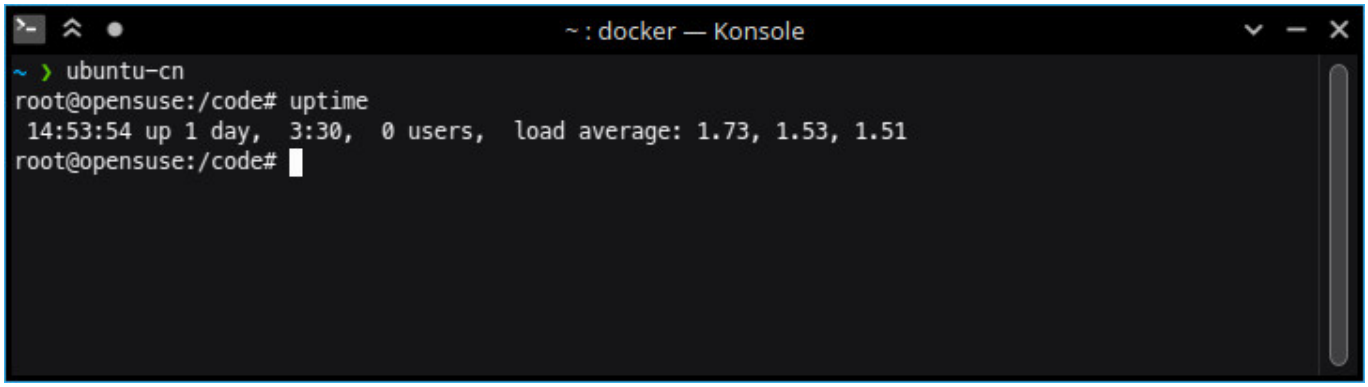
10. wall



`wall` - write a message to all users

`wall` displays a message on the terminals of all currently logged in users.

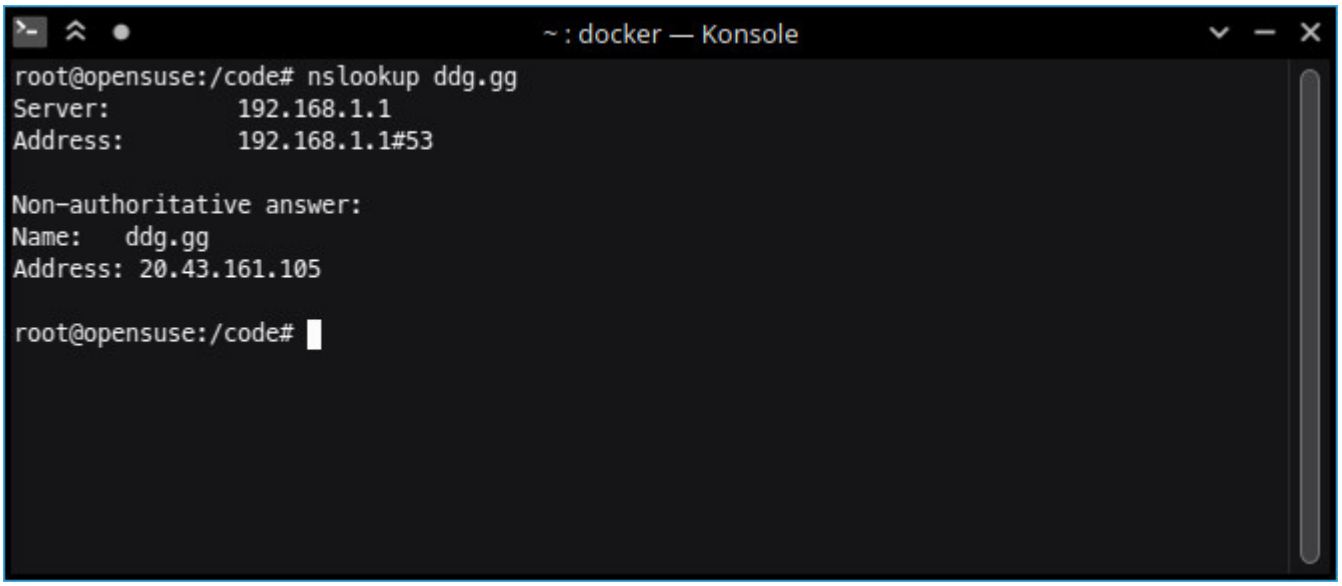
11. uptime



`uptime` - Tell how long the system has been running.

`uptime` command displays the current time, how long the system has been running, how many users are currently logged on, and the system load averages for the past 1, 5, and 15 minutes. This information is also the very first line of the `top` command

12. nslookup



`nslookup` - query Internet name servers interactively

`nslookup` is a program to find the IP address associated with the given domain name. it can also be used to query other DNS records. DNS is split into multiple zones each with its own authoritative servers. DNS is often cached and here we receive the answer from a non-authoritative source.