Experiment No.: 5 **Date: 19-03-2024**

SHELL SCRIPTING

AIM

Execute the basic shell scripting programs

1. Write a shell program to read a string and display it?

```
echo "Enter a string:"
read userstring
echo "You entered: $userstring"
```

OUTPUT

```
snehav@sneha-v:~$ nano exp1.sh
snehav@sneha-v:~$ sh exp1.sh
Enter a string:
Shell scripting
You entered: Shell scripting
```

2. Write a shell program to read 2 numbers and find sum, difference, product, quotient?

```
echo "Enter the first number:"
read num1
echo "Enter the second number:"
read num2
sum=$((num1+num2))
echo "Sum: $sum"
difference=$((num1-num2))
echo "Difference: $difference"
product=$((num1*num2))
echo "Product: $product"
if [ $num2 -ne 0 ]; then
quotient=$(echo "scale=2; $num1/$num2" | bc)
echo "Quotient: $quotient"
else
echo "Cannot divide by zero. Quotient is undefined."
fi
```

OUTPUT

```
snehav@sneha-v:~$ nano exp2.sh
snehav@sneha-v:~$ sh exp2.sh
Enter the first number:
44
Enter the second number:
4
Sum: 48
Difference: 40
Product: 176
Quotient: 11.00
snehav@sneha-v:~$
```

3. Write a shell program to check if a number is odd or even?

```
echo "Enter a number:"
read number
if [ $((number % 2)) -eq 0 ]; then
echo "$number is even"
else
echo "$number is odd"
fi
```

OUTPUT

```
snehav@sneha-v:~$ nano exp3.sh
snehav@sneha-v:~$ sh exp3.sh
Enter a number:
15
15 is odd
snehav@sneha-v:~$
```

4. Write a shell program to read 3 numbers and find the largest of them?

```
#!/bin/bash
echo "Enter the first number:"
read num1
echo "Enter the second number:"
read num2
echo "Enter the third number:"
read num3
largest=$num1
if [ $num2 -gt $largest ]; then
largest=$num2
fi
if [ $num3 -gt $largest ]; then
largest=$num3
fi
echo "The largest number is: $largest"
```

OUTPUT

```
snehav@sneha-v:~$ nano exp4.sh
snehav@sneha-v:~$ sh exp4.sh
Enter the first number:
6
Enter the second number:
13
Enter the third number:
17
The largest number is: 17
snehav@sneha-v:~$
```

5. Read 3 marks of a student and find the average. Display the grade of the student based on the average.

   a) S >= 90%

   b) A < 90%, but >= 80%

   c) B < 80%, but >= 60%

   d) P < 80%, but >= 40%

   e) F < 40%

```
#!/bash
echo "Enter the first mark:"
read mark1
echo "Enter the second mark:"
read mark2
echo "Enter the third mark:"
read mark3
average=$(( (mark1+mark2+mark3)/3 ))
echo "Average Mark: $average"
if [ $average -ge 90 ]; then
        echo "Grade:S"
elif [ $average -ge 80 ]; then
        echo "Grade:A"
elif [ $average -ge 60 ]; then
        echo "Grade:B"
elif [ $average -ge 40 ]; then
        echo "Grade:P"
else
        echo "Grade:F"
fi
```

OUTPUT

6. Write a shell program to read a filename as command line argument and check whether it exists or not?

```
if [ $# -ne 1 ]; then
echo "Usage: $0 <filename>"
   exit 1
fi

filename=$1

# Check if the file exists
if [ -e "$filename" ]; then
   echo "File '$filename' already exists."
else
   echo "File '$filename' does not exist."
fi
```

OUTPUT

```
snehav@sneha-v:~$ nano exp6.sh
snehav@sneha-v:~$ chmod +x exp6.sh
snehav@sneha-v:~$ ./exp6.sh exp1.sh
File 'exp1.sh' already exists.
snehav@sneha-v:~$ ./exp6.sh exp16.sh
File 'exp16.sh' does not exist.
snehav@sneha-v:~$
```

7. Write a shell program to display the multiplication table of a number n?

```
echo "Enter a number:"
read n

echo "Multiplication table for $n:"
for ((i = 1; i <= 10; i++)); do
   echo "$n x $i = $((n * i))"
done
```

