KANDRA KSHEERAJ **19BCE0829**

CSE 1004 – Network and Communication

SLOT: L47+L48

Faculty: SRIMATHI C mam

LAB Digital Assignment- 1

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STUDY OF NETWORKING HARDWARE

- **HUB**

A hub is a physical layer networking device which is used to connect multiple devices in a network.
A small rectangular box that joins computers together through ports on the back of the hub.
It receives data packets and passes on all the Information it receives to all the other computers connected to the hub.

S.no	Image	Manufacturer	Cost	Specifications
1	iBall Paino 423 	iBall	₹ 429	-High speed USB 4 port Hub -Slim design with Piano finish -Compact design with strong rubber foot pad -Data transfer rate up to 480 Mbps -Keep everything connected - 16 x 11.99 x 2.79 cm - 82 Grams

2	D-Link Dub-H7 	D-Link	₹ 13,492	-7-Port -USB 2.0 - 9.93 x 5.74 x 2.59 cm -340.19 Grams - 802.11bgn
3	Moxa UPort 407 	Moxa	₹ 2,299	-12 Mbps, 480 Mbps speed -USB Type B -80 x 35 x 130 mm -12 to 40 VDC
4	Smartcraft 11186 USB Hub 	powerglow	₹ 350	-number of ports 3 - colours Blue, Black, red and White
5	Belkin F4U021bt 	Belkin	₹ 600	-4 USB Ports -9.5 x 3.1 x 1.5 cm; 27.22 Grams -Mac/PC compatible

6	Netgear EN104TP 	Netgear	₹ 6750	-4-Port -3.7 x 4 x 1.1 inches -10Mbps data transfer

- **SWITCH**

Switches work about the same way as hubs. Unlike hubs, switches can identify the destination of a packet.
send and retrieve information at the same time which makes sending information faster to retrieve than hubs.

S.no	Image	Manufacturer	Cost	Specifications
1	TP-Link TL-SG105E 	TP-Link	₹ 1,499	-5 Port Gigabit Switch 9.91 x 9.91 x 2.54 cm -290 Grams -Data transfer rate is 1 Gigabits Per Second -Support QoS, Vlan, IGMP and Link Aggregation

2	Netgear GS116LP 	Netgear	₹ 18,600	-Number of Ethernet ports 16 -10.16 x 28.7 x 2.54 cm -Speed 100 Mbps
3	Tenda SG108 	Tenda	₹ 1,699	-8-Port -8.99 x 2.39 x 14.2 cm - Data transfer rate is 1000 Megabits Per Second - 159 g
4	Mercusys MS108 	Mercusys	₹ 519	- 8-Port - 12.7 x 6 x 2.2 cm - 0.35 Grams - 100Mbps - auto MDI/MDIX supported

5	Cisco SG250-10P Smart Switch 	Cisco	₹ 13,903	- 10 Ports - 17 x 28 x 3.6 cm - 1.2 Kilograms - 2 Gigabit Ethernet Combo SFP
6	D-Link DGS 1005A 	D-Link	₹ 1,394	- 5-port - 12 x 10.2 x 8.2 cm - 220 Grams - 100 Mbps

- **ROUTER**

A specialized computer programmed to interface between different networks.

Routers connect computers and other devices to the Internet.

A router acts as a dispatcher, choosing the best route for your information to travel.

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S.no	Image	Manufacturer	Cost	Specifications
1	D-Link DSL-2730U 	D-Link	₹ 1,349	-Input Type RJ-11 (Ethernet Cable) supported by ISPs -High-speed ADSL2 + internet connection High - 11.6 x 3.7 x 19.5 cm; 137 Grams - 802.11n
2	Mi Smart Router 4C 	Mi	₹ 999	- 300 Mbps - 29 x 20 x 5.5 cm; 460 Grams - 2.4 GHz Radio Frequency - 802.11n
3	ASUS RT-AC53 	Asus	₹ 2,999	- Dual Band Gigabit - 20.5 x 7.3 x 32.5 cm - 710 Grams - 3 Ethernet ports

4	JIO M2 Wireless 	Reliance	₹ 1,999	-150 Mbps download speed, 50 Mbps upload speed -4 Gb ROM and 2Gb RAM
5	INTEX N30 	INTEX	₹ 1300	- 300Mbps wireless speed - 28 x 21.8 x 7.4 cm; 130 Grams - Wireless type 802.11n, 802.11b, 802.11g
6	iBall Baton iB-WRD12EN 	iBall	₹ 1600	-Dual band AC technology (2.4GHz + 5GHz) -1200 Mbps -17 x 17 x 2.4 cm; 660 Grams - Wireless type 5 GHz Radio Frequency, 802.11ac, 2.4 GHz Radio Frequency

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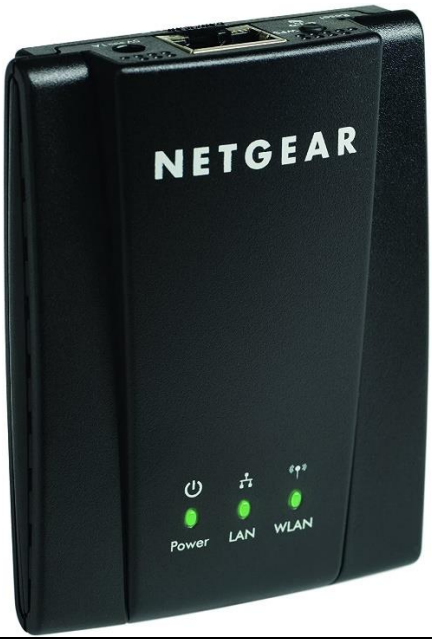
- **BRIDGE**

A hardware device used to create a connection between two separate computer networks or to divide one network into two. Bridges are networking devices that connect networks. Sometimes it is necessary to divide networks into subnets to reduce the amount of traffic on each larger subnet or for security reasons.

S.no	Image	Manufacturer	Cost	Specifications
1	IOGEAR GPLB200K Nano Ethernet Bridge 	IOGEAR	₹ 6,500	- 2.21 x 4.45 x 6.65 cm; 45.36 Grams -7200 range
2	NETGEAR WNCE2001 Ethernet to Wireless Adapter - Bridge 	NETGEAR	₹ 1,16,38	- 802.11b/g/n - 16 x 13 x 5.21 cm; 58.97 Grams - 4 GB RAM

3	Comtrend PG-9172PoE Ethernet Bridge Adapter 	Comtrend	₹ 12,551	- 9.4 x 6.1 x 4.06 cm; 270 Grams - POE Cameras and Access Points - with Power Over Ethernet - 1200 Mbps
4	LinkStyle Wireless Wifi Bridge Dongle 	LinkStyle	₹ 5,587	- 300mbps - 15.24 x 2.54 x 2.54 cm; 93 Grams - Convert RJ45 Ethernet Port to Wireless/WiFi Dongle - High Power Wifi Hotspot Extender Amplifier

5	axGear Network LAN Bridge 	axGear	₹ 1275	- 5.8 x 4.3 x 1.2 inches - 2.4Ghz -IEEE 802.11b/g/n compliant -100M transmission distance - 300Mbps transmission rate
6	Linksys WET610N Dual-Band Wireless-N Ethernet Bridge 	Linksys	₹ 13000	-LAN connections -8.58 x 6.38 x 3.62 inches -one ethernet port Connection -supports old A/V Components - Dual-Band -wireless

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- **GATEWAY**

A communication device that provides a remote network with connectivity to the host network.
Is a piece of networking hardware used in telecommunications for telecommunications networks that allows data to flow from one discrete network to another.

S.no	Image	Manufacturer	Cost	Specifications
1	Advantech WISE-3310-D100L1E 	Advantech	₹ 30750	-Wireless IoT Mesh Network Gateway -250Kbps data rate -Minimum Operating Temperature 0 C - Maximum Operating Temperature 40 C
2	Laird RG186	Laird	₹ 20,325	-Wireless Frequency 2.4GHz/5GHz IP67 -1 Port

				-Minimum Operating Temperature -30 C - Maximum Operating Temperature 70 C
3	Digi International X4-Z1U-B201-A 	Digi International	₹ 21750	-Cellular type 3G -wireless frequency 850MHz/900MHz /1700MHz/ 1900MHz/2100MHz -Data Rate10Mbps/100 Mbps UDP/TCP/DHCP/ SNMP -v1/v2 Port -Minimum Operating Temperature -30C - Maximum Operating Temperature 75C

4	Siemens IOT2040 	Siemens	₹ 31,033	-Intel Quark x1020(x86 400 MHz) -DDR3 RAM,SRAM -USB 2.0 -2 COM ports -Minimum Operating Temperature 0 C - Maximum Operating Temperature 50 C
5	Ubiquiti US-8-60W 	Ubiquiti	₹ 9,900	-Dual-Core 500 MHz Processor -2GB On-Board Flash Memory -1 x RJ-45 Serial Console Port -3 x Gigabit Ethernet Ports
6	Teltonika TRB140 	Teltonika	₹ 10,870	-LTE CAT4 Gateway Board RJ45 – Board -LAN(10/100 Mbps) -single Ethernet port -SMS control, firewall, open VPN, IPsec, RMS and FOTA support

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STUDY OF NETWORK COMMANDS

1. **IPCONFIG**- The IP Configuration window configures the Internet Protocol parameters, allowing the device to receive and send IP packets.

Ipconfig

ifconfig (interface configurator) command is use to initialize an interface, assign, configure IP Address to interface and enable or disable interface on demand. With this command you can view IP Address and Hardware / MAC address assign to interface and also MTU (Maximum transmission unit) size.

```
C:\vit\kandra ksheeraj>ipconfig

Windows IP Configuration


Ethernet adapter VirtualBox Host-Only Network:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::4807:a1b7:150c:3c56%25
   IPv4 Address. . . . . . . . . . . : 192.168.56.1
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . :

Wireless LAN adapter Local Area Connection* 2:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Wireless LAN adapter Local Area Connection* 11:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Ethernet adapter Ethernet 2:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Ethernet adapter Ethernet 7:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
```

ipconfig /all -Syntax IPCONFIG /all Display full configuration information Show detailed information

```
C:\vit\kandra ksheeraj>ipconfig /all

Windows IP Configuration

   Host Name . . . . . . . . . . . . : DESKTOP-VDPV273
   Primary Dns Suffix  . . . . . . . :
   Node Type . . . . . . . . . . . . : Hybrid
   IP Routing Enabled. . . . . . . . : No
   WINS Proxy Enabled. . . . . . . . : No

Ethernet adapter VirtualBox Host-Only Network:

   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : VirtualBox Host-Only Ethernet Adapter
   Physical Address. . . . . . . . . : 0A-00-27-00-00-19
   DHCP Enabled. . . . . . . . . . . : No
   Autoconfiguration Enabled . . . . : Yes
   Link-local IPv6 Address . . . . . : fe80::4807:a1b7:150c:3c56%25(Preferred)
   IPv4 Address. . . . . . . . . . . : 192.168.56.1(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . :
   DHCPv6 IAID . . . . . . . . . . . : 168427559
   DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-1F-8A-B9-3B-A4-02-B9-53-68-26
   DNS Servers . . . . . . . . . . . : fec0:0:0:ffff::1%1
                                       fec0:0:0:ffff::2%1
                                       fec0:0:0:ffff::3%1
   NetBIOS over Tcpip. . . . . . . . : Enabled

Wireless LAN adapter Local Area Connection* 2:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Microsoft Wi-Fi Direct Virtual Adapter
   Physical Address. . . . . . . . . : A4-02-B9-53-68-27
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
```

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ipconfig /allcompartments – Show information about all compartments

```
C:\vit\kandra ksheeraj>ipconfig /allcompartments

Windows IP Configuration


============================================================================
Network Information for Compartment 1 (ACTIVE)
============================================================================

Ethernet adapter VirtualBox Host-Only Network:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::4807:a1b7:150c:3c56%25
   IPv4 Address. . . . . . . . . . . : 192.168.56.1
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . :

Wireless LAN adapter Local Area Connection* 2:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Wireless LAN adapter Local Area Connection* 11:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Ethernet adapter Ethernet 2:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Ethernet adapter Ethernet 7:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
```

ipconfig /allcompartments /all Show detailed information about all compartments

```
C:\vit\kandra ksheeraj>ipconfig /allcompartments /all

Windows IP Configuration


============================================================================
Network Information for Compartment 1 (ACTIVE)
============================================================================
   Host Name . . . . . . . . . . . . : DESKTOP-VDPV273
   Primary Dns Suffix  . . . . . . . :
   Node Type . . . . . . . . . . . . : Hybrid
   IP Routing Enabled. . . . . . . . : No
   WINS Proxy Enabled. . . . . . . . : No

Ethernet adapter VirtualBox Host-Only Network:

   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : VirtualBox Host-Only Ethernet Adapter
   Physical Address. . . . . . . . . : 0A-00-27-00-00-19
   DHCP Enabled. . . . . . . . . . . : No
   Autoconfiguration Enabled . . . . : Yes
   Link-local IPv6 Address . . . . . : fe80::4807:a1b7:150c:3c56%25(Preferred)
   IPv4 Address. . . . . . . . . . . : 192.168.56.1(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . :
   DHCPv6 IAID . . . . . . . . . . . : 168427559
   DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-1F-8A-B9-3B-A4-02-B9-53-68-26
   DNS Servers . . . . . . . . . . . : fec0:0:0:ffff::1%1
                                       fec0:0:0:ffff::2%1
                                       fec0:0:0:ffff::3%1
   NetBIOS over Tcpip. . . . . . . . : Enabled
```

2. ARP

Displays and modifies the IP-to-Physical address translation tables used by address resolution protocol (ARP).

