CSE 611 Assignment 1

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Use a command to display the name of your computer

We can use the `cat` command to get the hostname

The `/cat/hostname` is the configuration file for the hostname and it contains the name of the computer i.e the hostname.

Check whether a system is connect to the internet or not

The `netstat` command with the option `-a` can be used to check all the active connections

```
→  ~ netstat -a
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 0.0.0.0:llmnr           0.0.0.0:*               LISTEN
tcp        0      0 _localdnsstub:domain    0.0.0.0:*               LISTEN
tcp        0      0 0.0.0.0:ssh             0.0.0.0:*               LISTEN
tcp        0      0 0.0.0.0:57621           0.0.0.0:*               LISTEN
tcp        0      0 0.0.0.0:60627           0.0.0.0:*               LISTEN
tcp        0      0 0.0.0.0:mysql           0.0.0.0:*               LISTEN
tcp        0      0 _localdnsproxy:domain   0.0.0.0:*               LISTEN
tcp        0      0 basu:46066              104.18.39.102:https     ESTABLISHED
tcp        0      0 basu:43948              172.64.148.154:https    ESTABLISHED
tcp        0      0 basu:52992              237.240.199.10:www-http ESTABLISHED
tcp        0      0 basu:43988              35.224.186.35.bc.:https ESTABLISHED
tcp        0      0 basu:37714              82.221.107.34.:www-http ESTABLISHED
tcp        0      0 basu:35856              39.224.186.35.bc.:https ESTABLISHED
tcp        0    295 basu:37672              82.221.107.34.:www-http ESTABLISHED
tcp        0      0 basu:57580              93.243.107.34.bc.:https ESTABLISHED
tcp6       0      0 [::]:llmnr              [::]:*                  LISTEN
tcp6       0      0 [::]:ssh                [::]:*                  LISTEN
tcp6       0      0 [::]:mysql              [::]:*                  LISTEN
udp        0      0 0.0.0.0:52309           0.0.0.0:*
udp        0      0 0.0.0.0:36731           0.0.0.0:*
udp        0      0 0.0.0.0:mdns            0.0.0.0:*
udp        0      0 mdns.mcast.net:mdns     0.0.0.0:*
udp        0      0 0.0.0.0:mdns            0.0.0.0:*
udp        0      0 0.0.0.0:mdns            0.0.0.0:*
udp        0      0 0.0.0.0:llmnr           0.0.0.0:*
udp        0      0 0.0.0.0:46537           0.0.0.0:*
udp        0      0 _localdnsproxy:domain   0.0.0.0:*
udp        0      0 _localdnsstub:domain    0.0.0.0:*
udp        0      0 basu:bootpc             _gateway:bootps         ESTABLISHED
udp        0      0 basu:bootpc             0.0.0.0:*
udp        0      0 0.0.0.0:57621           0.0.0.0:*
udp        0      0 0.0.0.0:ssdp            0.0.0.0:*
udp        0      0 0.0.0.0:ssdp            0.0.0.0:*
udp6       0      0 [::]:mdns               [::]:*
udp6       0      0 [::]:mdns               [::]:*
udp6       0      0 [::]:llmnr              [::]:*
raw6       0      0 [::]:ipv6-icmp          [::]:*                  7
raw6       0      0 [::]:ipv6-icmp          [::]:*                  7
Active UNIX domain sockets (servers and established)
```

Use a command to display the statistics of a network

The `netstat` command displays active TCP connections, ports on which the computer is listening, Ethernet statistics, the IP routing table, IPv4 statistics (for the IP, ICMP, TCP, and UDP protocols), and IPv6 statistics (for the IPv6, ICMPv6, TCP over IPv6, and UDP over IPv6 protocols). Used without parameters, this command displays active TCP connections.

```
➜  ~ netstat --statistics
Ip:
    Forwarding: 2
    429499 total packets received
    171 with invalid addresses
    0 forwarded
    0 incoming packets discarded
    404343 incoming packets delivered
    353995 requests sent out
    695 dropped because of missing route
Icmp:
    47 ICMP messages received
    0 input ICMP message failed
    ICMP input histogram:
        destination unreachable: 13
        timeout in transit: 13
        echo requests: 6
        echo replies: 15
    496 ICMP messages sent
    0 ICMP messages failed
    OutRateLimitHost: 35
    ICMP output histogram:
        destination unreachable: 460
        echo requests: 30
        echo replies: 6
IcmpMsg:
        InType0: 15
        InType3: 13
        InType8: 6
        InType11: 13
        OutType0: 6
        OutType3: 460
        OutType8: 30
Tcp:
    5351 active connection openings
    12 passive connection openings
    66 failed connection attempts
    103 connection resets received
    14 connections established
    466368 segments received
    390587 segments sent out
    3579 segments retransmitted
```

Run the `arp` command. Check the result and explain the role of `arp`

The ARP(Address Resolution Protocol) is used to find the MAC address for a given IPv4 address. The `arp` command can manipulate the kernel's IPv4 network neighbor cache.