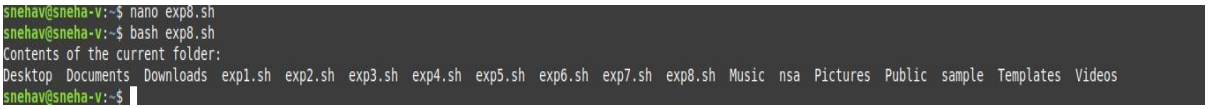
OUTPUT

```
snehav@sneha-v:~$ nano exp7.sh
snehav@sneha-v:~$ bash exp7.sh
Enter a number:
6
Multiplication table for 6:
6 x 1 = 6
6 x 2 = 12
6 x 3 = 18
6 x 4 = 24
6 x 5 = 30
6 x 6 = 36
6 x 7 = 42
6 x 8 = 48
6 x 9 = 54
6 x 10 = 60
snehav@sneha-v:~$
```

8. Write a shell program to display the contents in your current folder.

```
echo “Contents of the current folder”
ls
```

OUTPUT



9. Write a shell program to find the sum of squares of first n numbers? (use while)

```
echo "Enter the value of n:"
read n

sum=0
count=1

while [ $count -le $n ]; do
   square=$((count * count))
   sum=$((sum + square))
   count=$((count + 1))
done

echo "The sum of squares of the first $n numbers is: $sum"
```

OUTPUT

10. Write a menu driven shell program to find the sum, difference, product, quotient of 2 numbers?

```
while true; do
   echo "Menu:"
   echo "1. Sum"
   echo "2. Difference"
   echo "3. Product"
   echo "4. Quotient"
   echo "5. Exit"
   echo "Enter your choice: "
   read choice
   case $choice in
      1)
```

```
    echo "Enter the first number:"
    read num1
    echo "Enter the second number:"
    read num2
    sum=$((num1 + num2))
    echo "Sum: $sum"
    ;;
2)
    echo "Enter the first number:"
    read num1
    echo "Enter the second number:"
    read num2
    difference=$((num1 - num2))
    echo "Difference: $difference"
    ;;

3)
  echo "Enter the first number:"
  read num1
  echo "Enter the second number:"
  read num2
  product=$((num1 * num2))
  echo "Product: $product"
  ;;

4)
  secho "Enter the first number:"
  read num1
  echo "Enter the second number:"
  read num2
  if [ $num2 -ne 0 ]; then
      quotient=$(echo "scale=2; $num1 / $num2" | bc)
      echo "Quotient: $quotient"
  else
      echo "Error: Division by zero!"

fi
;;
5)
echo "Exiting..."
 exit 0
;;

echo "Invalid choice! Please enter a number between 1 and 5."
;;

*)

esac

done
```

OUTPUT

```
snehav@sneha-v:~$ nano exp10.sh
snehav@sneha-v:~$ bash exp10.sh
Menu:
1. Sum
2. Difference
3. Product
4. Quotient
5. Exit
Enter your choice:
1
Enter the first number:
4
Enter the second number:
7
Sum: 11
Menu:
1. Sum
2. Difference
3. Product
4. Quotient
5. Exit
Enter your choice:
2
Enter the first number:
5
Enter the second number:
2
Difference: 3
Menu:
1. Sum
2. Difference
3. Product
4. Quotient
5. Exit
Enter your choice:
3
Enter the first number:
8
Enter the second number:
2
Product: 16
Menu:
1. Sum
2. Difference
3. Product
4. Quotient
5. Exit
Enter your choice:
4
```

```
Menu:
1. Sum
2. Difference
3. Product
4. Quotient
5. Exit
Enter your choice:
4
Enter the first number:
15
Enter the second number:
2
Quotient: 7.50
Menu:
1. Sum
2. Difference
3. Product
4. Quotient
5. Exit
Enter your choice:
5
Exiting...
snehav@sneha-v:~$
```

11. Write a menu driven shell program to find the month if a number gives. (repeat the menu infinitely)

```
while true; do
    echo "Menu:"
    echo "1. Find month by number"
    echo "2. Exit"
    echo "Enter your choice: "
    read choice
    case $choice in
        1)
            echo "Enter the number of the month (1-12):"
            read month_number
            case $month_number in
                1) echo "January";;
                2) echo "February";;
                3) echo "March";;
                4) echo "April";;
                5) echo "May";;
                6) echo "June";;
                7) echo "July";;
                8) echo "August";;
                9) echo "September";;
                10) echo "October";;
                11) echo "November";;
                12) echo "December";;
                *) echo "Invalid month number! Please enter a number between 1 and 12.";;
            esac
            ;;
        2) echo "Exiting..."
                exit 0
                ;;
```

```
        *) echo "Invalid choice! Please enter 1 or 2."
                ;;
        esac
        done
```