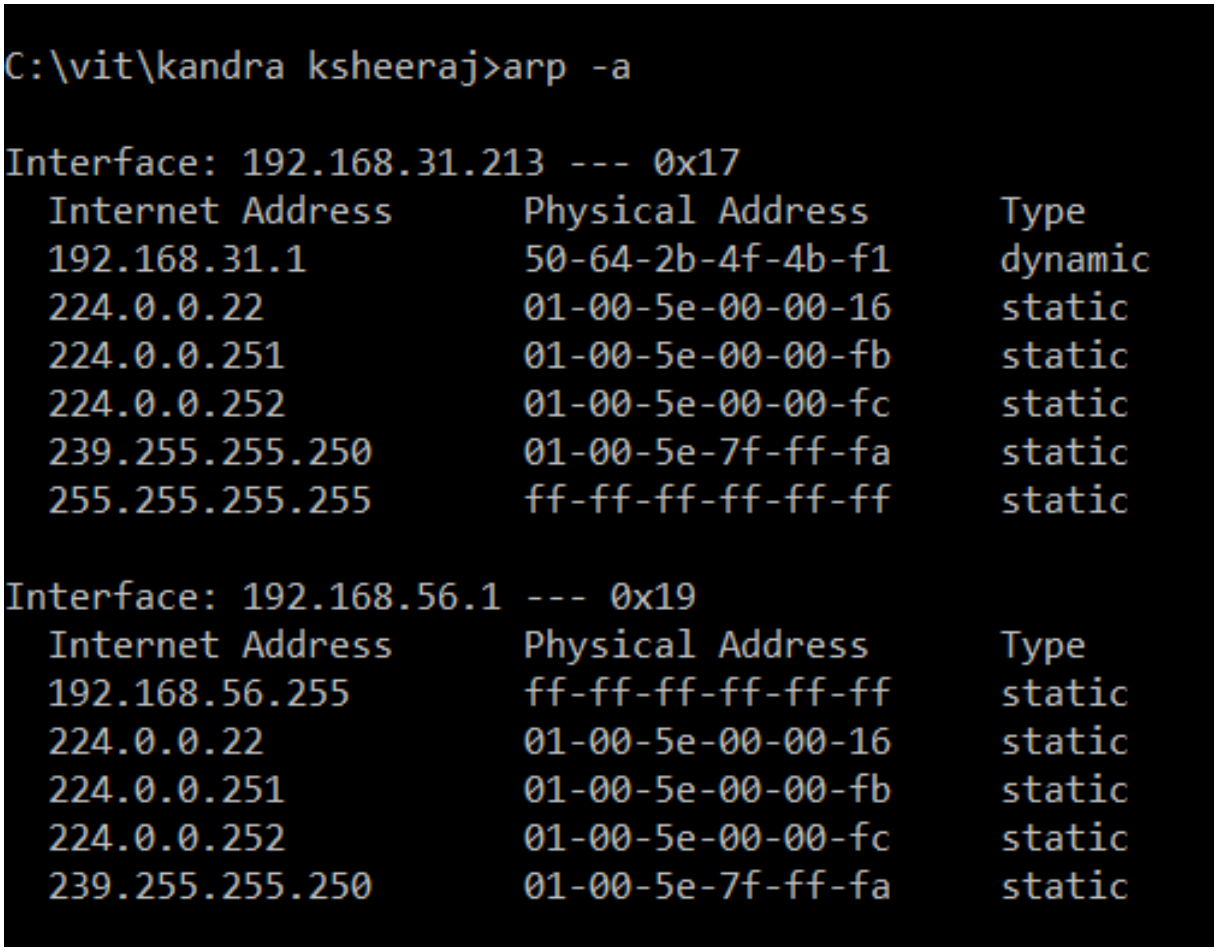
arp

It is useful to view / add the contents of the kernel's ARP tables.

```
C:\vit\kandra ksheeraj>arp

Displays and modifies the IP-to-Physical address translation tables used by
address resolution protocol (ARP).

ARP -s inet_addr eth_addr [if_addr]
ARP -d inet_addr [if_addr]
ARP -a [inet_addr] [-N if_addr] [-v]

  -a            Displays current ARP entries by interrogating the current
                protocol data.  If inet_addr is specified, the IP and Physical
                addresses for only the specified computer are displayed.  If
                more than one network interface uses ARP, entries for each ARP
                table are displayed.
  -g            Same as -a.
  -v            Displays current ARP entries in verbose mode.  All invalid
                entries and entries on the loop-back interface will be shown.
  inet_addr     Specifies an internet address.
  -N if_addr    Displays the ARP entries for the network interface specified
                by if_addr.
  -d            Deletes the host specified by inet_addr. inet_addr may be
                wildcarded with * to delete all hosts.
  -s            Adds the host and associates the Internet address inet_addr
                with the Physical address eth_addr.  The Physical address is
                given as 6 hexadecimal bytes separated by hyphens. The entry
                is permanent.
  eth_addr      Specifies a physical address.
  if_addr       If present, this specifies the Internet address of the
                interface whose address translation table should be modified.
                If not present, the first applicable interface will be used.
Example:
  > arp -s 157.55.85.212   00-aa-00-62-c6-09  .... Adds a static entry.
  > arp -a                                    .... Displays the arp table.
```

arp -a It displays address resolution protocol table(IP->phy address)4th layer)

Displays current ARP entries by interrogating the current protocol data. If inet_addr is specified, the IP and Physical addresses for only the specified computer are displayed. If more than one network interface uses ARP, entries for each ARP table are displayed.



arp -g Same as -a

```
C:\vit\kandra ksheeraj>arp -g

Interface: 192.168.31.213 --- 0x17
  Internet Address      Physical Address      Type
  192.168.31.1          50-64-2b-4f-4b-f1     dynamic
  224.0.0.22            01-00-5e-00-00-16     static
  224.0.0.251           01-00-5e-00-00-fb     static
  224.0.0.252           01-00-5e-00-00-fc     static
  239.255.255.250       01-00-5e-7f-ff-fa     static
  255.255.255.255       ff-ff-ff-ff-ff-ff     static

Interface: 192.168.56.1 --- 0x19
  Internet Address      Physical Address      Type
  192.168.56.255        ff-ff-ff-ff-ff-ff     static
  224.0.0.22            01-00-5e-00-00-16     static
  224.0.0.251           01-00-5e-00-00-fb     static
  224.0.0.252           01-00-5e-00-00-fc     static
  239.255.255.250       01-00-5e-7f-ff-fa     static
```

3. **NETSTAT** (active connections with system)

   it will tell us what the status of ports are ie. open, closed, waiting connections. It is used to display the TCP/IP network protocol statistics and information.

netstat

(Network Statistic) command display connection info, routing table information etc.

```
C:\vit\kandra ksheeraj>netstat

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    127.0.0.1:4767         support:49834          ESTABLISHED
  TCP    127.0.0.1:5354         support:49669          ESTABLISHED
  TCP    127.0.0.1:5354         support:49670          ESTABLISHED
  TCP    127.0.0.1:49669        support:5354           ESTABLISHED
  TCP    127.0.0.1:49670        support:5354           ESTABLISHED
  TCP    127.0.0.1:49673        support:49675          ESTABLISHED
  TCP    127.0.0.1:49674        support:49677          ESTABLISHED
  TCP    127.0.0.1:49675        support:49673          ESTABLISHED
  TCP    127.0.0.1:49676        support:49679          ESTABLISHED
  TCP    127.0.0.1:49677        support:49674          ESTABLISHED
  TCP    127.0.0.1:49678        support:49680          ESTABLISHED
  TCP    127.0.0.1:49679        support:49676          ESTABLISHED
  TCP    127.0.0.1:49680        support:49678          ESTABLISHED
  TCP    127.0.0.1:49728        support:49773          ESTABLISHED
  TCP    127.0.0.1:49773        support:49728          ESTABLISHED
  TCP    127.0.0.1:49834        support:4767           ESTABLISHED
  TCP    127.0.0.1:49974        support:49975          ESTABLISHED
  TCP    127.0.0.1:49975        support:49974          ESTABLISHED
  TCP    127.0.0.1:50374        support:50375          ESTABLISHED
  TCP    127.0.0.1:50375        support:50374          ESTABLISHED
  TCP    127.0.0.1:54131        support:54132          ESTABLISHED
  TCP    127.0.0.1:54132        support:54131          ESTABLISHED
  TCP    192.168.31.213:20080   DESKTOP-VDPV273:60428  ESTABLISHED
  TCP    192.168.31.213:20080   DESKTOP-VDPV273:60467  ESTABLISHED
  TCP    192.168.31.213:20080   DESKTOP-VDPV273:60471  ESTABLISHED
  TCP    192.168.31.213:20080   DESKTOP-VDPV273:60473  ESTABLISHED
  TCP    192.168.31.213:20080   DESKTOP-VDPV273:60474  ESTABLISHED
  TCP    192.168.31.213:20080   DESKTOP-VDPV273:60475  ESTABLISHED
  TCP    192.168.31.213:20080   DESKTOP-VDPV273:60483  ESTABLISHED
  TCP    192.168.31.213:20080   DESKTOP-VDPV273:60489  ESTABLISHED
  TCP    192.168.31.213:20080   DESKTOP-VDPV273:60491  ESTABLISHED
  TCP    192.168.31.213:20080   DESKTOP-VDPV273:60493  ESTABLISHED
  TCP    192.168.31.213:20080   DESKTOP-VDPV273:60494  ESTABLISHED
  TCP    192.168.31.213:20080   DESKTOP-VDPV273:60497  ESTABLISHED
  TCP    192.168.31.213:20080   DESKTOP-VDPV273:60499  ESTABLISHED
  TCP    192.168.31.213:20080   DESKTOP-VDPV273:60500  ESTABLISHED
  TCP    192.168.31.213:20080   DESKTOP-VDPV273:60503  ESTABLISHED
  TCP    192.168.31.213:20080   DESKTOP-VDPV273:60505  ESTABLISHED
  TCP    192.168.31.213:20080   DESKTOP-VDPV273:60507  ESTABLISHED
  TCP    192.168.31.213:20080   DESKTOP-VDPV273:60509  ESTABLISHED
  TCP    192.168.31.213:20080   DESKTOP-VDPV273:60511  ESTABLISHED
  TCP    192.168.31.213:20080   DESKTOP-VDPV273:60519  ESTABLISHED
  TCP    192.168.31.213:20080   DESKTOP-VDPV273:60521  ESTABLISHED
  TCP    192.168.31.213:20080   DESKTOP-VDPV273:60525  ESTABLISHED
```

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netstat ?