The `arp -v` option displays the verbose output

```
→  ~ arp -v
Address                     HWtype  HWaddress           Flags Mask          Iface
_gateway                    ether   40:b9:3c:ba:88:73   C                   eno1
Entries: 1      Skipped: 0      Found: 1
```

The `arp --numeric` option shows the numeric addresses

```
→  ~ arp --numeric
Address                     HWtype  HWaddress           Flags Mask          Iface
172.16.4.1                  ether   40:b9:3c:ba:88:73   C                   eno1
```

The `arp -a` option displays in the BSD style format

```
→  ~ arp -a
_gateway (172.16.4.1) at 40:b9:3c:ba:88:73 [ether] on eno1
```

The `arp -e` option displays in the Linux format

```
→  ~ arp -e
Address                     HWtype  HWaddress           Flags Mask          Iface
_gateway                    ether   40:b9:3c:ba:88:73   C                   eno1
```

Use command `ifconfig`. Check the result and discuss the role of `ifconfig`

It is a tool for configuring and displaying the status of all the network interfaces in Linux

```
➜  ~ ifconfig
eno1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 172.16.4.46  netmask 255.255.255.0  broadcast 172.16.4.255
        inet6 fe80::c2bd:8e0f:38c:555b  prefixlen 64  scopeid 0x20<link>
        ether 5c:60:ba:c1:28:cb  txqueuelen 1000  (Ethernet)
        RX packets 352308  bytes 298038524 (284.2 MiB)
        RX errors 0  dropped 4405  overruns 0  frame 0
        TX packets 313395  bytes 39210660 (37.3 MiB)
        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 188  bytes 27886 (27.2 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 188  bytes 27886 (27.2 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

The `ifconfig -a` displays all the interfaces, even those that are down

```
→ ~ ifconfig -a
eno1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 172.16.4.46  netmask 255.255.255.0  broadcast 172.16.4.255
        inet6 fe80::c2bd:8e0f:38c:555b  prefixlen 64  scopeid 0x20<link>
        ether 5c:60:ba:c1:28:cb  txqueuelen 1000  (Ethernet)
        RX packets 352986  bytes 298446439 (284.6 MiB)
        RX errors 0  dropped 4420  overruns 0  frame 0
        TX packets 314131  bytes 39472700 (37.6 MiB)
        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 188  bytes 27886 (27.2 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 188  bytes 27886 (27.2 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

wlan0: flags=4098<BROADCAST,MULTICAST>  mtu 1500
        ether 3e:92:de:ba:23:09  txqueuelen 1000  (Ethernet)
        RX packets 538983  bytes 549661218 (524.1 MiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 274485  bytes 46770530 (44.6 MiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

The `ifconfig -s` command displays a small list.

```
→ ~ ifconfig -s
Iface      MTU      RX-OK RX-ERR RX-DRP RX-OVR    TX-OK TX-ERR TX-DRP TX-OVR Flg
eno1            1500   354167      0   4438 0       315160      0      0      0 BMRU
lo             65536      188      0      0 0          188      0      0      0 LRU
```

The `ifconfig -v` shows a verbose output.

```
→ ~ ifconfig -v
eno1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 172.16.4.46  netmask 255.255.255.0  broadcast 172.16.4.255
        inet6 fe80::c2bd:8e0f:38c:555b  prefixlen 64  scopeid 0x20<link>
        ether 5c:60:ba:c1:28:cb  txqueuelen 1000  (Ethernet)
        RX packets 354817  bytes 299765812 (285.8 MiB)
        RX errors 0  dropped 4459  overruns 0  frame 0
        TX packets 315905  bytes 39893333 (38.0 MiB)
        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 188  bytes 27886 (27.2 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 188  bytes 27886 (27.2 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

Use the `nslookup` command. Check the result and explain the role of nslookup

It is a program to get the DNS records of a website.


```
→ ~ nslookup google.com
Server:         127.0.0.53
Address:        127.0.0.53#53

Non-authoritative answer:
Name:    google.com
Address: 142.250.207.206
Name:    google.com
Address: 2404:6800:4002:82e::200e
```

Use the `tracepath` command. Check the result and explain the role of nslookup

This command traces a path from the source to destination and displays the MTU(maximum transmission unit)

```
→  ~ tracepath -n google.com
 1?: [LOCALHOST]                        pmtu 1500
 1:  no reply
 2:  no reply
 3:  150.129.111.113                                    3.140ms
 4:  10.200.30.2                                        6.060ms
 5:  10.220.220.1                                       8.088ms
 6:  10.102.102.5                                      46.980ms
 7:  74.125.48.252                                     46.095ms asymm  8
 8:  no reply
 9:  no reply
10:  no reply
11:  no reply
12:  no reply
13:  no reply
14:  no reply
15:  no reply
16:  no reply
17:  no reply
18:  no reply
19:  no reply
20:  no reply
21:  no reply
22:  no reply
23:  no reply
24:  no reply
25:  no reply
26:  no reply
27:  no reply
28:  no reply
29:  no reply
30:  no reply
     Too many hops: pmtu 1500
     Resume: pmtu 1500
```