Displays protocol statistics and current TCP/IP network connections

```
C:\vit\kandra ksheeraj>netstat ?

Displays protocol statistics and current TCP/IP network connections.

NETSTAT [-a] [-b] [-e] [-f] [-n] [-o] [-p proto] [-r] [-s] [-x] [-t] [interval]

  -a            Displays all connections and listening ports.
  -b            Displays the executable involved in creating each connection or
                listening port. In some cases well-known executables host
                multiple independent components, and in these cases the
                sequence of components involved in creating the connection
                or listening port is displayed. In this case the executable
                name is in [] at the bottom, on top is the component it called,
                and so forth until TCP/IP was reached. Note that this option
                can be time-consuming and will fail unless you have sufficient
                permissions.
  -e            Displays Ethernet statistics. This may be combined with the -s
                option.
  -f            Displays Fully Qualified Domain Names (FQDN) for foreign
                addresses.
  -n            Displays addresses and port numbers in numerical form.
  -o            Displays the owning process ID associated with each connection.
  -p proto      Shows connections for the protocol specified by proto; proto
                may be any of: TCP, UDP, TCPv6, or UDPv6.  If used with the -s
                option to display per-protocol statistics, proto may be any of:
                IP, IPv6, ICMP, ICMPv6, TCP, TCPv6, UDP, or UDPv6.
  -q            Displays all connections, listening ports, and bound
                nonlistening TCP ports. Bound nonlistening ports may or may not
                be associated with an active connection.
  -r            Displays the routing table.
  -s            Displays per-protocol statistics.  By default, statistics are
                shown for IP, IPv6, ICMP, ICMPv6, TCP, TCPv6, UDP, and UDPv6;
                the -p option may be used to specify a subset of the default.
  -t            Displays the current connection offload state.
  -x            Displays NetworkDirect connections, listeners, and shared
                endpoints.
  -y            Displays the TCP connection template for all connections.
                Cannot be combined with the other options.
  interval      Redisplays selected statistics, pausing interval seconds
                between each display.  Press CTRL+C to stop redisplaying
                statistics.  If omitted, netstat will print the current
                configuration information once.
```

netstat -r (routing table)

To displays routing table information

```
C:\vit\kandra ksheeraj>netstat -r
===========================================================================
Interface List
 25...0a 00 27 00 00 19 ......VirtualBox Host-Only Ethernet Adapter
  8...a4 02 b9 53 68 27 ......Microsoft Wi-Fi Direct Virtual Adapter
 13...a6 02 b9 53 68 26 ......Microsoft Wi-Fi Direct Virtual Adapter #2
 10...00 ff 61 de b4 69 ......Kaspersky Security Data Escort Adapter
 24...00 ff ea b7 7f 92 ......Kaspersky Security Data Escort Adapter #2
 23...a4 02 b9 53 68 26 ......Intel(R) Dual Band Wireless-AC 7265
 20...a4 02 b9 53 68 2a ......Bluetooth Device (Personal Area Network)
  1...........................Software Loopback Interface 1
===========================================================================

IPv4 Route Table
===========================================================================
Active Routes:
Network Destination        Netmask          Gateway       Interface  Metric
          0.0.0.0          0.0.0.0    192.168.31.1   192.168.31.213     50
        127.0.0.0        255.0.0.0         On-link         127.0.0.1    331
        127.0.0.1  255.255.255.255         On-link         127.0.0.1    331
  127.255.255.255  255.255.255.255         On-link         127.0.0.1    331
     192.168.31.0    255.255.255.0         On-link    192.168.31.213    306
   192.168.31.213  255.255.255.255         On-link    192.168.31.213    306
   192.168.31.255  255.255.255.255         On-link    192.168.31.213    306
     192.168.56.0    255.255.255.0         On-link      192.168.56.1    281
     192.168.56.1  255.255.255.255         On-link      192.168.56.1    281
   192.168.56.255  255.255.255.255         On-link      192.168.56.1    281
        224.0.0.0        240.0.0.0         On-link         127.0.0.1    331
        224.0.0.0        240.0.0.0         On-link      192.168.56.1    281
        224.0.0.0        240.0.0.0         On-link    192.168.31.213    306
  255.255.255.255  255.255.255.255         On-link         127.0.0.1    331
  255.255.255.255  255.255.255.255         On-link      192.168.56.1    281
  255.255.255.255  255.255.255.255         On-link    192.168.31.213    306
===========================================================================
Persistent Routes:
  None

IPv6 Route Table
===========================================================================
Active Routes:
 If Metric Network Destination      Gateway
  1    331 ::1/128                  On-link
 25    281 fe80::/64                On-link
 23    306 fe80::/64                On-link
 25    281 fe80::4807:a1b7:150c:3c56/128
                                    On-link
 23    306 fe80::d561:8cd5:d174:7acb/128
                                    On-link
  1    331 ff00::/8                 On-link
 25    281 ff00::/8                 On-link
```

netstat -a

all the active connections from different states

```
C:\vit\kandra ksheeraj>netstat -a

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    0.0.0.0:135            DESKTOP-VDPV273:0      LISTENING
  TCP    0.0.0.0:445            DESKTOP-VDPV273:0      LISTENING
  TCP    0.0.0.0:1521           DESKTOP-VDPV273:0      LISTENING
  TCP    0.0.0.0:2343           DESKTOP-VDPV273:0      LISTENING
  TCP    0.0.0.0:3580           DESKTOP-VDPV273:0      LISTENING
  TCP    0.0.0.0:5040           DESKTOP-VDPV273:0      LISTENING
  TCP    0.0.0.0:7680           DESKTOP-VDPV273:0      LISTENING
  TCP    0.0.0.0:8080           DESKTOP-VDPV273:0      LISTENING
  TCP    0.0.0.0:8081           DESKTOP-VDPV273:0      LISTENING
  TCP    0.0.0.0:20080          DESKTOP-VDPV273:0      LISTENING
  TCP    0.0.0.0:49664          DESKTOP-VDPV273:0      LISTENING
  TCP    0.0.0.0:49665          DESKTOP-VDPV273:0      LISTENING
  TCP    0.0.0.0:49666          DESKTOP-VDPV273:0      LISTENING
  TCP    0.0.0.0:49667          DESKTOP-VDPV273:0      LISTENING
  TCP    0.0.0.0:49668          DESKTOP-VDPV273:0      LISTENING
  TCP    0.0.0.0:49687          DESKTOP-VDPV273:0      LISTENING
  TCP    0.0.0.0:49688          DESKTOP-VDPV273:0      LISTENING
  TCP    0.0.0.0:49689          DESKTOP-VDPV273:0      LISTENING
  TCP    0.0.0.0:49690          DESKTOP-VDPV273:0      LISTENING
  TCP    0.0.0.0:49691          DESKTOP-VDPV273:0      LISTENING
  TCP    0.0.0.0:49775          DESKTOP-VDPV273:0      LISTENING
  TCP    0.0.0.0:49787          DESKTOP-VDPV273:0      LISTENING
  TCP    0.0.0.0:59110          DESKTOP-VDPV273:0      LISTENING
  TCP    0.0.0.0:59111          DESKTOP-VDPV273:0      LISTENING
  TCP    127.0.0.1:4767         DESKTOP-VDPV273:0      LISTENING
  TCP    127.0.0.1:4767         support:49834          ESTABLISHED
  TCP    127.0.0.1:5354         DESKTOP-VDPV273:0      LISTENING
  TCP    127.0.0.1:5354         support:49669          ESTABLISHED
  TCP    127.0.0.1:5354         support:49670          ESTABLISHED
  TCP    127.0.0.1:5939         DESKTOP-VDPV273:0      LISTENING
  TCP    127.0.0.1:7080         DESKTOP-VDPV273:0      LISTENING
  TCP    127.0.0.1:15292        DESKTOP-VDPV273:0      LISTENING
  TCP    127.0.0.1:15393        DESKTOP-VDPV273:0      LISTENING
  TCP    127.0.0.1:16494        DESKTOP-VDPV273:0      LISTENING
  TCP    127.0.0.1:27015        DESKTOP-VDPV273:0      LISTENING
  TCP    127.0.0.1:27017        DESKTOP-VDPV273:0      LISTENING
  TCP    127.0.0.1:45623        DESKTOP-VDPV273:0      LISTENING
  TCP    127.0.0.1:49669        support:5354           ESTABLISHED
  TCP    127.0.0.1:49670        support:5354           ESTABLISHED
  TCP    127.0.0.1:49671        DESKTOP-VDPV273:0      LISTENING
  TCP    127.0.0.1:49673        support:49675          ESTABLISHED
  TCP    127.0.0.1:49674        support:49677          ESTABLISHED
  TCP    127.0.0.1:49675        support:49673          ESTABLISHED
  TCP    127.0.0.1:49676        support:49679          ESTABLISHED
  TCP    127.0.0.1:49677        support:49674          ESTABLISHED
```

netstat -e Displays Ethernet statistics. This may be combined with the -s option.

```
C:\vit\kandra ksheeraj>netstat -e
Interface Statistics

                           Received            Sent

Bytes                    1688607865       121038456
Unicast packets             1215634          247331
Non-unicast packets               0            2835
Discards                          0               0
Errors                            0               0
Unknown protocols                 0
```

netstat -f Displays Fully Qualified Domain Names (FQDN) for foreign addresses.

```
C:\vit\kandra ksheeraj>netstat -f

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    127.0.0.1:4767         support.wondershare.net:49834  ESTABLISHED
  TCP    127.0.0.1:5354         support.wondershare.net:49669  ESTABLISHED
  TCP    127.0.0.1:5354         support.wondershare.net:49670  ESTABLISHED
  TCP    127.0.0.1:49669        support.wondershare.net:5354   ESTABLISHED
  TCP    127.0.0.1:49670        support.wondershare.net:5354   ESTABLISHED
  TCP    127.0.0.1:49673        support.wondershare.net:49675  ESTABLISHED
  TCP    127.0.0.1:49674        support.wondershare.net:49677  ESTABLISHED
  TCP    127.0.0.1:49675        support.wondershare.net:49673  ESTABLISHED
  TCP    127.0.0.1:49676        support.wondershare.net:49679  ESTABLISHED
  TCP    127.0.0.1:49677        support.wondershare.net:49674  ESTABLISHED
  TCP    127.0.0.1:49678        support.wondershare.net:49680  ESTABLISHED
  TCP    127.0.0.1:49679        support.wondershare.net:49676  ESTABLISHED
  TCP    127.0.0.1:49680        support.wondershare.net:49678  ESTABLISHED
  TCP    127.0.0.1:49728        support.wondershare.net:49773  ESTABLISHED
  TCP    127.0.0.1:49773        support.wondershare.net:49728  ESTABLISHED
  TCP    127.0.0.1:49834        support.wondershare.net:4767   ESTABLISHED
  TCP    127.0.0.1:49974        support.wondershare.net:49975  ESTABLISHED
  TCP    127.0.0.1:49975        support.wondershare.net:49974  ESTABLISHED
  TCP    127.0.0.1:50374        support.wondershare.net:50375  ESTABLISHED
  TCP    127.0.0.1:50375        support.wondershare.net:50374  ESTABLISHED
  TCP    127.0.0.1:54131        support.wondershare.net:54132  ESTABLISHED
  TCP    127.0.0.1:54132        support.wondershare.net:54131  ESTABLISHED
  TCP    192.168.31.213:20080   DESKTOP-VDPV273:60428  ESTABLISHED
  TCP    192.168.31.213:20080   DESKTOP-VDPV273:60467  ESTABLISHED
  TCP    192.168.31.213:20080   DESKTOP-VDPV273:60471  ESTABLISHED
  TCP    192.168.31.213:20080   DESKTOP-VDPV273:60473  ESTABLISHED
```

4. TRACERT

traceroute will show the route of a packet. It attempts to list the series of hosts through which our packets travel on their way to a given destination

traceroute is a network troubleshooting utility which shows number of hops taken to reach destination also determine packets traveling path. Below we are tracing route to global DNS server IP

tracert

Address and able to reach destination also shows path of that packet is traveling.

```
C:\vit\kandra ksheeraj>tracert

Usage: tracert [-d] [-h maximum_hops] [-j host-list] [-w timeout]
               [-R] [-S srcaddr] [-4] [-6] target_name

Options:
    -d                 Do not resolve addresses to hostnames.
    -h maximum_hops    Maximum number of hops to search for target.
    -j host-list       Loose source route along host-list (IPv4-only).
    -w timeout         Wait timeout milliseconds for each reply.
    -R                 Trace round-trip path (IPv6-only).
    -S srcaddr         Source address to use (IPv6-only).
    -4                 Force using IPv4.
    -6                 Force using IPv6.
```

tracert www.github.com

Each host will be displayed, along with the response times at each host.

```
C:\vit\kandra ksheeraj>tracert www.github.com

Tracing route to github.com [13.234.210.38]
over a maximum of 30 hops:

  1     1 ms    <1 ms     7 ms  XiaoQiang [192.168.31.1]
  2     3 ms     2 ms     2 ms  broadband.actcorp.in [49.205.0.1]
  3    15 ms    22 ms     *     broadband.actcorp.in [106.51.255.81]
  4   173 ms    82 ms    13 ms  broadband.actcorp.in [106.51.255.90]
  5    81 ms     8 ms    15 ms  broadband.actcorp.in [49.205.163.2]
  6     7 ms    15 ms    16 ms  broadband.actcorp.in [183.82.14.42]
  7    10 ms     8 ms     7 ms  99.83.69.114
  8    20 ms    13 ms    10 ms  150.222.219.128
  9     9 ms     8 ms    37 ms  150.222.219.137
 10     *        *        *     Request timed out.
 11    38 ms    39 ms    27 ms  150.222.246.114
 12     *        *        *     Request timed out.
 13    28 ms    50 ms    26 ms  52.95.67.100
 14    23 ms    26 ms    28 ms  52.95.64.232
 15    25 ms    36 ms    33 ms  52.95.64.233
 16    26 ms    25 ms    27 ms  52.95.67.109
 17    48 ms    31 ms    27 ms  52.95.65.151
 18     *        *        *     Request timed out.
 19     *        *        *     Request timed out.
 20     *        *        *     Request timed out.
 21     *        *        *     Request timed out.
```

Tracert -d Do not resolve addresses to hostnames.

```
C:\vit\kandra ksheeraj>tracert -d www.github.com

Tracing route to github.com [13.234.210.38]
over a maximum of 30 hops:

  1     1 ms     2 ms     1 ms  192.168.31.1
  2     3 ms     3 ms     3 ms  49.205.0.1
  3     *       38 ms    24 ms  106.51.255.81
  4     5 ms     4 ms     4 ms  106.51.255.90
  5     8 ms     7 ms     7 ms  49.205.163.2
  6    52 ms    27 ms    15 ms  183.82.14.42
  7     9 ms     7 ms    20 ms  99.83.69.114
  8    10 ms     7 ms     7 ms  150.222.219.128
  9     9 ms     8 ms    21 ms  150.222.219.137
 10     *        *        *     Request timed out.
 11    25 ms    24 ms    25 ms  150.222.246.114
 12     *        *        *     Request timed out.
 13    25 ms    24 ms     *     52.95.67.100
 14    24 ms    24 ms    24 ms  52.95.64.232
 15    30 ms    29 ms    25 ms  52.95.64.233
 16    29 ms    39 ms    27 ms  52.95.67.109
 17    24 ms    25 ms    25 ms  52.95.65.151
 18     *        *        *     Request timed out.
 19     *        *        *     Request timed out.
```

Tracert -4 Force using IPv4.

```
C:\vit\kandra ksheeraj>tracert -4  www.github.com

Tracing route to github.com [13.234.210.38]
over a maximum of 30 hops:

  1     1 ms    <1 ms    <1 ms  XiaoQiang [192.168.31.1]
  2     4 ms     3 ms     4 ms  broadband.actcorp.in [49.205.0.1]
  3   910 ms     *        *     broadband.actcorp.in [106.51.255.81]
  4   160 ms    20 ms     7 ms  broadband.actcorp.in [106.51.255.90]
  5    25 ms    38 ms     7 ms  broadband.actcorp.in [49.205.163.2]
  6    44 ms    20 ms    10 ms  broadband.actcorp.in [183.82.14.42]
  7     9 ms     7 ms     8 ms  99.83.69.114
  8    12 ms     8 ms     7 ms  150.222.219.128
  9     8 ms     9 ms     7 ms  150.222.219.137
 10     *        *        *     Request timed out.
 11    26 ms    24 ms    27 ms  150.222.246.114
 12     *        *        *     Request timed out.
 13    32 ms     *       31 ms  52.95.67.100
 14    27 ms    36 ms    39 ms  52.95.64.232
 15    26 ms    24 ms    38 ms  52.95.64.233
 16    26 ms    26 ms    27 ms  52.95.67.109
 17    25 ms    27 ms    25 ms  52.95.65.151
 18     *        *        *     Request timed out.
 19     *        *        *     Request timed out.
 20     *        *        *     Request timed out.
```

5. NSLOOKUP

returns the ipaddress of the given hostname and vice versa.
nslookup command also use to find out DNS related query

```
C:\vit\kandra ksheeraj>nslookup
Default Server:  XiaoQiang
Address:  192.168.31.1
```

nslookup www.google.com

```
C:\vit\kandra ksheeraj>nslookup www.google.com
Server:  XiaoQiang
Address:  192.168.31.1

Non-authoritative answer:
Name:    www.google.com
Addresses:  2404:6800:4007:80f::2004
          172.217.163.164
```

nslookup 2404:6800:4007:80f::2004

```
C:\vit\kandra ksheeraj>nslookup 2404:6800:4007:80f::2004
Server:  XiaoQiang
Address:  192.168.31.1

Name:    maa05s05-in-x04.1e100.net
Address:  2404:6800:4007:80f::2004
```

6. PING (icmp-internet control msg protocal-3rd layer)

The ping command (named after the sound of an active sonar system) sends echo requests to the host specified on the command line, and lists the responses received.

- ping - sends an ICMP *ECHO_REQUEST* packet to the specified host. If the host responds, an ICMP packet is received.
- One can “ping” an IP address to see if a machine is alive.
- It provides a very quick way to see if a machine is up and connected to the network.

ping

PING (Packet INternet Groper) command is the best way to test connectivity between two nodes. Whether it is Local Area Network (LAN) or Wide Area Network (WAN). Ping use ICMP (Internet Control Message Protocol) to communicate to other devices. You can ping host name of ip address using below command.

```
C:\vit\kandra ksheeraj>ping

Usage: ping [-t] [-a] [-n count] [-l size] [-f] [-i TTL] [-v TOS]
            [-r count] [-s count] [[-j host-list] | [-k host-list]]
            [-w timeout] [-R] [-S srcaddr] [-c compartment] [-p]
            [-4] [-6] target_name

Options:
    -t             Ping the specified host until stopped.
                   To see statistics and continue - type Control-Break;
                   To stop - type Control-C.
    -a             Resolve addresses to hostnames.
    -n count       Number of echo requests to send.
    -l size        Send buffer size.
    -f             Set Don't Fragment flag in packet (IPv4-only).
    -i TTL         Time To Live.
    -v TOS         Type Of Service (IPv4-only. This setting has been deprecated
                   and has no effect on the type of service field in the IP
                   Header).
    -r count       Record route for count hops (IPv4-only).
    -s count       Timestamp for count hops (IPv4-only).
    -j host-list   Loose source route along host-list (IPv4-only).
    -k host-list   Strict source route along host-list (IPv4-only).
    -w timeout     Timeout in milliseconds to wait for each reply.
    -R             Use routing header to test reverse route also (IPv6-only).
                   Per RFC 5095 the use of this routing header has been
                   deprecated. Some systems may drop echo requests if
                   this header is used.
    -S srcaddr     Source address to use.
    -c compartment Routing compartment identifier.
    -p             Ping a Hyper-V Network Virtualization provider address.
    -4             Force using IPv4.
    -6             Force using IPv6.
```

ping -n 3 www.google.com

host available or not(timeout)

```
C:\vit\kandra ksheeraj>ping -n 3 www.google.com

Pinging www.google.com [172.217.163.164] with 32 bytes of data:
Reply from 172.217.163.164: bytes=32 time=22ms TTL=116
Reply from 172.217.163.164: bytes=32 time=15ms TTL=116
Reply from 172.217.163.164: bytes=32 time=79ms TTL=116

Ping statistics for 172.217.163.164:
    Packets: Sent = 3, Received = 3, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 15ms, Maximum = 79ms, Average = 38ms
```

ping 172.217.163.164

ping the address

```
C:\vit\kandra ksheeraj>ping 172.217.163.164

Pinging 172.217.163.164 with 32 bytes of data:
Reply from 172.217.163.164: bytes=32 time=9ms TTL=116
Reply from 172.217.163.164: bytes=32 time=17ms TTL=116
Reply from 172.217.163.164: bytes=32 time=15ms TTL=116
Reply from 172.217.163.164: bytes=32 time=8ms TTL=116

Ping statistics for 172.217.163.164:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 8ms, Maximum = 17ms, Average = 12ms
```

ping -t www.google.com

Ping the specified host until stopped.

```
C:\vit\kandra ksheeraj>ping -t www.google.com

Pinging www.google.com [172.217.163.164] with 32 bytes of data:
Reply from 172.217.163.164: bytes=32 time=10ms TTL=116
Reply from 172.217.163.164: bytes=32 time=11ms TTL=116
Reply from 172.217.163.164: bytes=32 time=14ms TTL=116
Reply from 172.217.163.164: bytes=32 time=8ms TTL=116
Reply from 172.217.163.164: bytes=32 time=8ms TTL=116
Reply from 172.217.163.164: bytes=32 time=8ms TTL=116
Reply from 172.217.163.164: bytes=32 time=15ms TTL=116
Reply from 172.217.163.164: bytes=32 time=9ms TTL=116
Reply from 172.217.163.164: bytes=32 time=10ms TTL=116
Reply from 172.217.163.164: bytes=32 time=8ms TTL=116
Reply from 172.217.163.164: bytes=32 time=9ms TTL=116
Reply from 172.217.163.164: bytes=32 time=11ms TTL=116
Reply from 172.217.163.164: bytes=32 time=9ms TTL=116
Reply from 172.217.163.164: bytes=32 time=15ms TTL=116
Reply from 172.217.163.164: bytes=32 time=16ms TTL=116
Reply from 172.217.163.164: bytes=32 time=10ms TTL=116
Reply from 172.217.163.164: bytes=32 time=9ms TTL=116
Reply from 172.217.163.164: bytes=32 time=81ms TTL=116
Reply from 172.217.163.164: bytes=32 time=8ms TTL=116
Reply from 172.217.163.164: bytes=32 time=9ms TTL=116
Reply from 172.217.163.164: bytes=32 time=8ms TTL=116
```

```
Ping statistics for 172.217.163.164:
    Packets: Sent = 58, Received = 58, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 8ms, Maximum = 81ms, Average = 14ms
```

ping -a www.google.com

Resolve addresses to hostnames

```
C:\vit\kandra ksheeraj>ping -a www.google.com

Pinging www.google.com [172.217.163.164] with 32 bytes of data:
Reply from 172.217.163.164: bytes=32 time=18ms TTL=116
Reply from 172.217.163.164: bytes=32 time=39ms TTL=116
Reply from 172.217.163.164: bytes=32 time=16ms TTL=116
Reply from 172.217.163.164: bytes=32 time=12ms TTL=116

Ping statistics for 172.217.163.164:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 12ms, Maximum = 39ms, Average = 21ms
```

ping -f www.google.com

Set Don't Fragment flag in packet (IPv4-only)

```
C:\vit\kandra ksheeraj>ping -f www.google.com

Pinging www.google.com [172.217.163.164] with 32 bytes of data:
Reply from 172.217.163.164: bytes=32 time=7ms TTL=116
Reply from 172.217.163.164: bytes=32 time=9ms TTL=116
Reply from 172.217.163.164: bytes=32 time=10ms TTL=116
Reply from 172.217.163.164: bytes=32 time=11ms TTL=116

Ping statistics for 172.217.163.164:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 7ms, Maximum = 11ms, Average = 9ms
```

7. HOSTNAME

Tells the user the host name of the computer they are logged into.

hostname

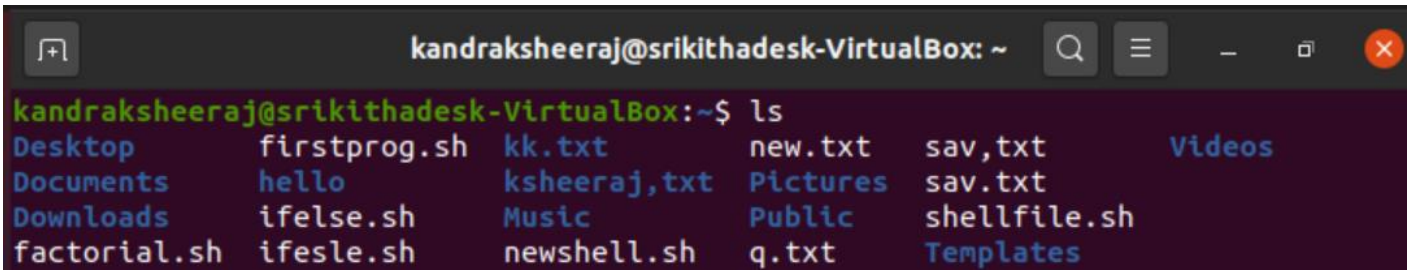
hostname is to identify in a network. Execute hostname command to see the hostname of your box. You can set hostname permanently in /etc/sysconfig/network. Need to reboot box once set a proper hostname.

```
C:\vit\kandra ksheeraj>hostname
DESKTOP-VDPV273
```

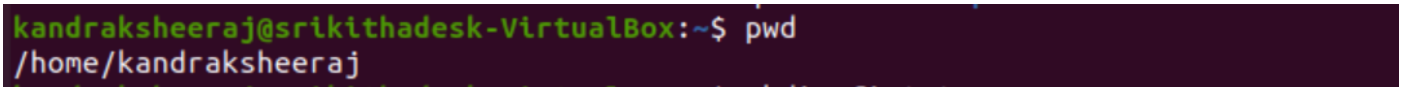
19BCE0829
KANDRA KSHEERAJ

BASIC LINUX COMMANDS

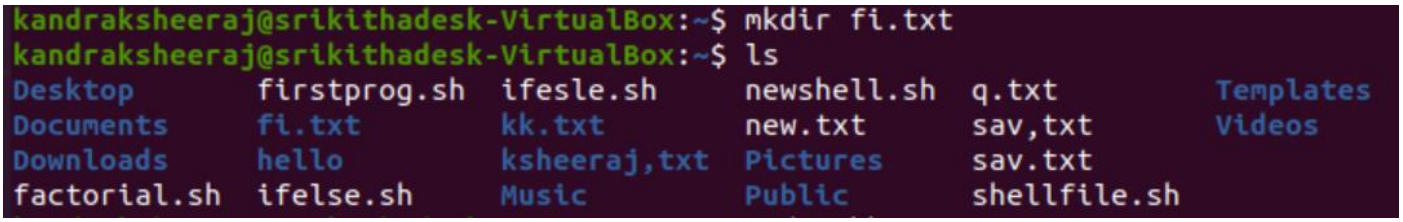
1. **Ls** - Directory listing



2. **pwd** - Show current working directory

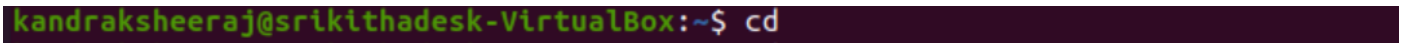


3. **mkdir dir** - Creating a directory dir

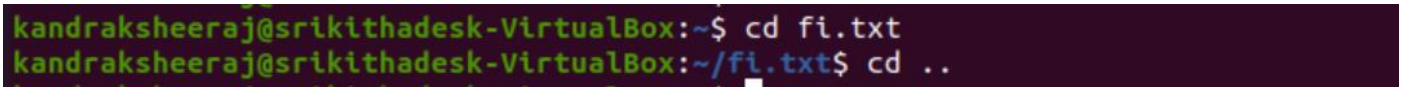


4. **rm -r dir** - Deleting the directory

5. **cd** - Change to home directory

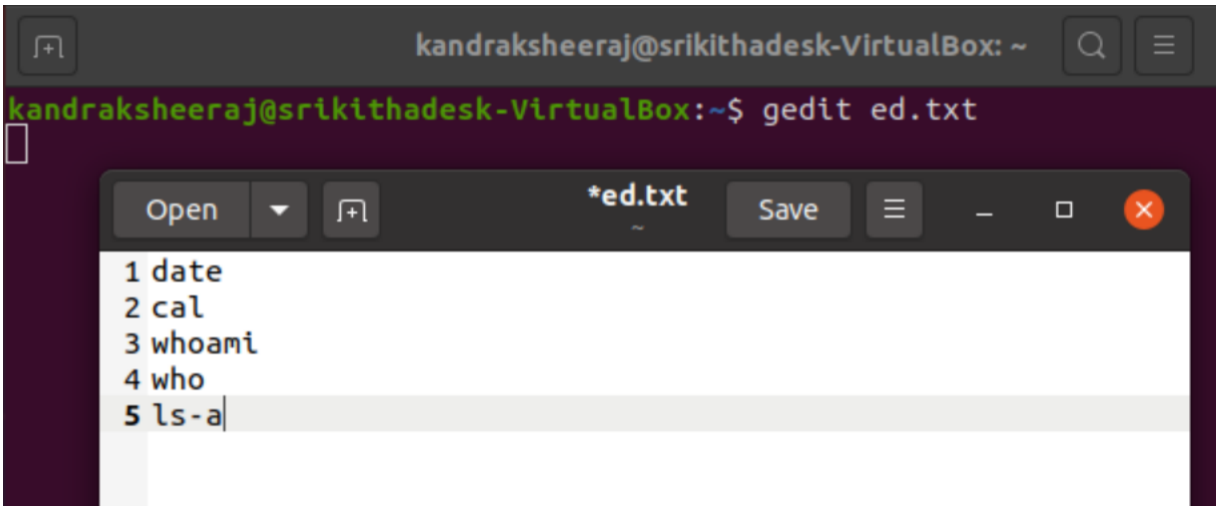


6. **cd dir** - Change directory to dir

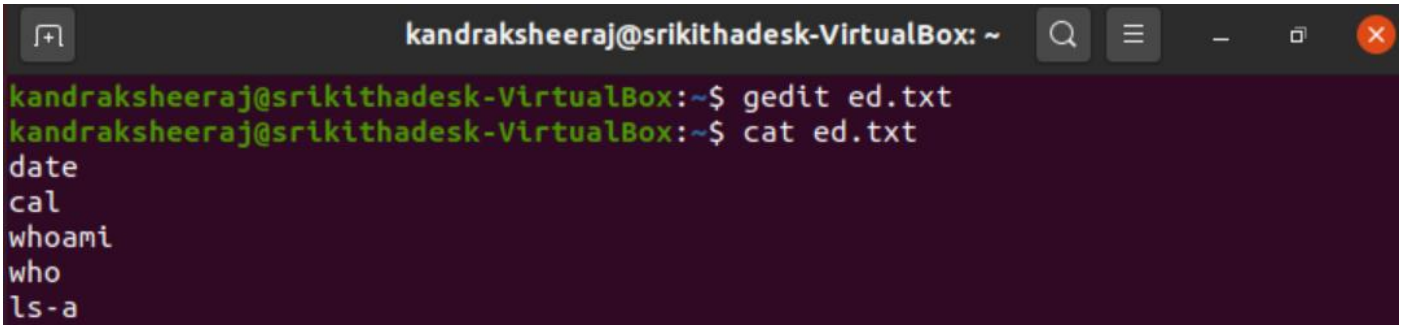


7. **cd ..** – change to previous directory

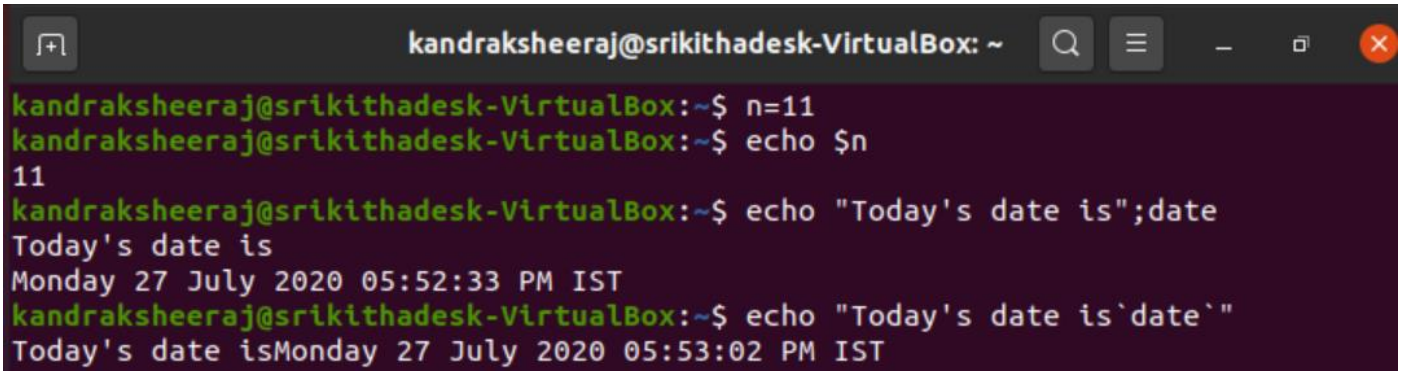
8. **gedit** – notepad to write programs



9. **cat**- display text on terminal

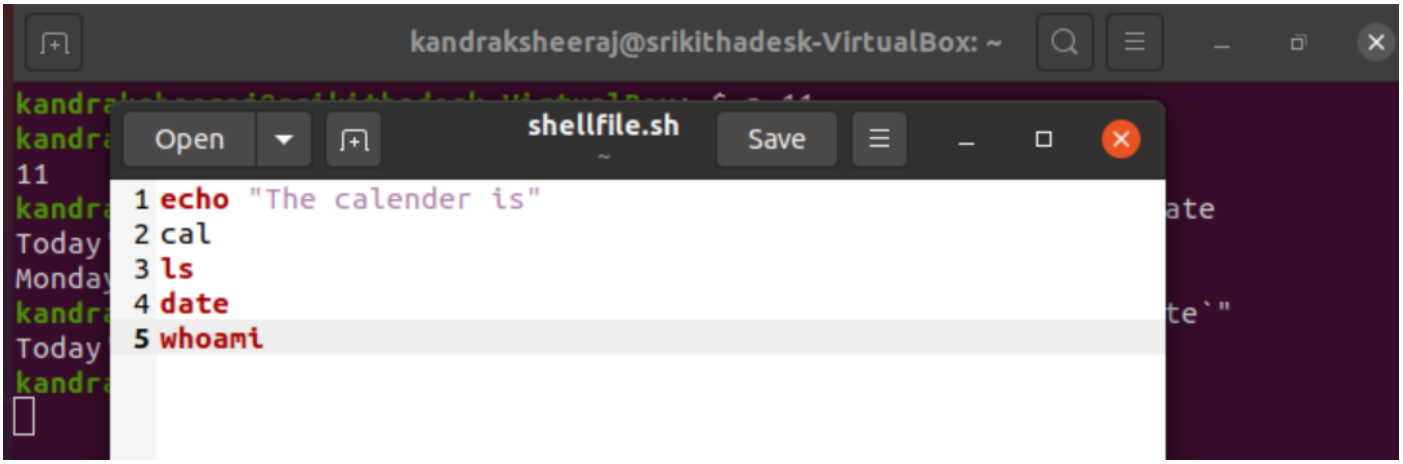


10. **echo** – display given argument



11. **Sh** – executing commands from gedit(notepad)

```
kandraksheeraj@srikithadesk-VirtualBox:~$ gedit shellfile.sh
kandraksheeraj@srikithadesk-VirtualBox:~$ sh newshell.sh
     July 2020
Su Mo Tu We Th Fr Sa
           1  2  3  4
 5  6  7  8  9 10 11
12 13 14 15 16 17 18
19 20 21 22 23 24 25
26 27 28 29 30 31
```



12. **Cal** - display calender
13. **Date** - display date
14. **Whoami** - display user name

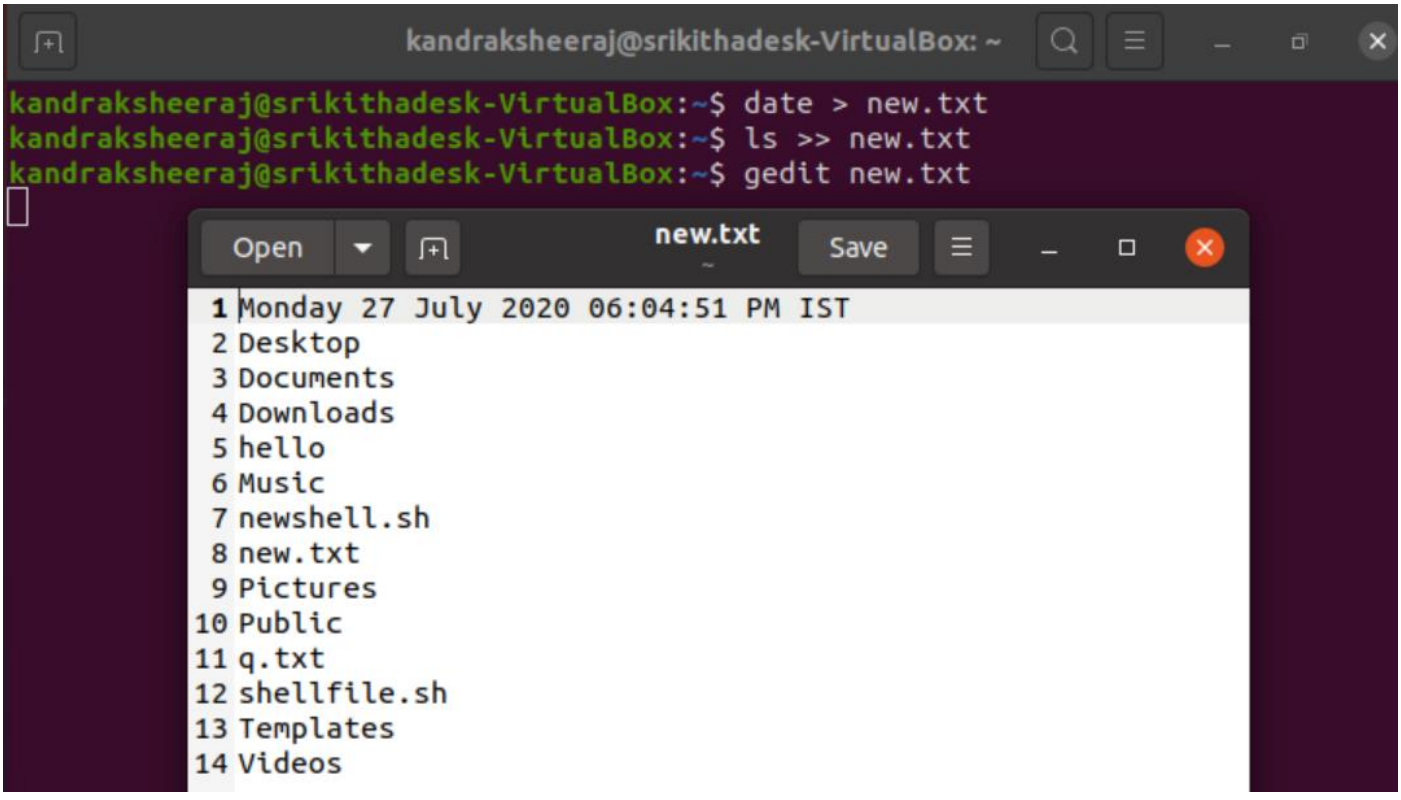
```
kandraksheeraj@srikithadesk-VirtualBox:~$ sh shellfile.sh
The calender is
     July 2020
Su Mo Tu We Th Fr Sa
           1  2  3  4
 5  6  7  8  9 10 11
12 13 14 15 16 17 18
19 20 21 22 23 24 25
26 27 28 29 30 31

Desktop    Downloads  Music        Pictures  q.txt         Templates
Documents  hello      newshell.sh  Public    shellfile.sh  Videos
Monday 27 July 2020 05:56:48 PM IST
kandraksheeraj
```

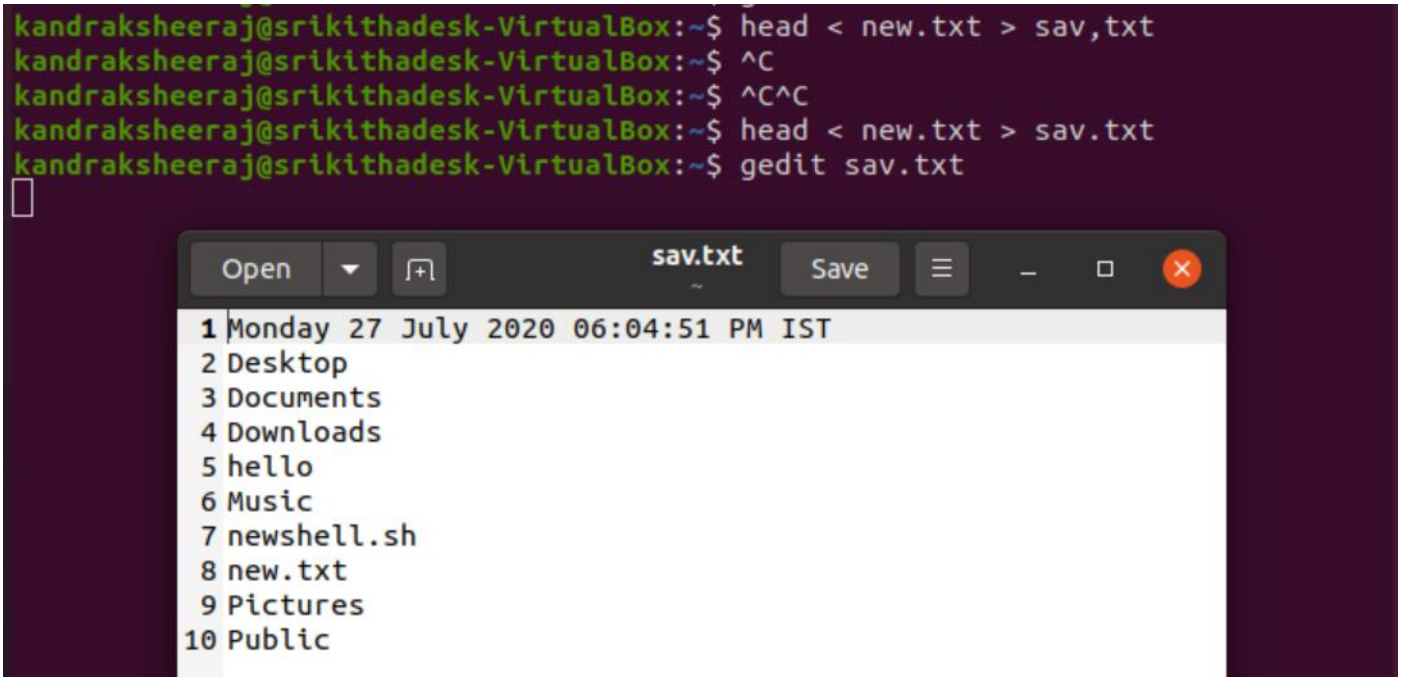
15. **Echo expr** – display result after operation

```
kandraksheeraj@srikithadesk-VirtualBox:~$ echo `expr 1+3`
1+3
kandraksheeraj@srikithadesk-VirtualBox:~$ echo `expr 1 + 3`
4
kandraksheeraj@srikithadesk-VirtualBox:~$ echo `expr 5 - 2`
3
kandraksheeraj@srikithadesk-VirtualBox:~$ echo `expr 7 \* 2`
14
kandraksheeraj@srikithadesk-VirtualBox:~$ echo `expr 4 / 2`
2
kandraksheeraj@srikithadesk-VirtualBox:~$
```

16. command – store output in a file
17. **>>** command- to append in to the same file



18. **head file**- Output the first 10 lines of the file



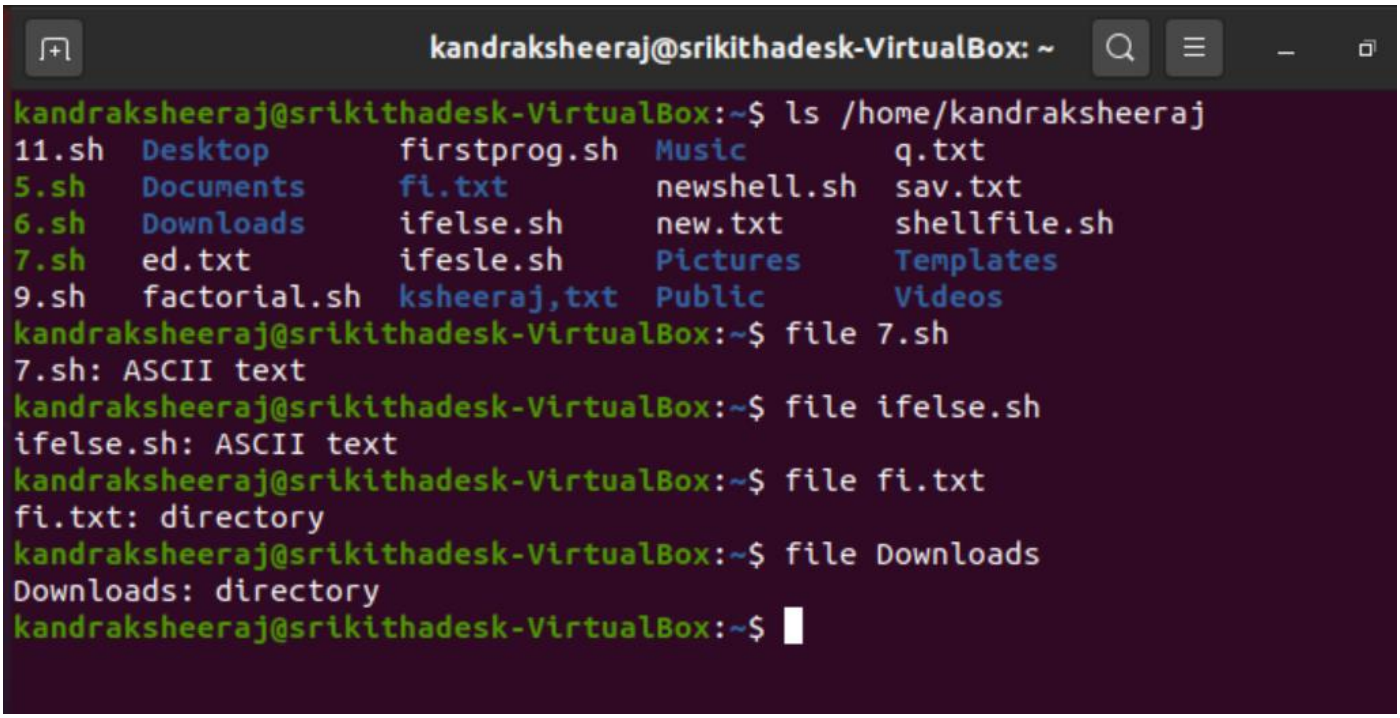
19. **Ls /home/kandra ksheeraj** display all files as well as the type of all files.

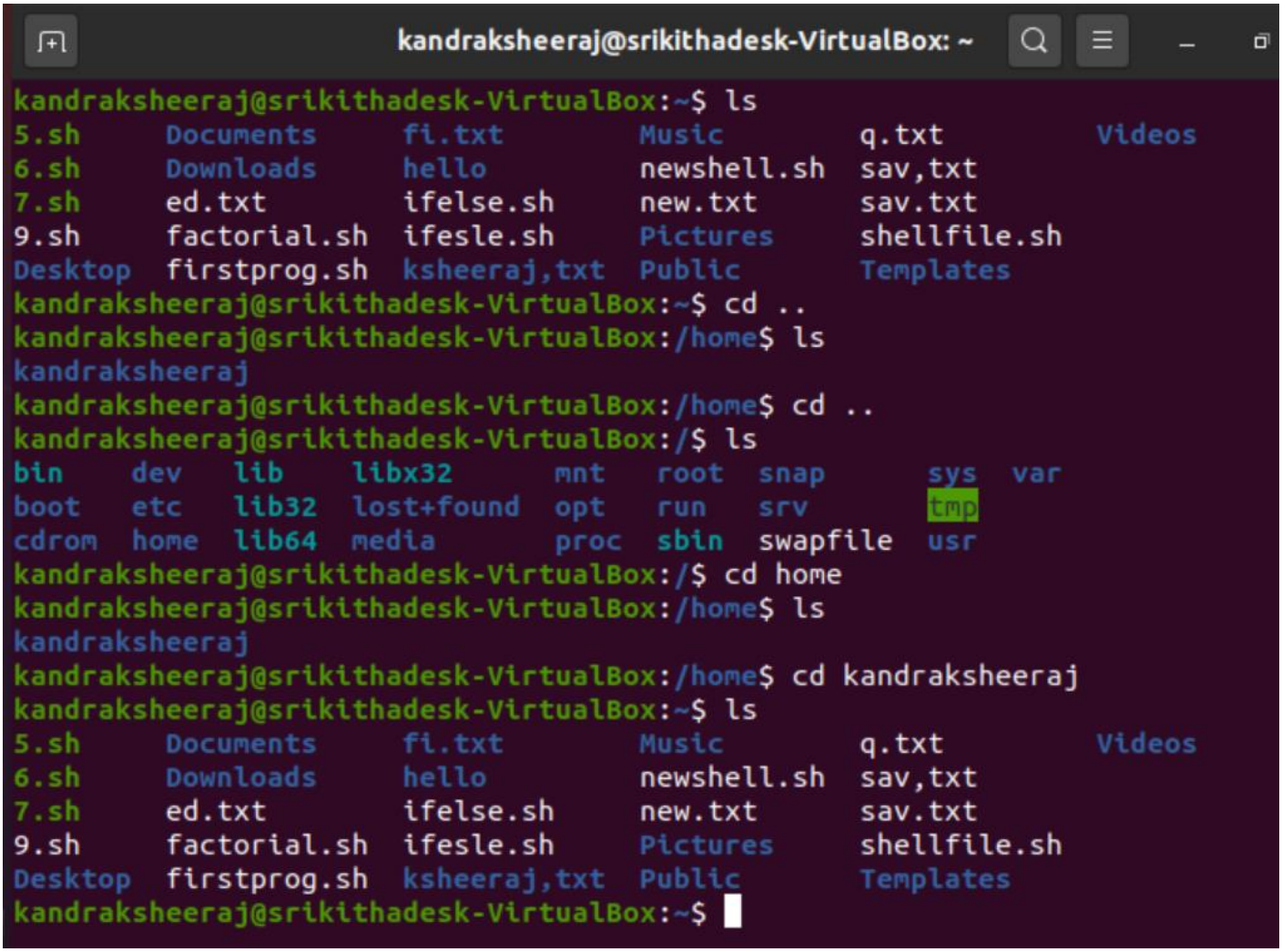
The type of the file can be recognised by the colour displayed:

White: any file (EX: ifelse.sh)

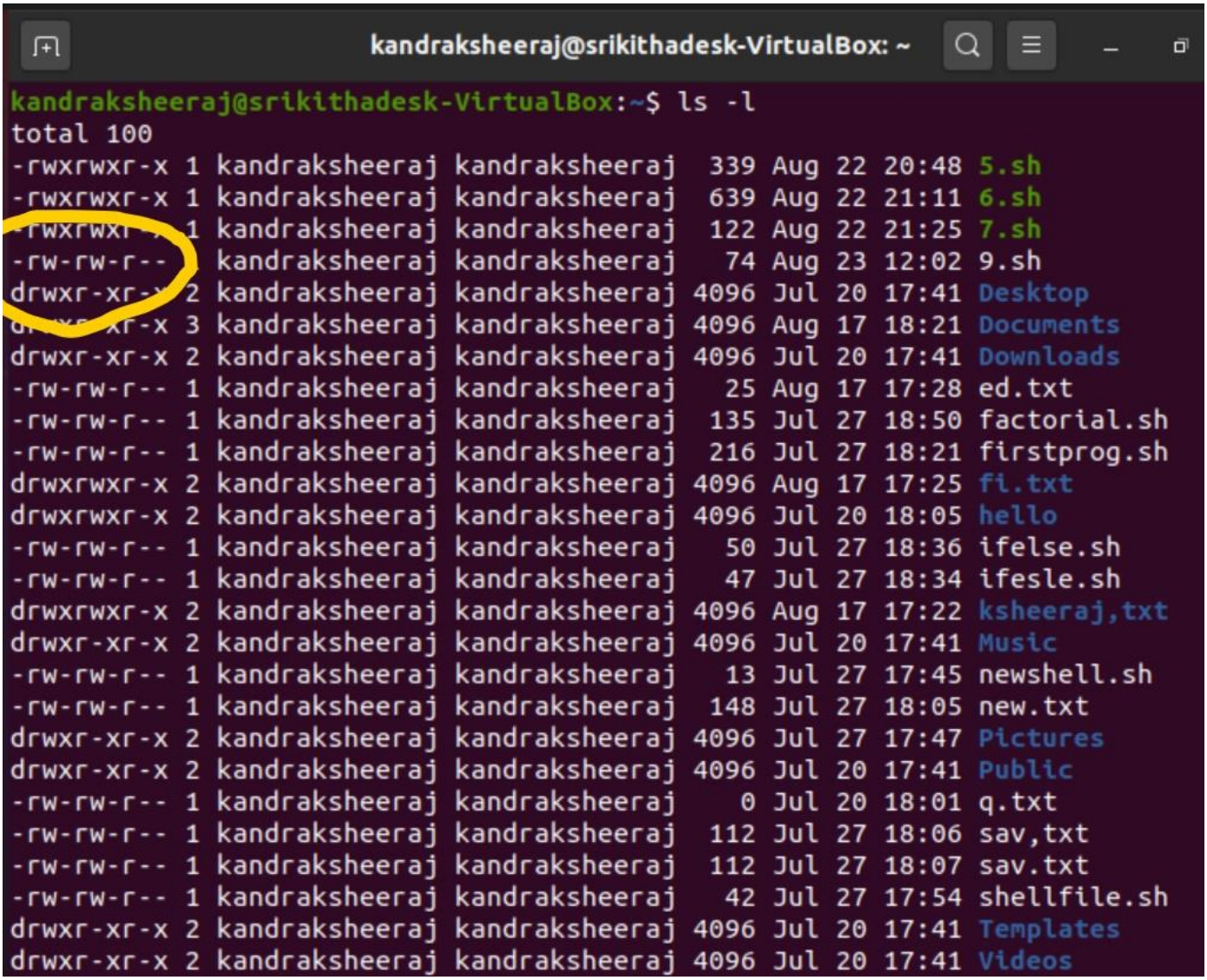
Blue: Directory (EX: Documents)

Green: executable files (EX: 5.sh)

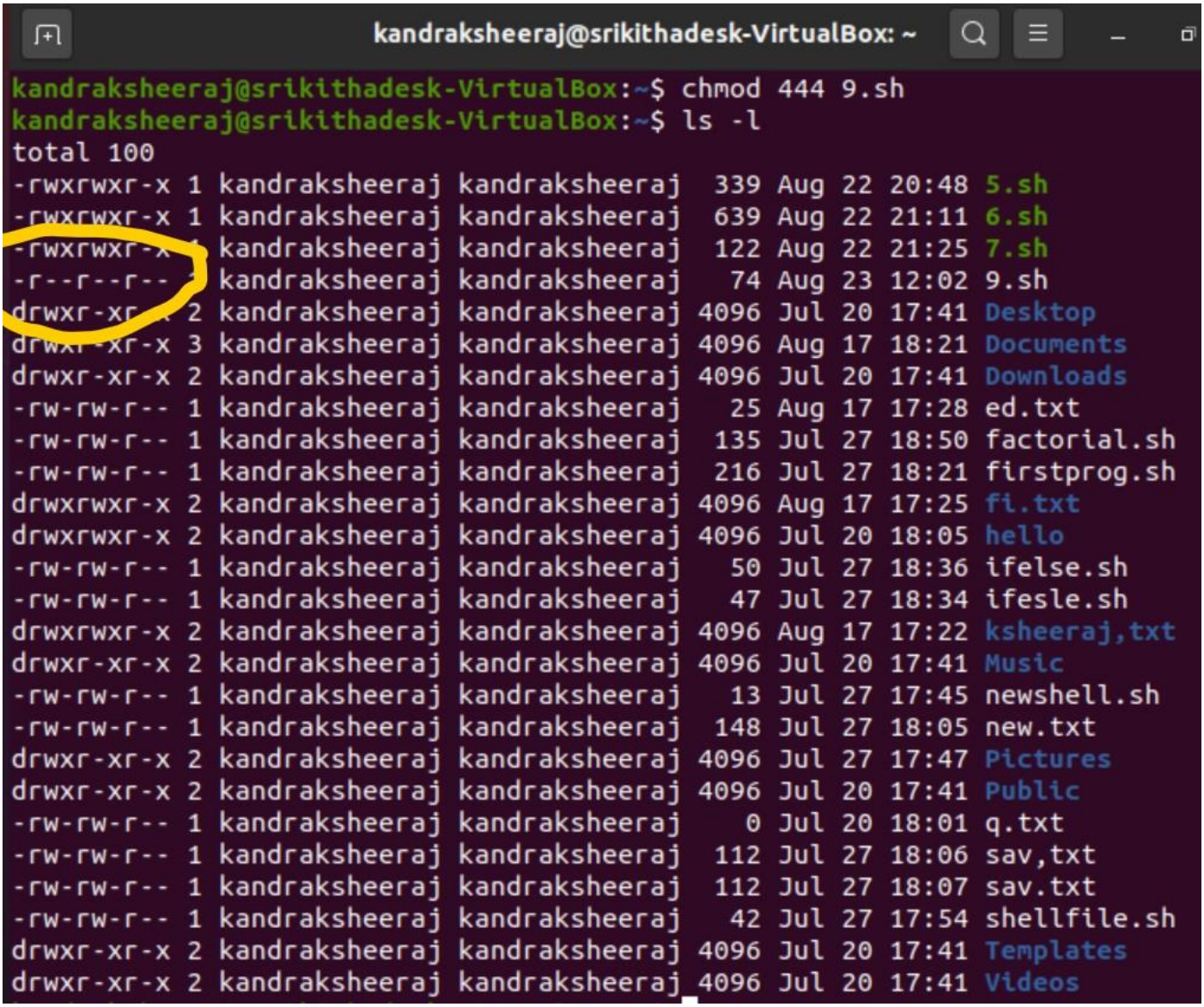

kandraksheeraj@srikithadesk-VirtualBox: ~
kandraksheeraj@srikithadesk-VirtualBox:~$ ls /home/kandraksheeraj
11.sh Desktop firstprog.sh Music q.txt
5.sh Documents fi.txt newshell.sh sav.txt
6.sh Downloads ifelse.sh new.txt shellfile.sh
7.sh ed.txt ifesle.sh Pictures Templates
9.sh factorial.sh ksheeraj,txt Public Videos
kandraksheeraj@srikithadesk-VirtualBox:~$ file 7.sh
7.sh: ASCII text
kandraksheeraj@srikithadesk-VirtualBox:~$ file ifelse.sh
ifelse.sh: ASCII text
kandraksheeraj@srikithadesk-VirtualBox:~$ file fi.txt
fi.txt: directory
kandraksheeraj@srikithadesk-VirtualBox:~$ file Downloads
Downloads: directory
kandraksheeraj@srikithadesk-VirtualBox:~$


kandraksheeraj@srikithadesk-VirtualBox: ~
kandraksheeraj@srikithadesk-VirtualBox:~$ ls
5.sh Documents fi.txt Music q.txt Videos
6.sh Downloads hello newshell.sh sav,txt
7.sh ed.txt ifelse.sh new.txt sav.txt
9.sh factorial.sh ifesle.sh Pictures shellfile.sh
Desktop firstprog.sh ksheeraj,txt Public Templates
kandraksheeraj@srikithadesk-VirtualBox:~$ cd ..
kandraksheeraj@srikithadesk-VirtualBox:/home$ ls
kandraksheeraj
kandraksheeraj@srikithadesk-VirtualBox:/home$ cd ..
kandraksheeraj@srikithadesk-VirtualBox:/$ ls
bin dev lib libx32 mnt root snap sys var
boot etc lib32 lost+found opt run srv tmp
cdrom home lib64 media proc sbin swapfile usr
kandraksheeraj@srikithadesk-VirtualBox:/$ cd home
kandraksheeraj@srikithadesk-VirtualBox:/home$ ls
kandraksheeraj
kandraksheeraj@srikithadesk-VirtualBox:/home$ cd kandraksheeraj
kandraksheeraj@srikithadesk-VirtualBox:~$ ls
5.sh Documents fi.txt Music q.txt Videos
6.sh Downloads hello newshell.sh sav,txt
7.sh ed.txt ifelse.sh new.txt sav.txt
9.sh factorial.sh ifesle.sh Pictures shellfile.sh
Desktop firstprog.sh ksheeraj,txt Public Templates
kandraksheeraj@srikithadesk-VirtualBox:~$

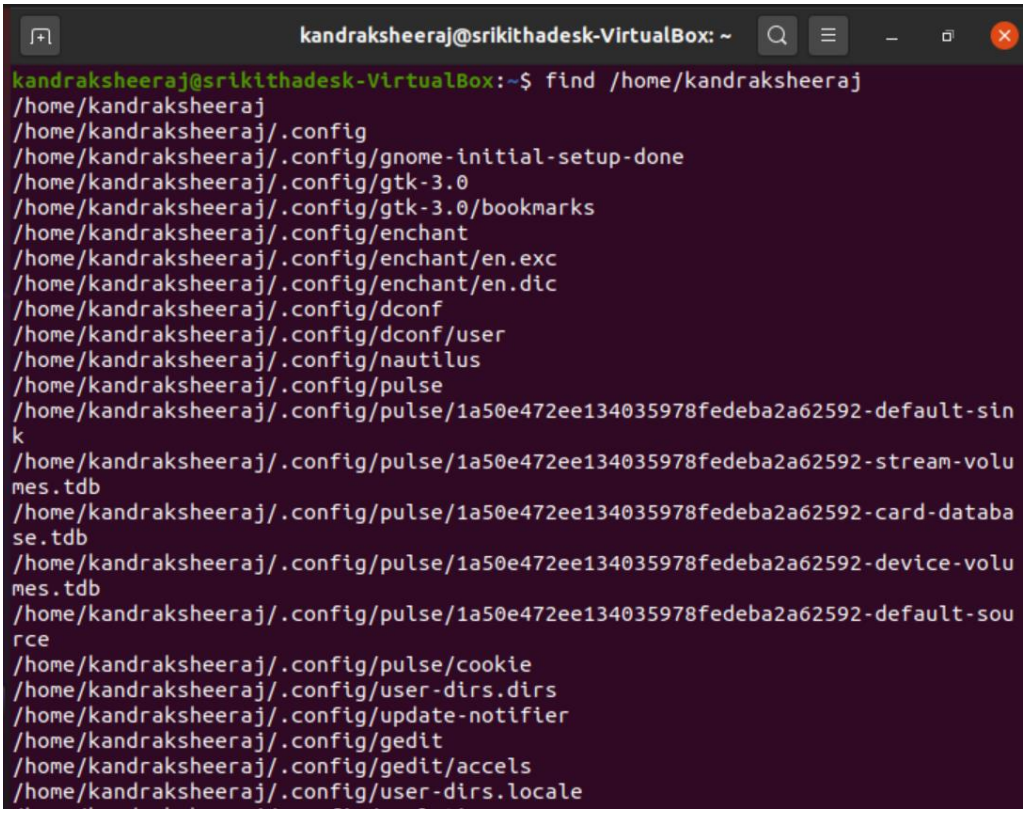
20. **ls -l** print file permissions

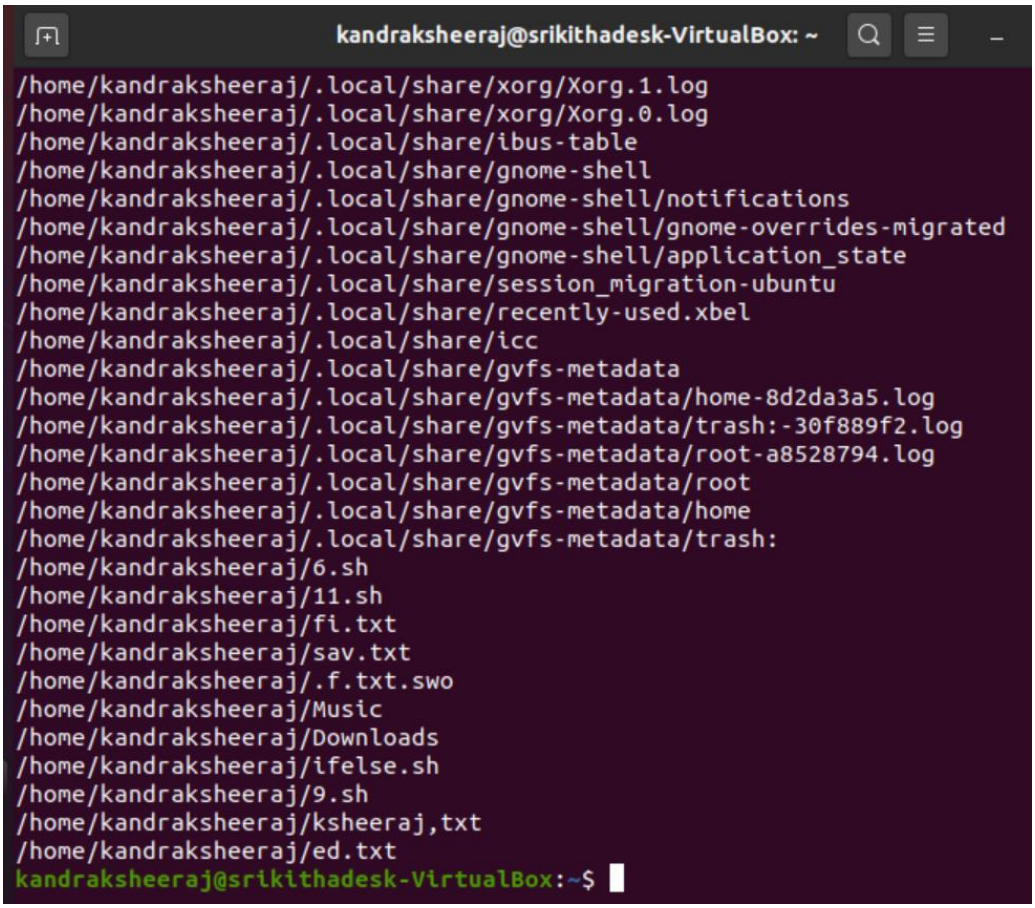


21. **Chmod** – change permission



22. **Find** command to display sorted list of all files
23. **Grep** commands to display where a particular word is present





```
kandraksheeraj@srikithadesk-VirtualBox: ~
kandraksheeraj@srikithadesk-VirtualBox:~$ grep hello 11.sh
hello
kandraksheeraj@srikithadesk-VirtualBox:~$ grep -c hello 11.sh
1
kandraksheeraj@srikithadesk-VirtualBox:~$ grep -i hello 11.sh
hello
HELLO
kandraksheeraj@srikithadesk-VirtualBox:~$ grep -n hello sav.txt
5:hello
kandraksheeraj@srikithadesk-VirtualBox:~$ grep -l hello *
11.sh
grep: Desktop: Is a directory
grep: Documents: Is a directory
grep: Downloads: Is a directory
grep: fi.txt: Is a directory
grep: ksheeraj,txt: Is a directory
grep: Music: Is a directory
new.txt
grep: Pictures: Is a directory
grep: Public: Is a directory
sav.txt
grep: Templates: Is a directory
grep: Videos: Is a directory
```

```
kandraksheeraj@srikithadesk-VirtualBox:~$ grep -l hello * | sort
grep: Desktop: Is a directory
grep: Documents: Is a directory
grep: Downloads: Is a directory
grep: fi.txt: Is a directory
grep: ksheeraj,txt: Is a directory
grep: Music: Is a directory
grep: Pictures: Is a directory
grep: Public: Is a directory
grep: Templates: Is a directory
grep: Videos: Is a directory
11.sh
new.txt
sav.txt
kandraksheeraj@srikithadesk-VirtualBox:~$
```

19BCE0829
KANDRA KSHEERAJ

LAB PROGRAMS

1. **convert the decimal to binary , count the no of 1 's in the binary values, add the parity (Even parity). restrict the binary equivalent to 7 bits. parity bit should be eighth bit. parity bit should be in right most position, again convert into decimal.**

```
#include<stdio.h>

#include<string.h>

#include<stdlib.h>

void main()

{

        long number, decimal_number, remainder, n, base = 1, base1 = 1, binary =
0, no_of_1s = 0, parity_bit = 0, final_decimal = 0;

        printf("Enter a decimal integer \n");

        scanf("%ld", &n1); decimal_number = number;

        while (number > 0) {

        remainder = number % 2;

        if (remainder == 1)

        {

        no_of_1s++;

        }

        binary = binary + remainder * base;

        n1 = n1 / 2;

        base = base * 10; }

        if(no_of_1s % 2==0)
```

```
        {
        parity_bit = 0;
        }
        else {
        parity_bit = 1;
        }
        printf("Input number is = %ld\n", decimal_number);
        printf("Its binary equivalent is = %07ld\n", binary);
        printf("No.of 1's in the binary n1ber is = %ld\n", no_of_1s);
int concat(int x, int y)
{
        char str1[20];
        char str2[20];
        sprintf(str1,"%d",x);
        sprintf(str2,"%d",y);
        strcat(str1,str2);
  return atoi(str1);
        }
  int final_binary = concat(binary,parity_bit);
  printf("The final binary number is =%07d\n",final_binary);
        while( final_binary > 0)
  {
        n = final_binary % 10; final_decimal = final_decimal + n * base1;
```

```
    final_binary = final_binary/10;
   base1 = base1 * 2;
        }
   printf("The final decimal equivalent number =%ld\n",final_decimal);
}
```

```
ksheeraj@ksheeraj-VirtualBox:~$ gedit netcom1.c
ksheeraj@ksheeraj-VirtualBox:~$ gcc netcom1.c
ksheeraj@ksheeraj-VirtualBox:~$ ./a.out
Enter a decimal integer
124
Input number is = 124
Its binary equivalent is = 1111100
No.of 1's in the binary n1ber is = 5
The final binary number is =11111001
The final decimal equivalent number =249
ksheeraj@ksheeraj-VirtualBox:~$
```

Open *netcom1.c Save

```
#include<stdio.h>
#include<string.h>
#include<stdlib.h>
void main()
{
        long number, decimal_number, remainder, n, base = 1, base1 = 1,
 binary = 0, no_of_1s = 0, parity_bit = 0, final_decimal = 0;
        printf("Enter a decimal integer \n");
        scanf("%ld", &n1); decimal_number = number;
        while (number > 0) {
        remainder = number % 2;
        if (remainder == 1)
        {
        no_of_1s++;
        }
        binary = binary + remainder * base;
        n1 = n1 / 2;
        base = base * 10; }
        if(no_of_1s % 2==0)
        {
        parity_bit = 0;
        }
        else {
        parity_bit = 1;
        }
```

```
25          printf("Input number is = %ld\n", decimal_number);
26          printf("Its binary equivalent is = %07ld\n", binary);
27          printf("No.of 1's in the binary n1ber is = %ld\n", no_of_1s);
28    int concat(int x, int y)
29    {
30          char str1[20];
31          char str2[20];
32          sprintf(str1,"%d",x);
33          sprintf(str2,"%d",y);
34          strcat(str1,str2);
35      return atoi(str1);
36          }
37      int final_binary = concat(binary,parity_bit);
38      printf("The final binary number is =%07d\n",final_binary);
39          while( final_binary > 0)
40      {
41          n = final_binary % 10; final_decimal = final_decimal + n * base1;
42       final_binary = final_binary/10;
43      base1 = base1 * 2;
44          }
45      printf("The final decimal equivalent number =%ld\n",final_decimal);
46  }
```

2. hamming code - calculate only the no of redundant bits

2^r>= k+r+1

input = k

k= no of bits in the data word.

calculate the no of bits in the code word

```
#include <stdio.h>
#include <math.h>
void main()
{
        int n,i=0,p_n = 0,c_l ;
        printf("Enter no of bits in Data Word: ");
        scanf("%d",&n);
        while(n > (pow(2,i) - (i+1)) )
        {
         p_n++;
         i++;
```

```
    }
    c_l = p_n + n;
    printf("No of redundant bits: %d\n",p_n);
    printf("No of bits in the code word: %d\n",c_l);
}
```

```
ksheeraj@ksheeraj-VirtualBox:~$ gedit netcom2.c
ksheeraj@ksheeraj-VirtualBox:~$ gcc netcom2.c -o netcom2 -lm
ksheeraj@ksheeraj-VirtualBox:~$ ./netcom2
Enter no of bits in Data Word: 7
No of redundant bits: 4
No of bits in the code word: 11
ksheeraj@ksheeraj-VirtualBox:~$
```

Open | netcom2.c | Save

```
1 #include <stdio.h>
2 #include <math.h>
3
4 void main()
5 {
6         int n,i=0,p_n = 0,c_l ;
7         printf("Enter no of bits in Data Word: ");
8         scanf("%d",&n);
9         while(n > (pow(2,i) - (i+1)) )
10        {
11          p_n++;
12          i++;
13        }
14        c_l = p_n + n;
15        printf("No of redundant bits: %d\n",p_n);
16        printf("No of bits in the code word: %d\n",c_l);
17 }
```