OUTPUT

```
snehav@sneha-v:~$ nano exp11.sh
snehav@sneha-v:~$ bash exp11.sh
Menu:
1. Find month by number
2. Exit
Enter your choice:
7
Invalid choice! Please enter 1 or 2.
Menu:
1. Find month by number
2. Exit
Enter your choice:
1
Enter the number of the month (1-12):
7
July
Menu:
1. Find month by number
2. Exit
Enter your choice:
2
Exiting...
snehav@sneha-v:~$
```

12. Write a shell program to find the factorial of a number? (Use function)

```
factorial() {
    local n=$1
    local result=1
    if [ $n -eq 0 ]; then
        echo 1
    else
        for ((i = 1; i <= n; i++)); do
            result=$((result * i))
        done
        echo $result
    fi
}
echo "Enter a number:"
read num
fact=$(factorial $num)
echo "Factorial of $num is: $fact"
```

OUTPUT

```
snehav@sneha-v:~$ nano exp12.sh
snehav@sneha-v:~$ bash exp12.sh
Enter a number:
0
Factorial of 0 is: 1
snehav@sneha-v:~$ bash exp12.sh
Enter a number:
4
Factorial of 4 is: 24
snehav@sneha-v:~$
```

13. Write a shell program to print the Fibonacci numbers upto N

```
fibonacci() {
n=$1
a=0
b=1
count=1
echo "Fibonacci sequence upto $n:"
echo -n "$a"
while [ $count -lt $n ];do
echo -n "$b"
temp=$b
b=$(( a+b ))
a=$temp
count=$(( count+1 ))
done
echo
 }
echo "Enter th limit (N) for fibonacci sequence:"
read limit
fibonacci $limit
```

OUTPUT

```
snehav@sneha-v:~$ nano exp13.sh
snehav@sneha-v:~$ bash exp13.sh
Enter th limit (N) for fibonacci sequence:
7
Fibonacci sequence upto 7:
0112358
```

14. Write a shell program to find the sum of squares of first n numbers (use while)

```
echo "Enter the value of N:"
read N
sum=0
i=1
while [ $i -le $N ]; do
    square=$((i * i))
    sum=$((sum + square))
    i=$((i + 1))
done
echo "The sum of squares of the first $N numbers is: $s
```

OUTPUT

```
snehav@sneha-v:~$ nano exp14.sh
snehav@sneha-v:~$ bash exp14.sh
enter a number(n):
7
Sum of square of the first 7 number is: 140
snehav@sneha-v:~$
```

15. Read a Decimal number. Convert it to Binary and display the result. (Use while)

```
echo "Enter a Decimal number:"
read decimal
binary=""
remainder=0
while [ $decimal -gt 0 ]; do
    remainder=$((decimal % 2))
    binary="$remainder$binary"
    decimal=$((decimal / 2))
done
echo "Binary equivalent: $binary"
```

OUTPUT

```
snehav@sneha-v:~$ nano exp15.sh
snehav@sneha-v:~$ bash exp15.sh
Enter a Decimal number:
23
Binary equivalent: 10111
snehav@sneha-v:~$
```

RESULT

Basic Shell scripting programs has been executed and the output is verified.

Experiment No.: 6 **Date: 26-03-2024**

COMMAND LINE TOOLS FOR NETWORKING

AIM

Study important options and uses of following command line tools for networking.
ping, traceroute, netstat, tcpdump, ip, nslookup, route, ifconfig, ifup,, ifquery, curl, wget

1. **ping**:

    - **Options**: Common options include **-c** to specify the number of packets to send, **-s** to set the packet size, and **-i** to set the interval between packets.
    - **Use Cases**: Ping is used to test network connectivity and measure the round-trip time between your computer and a target host.

      Eg:

```
snehav@sneha-v:~$ ping www.google.com
PING www.google.com (142.250.182.68) 56(84) bytes of data.
64 bytes from maa05s20-in-f4.1e100.net (142.250.182.68): icmp_seq=1 ttl=63 time=22.4 ms
64 bytes from maa05s20-in-f4.1e100.net (142.250.182.68): icmp_seq=2 ttl=63 time=22.2 ms
64 bytes from maa05s20-in-f4.1e100.net (142.250.182.68): icmp_seq=3 ttl=63 time=22.7 ms
64 bytes from maa05s20-in-f4.1e100.net (142.250.182.68): icmp_seq=4 ttl=63 time=22.1 ms
64 bytes from maa05s20-in-f4.1e100.net (142.250.182.68): icmp_seq=5 ttl=63 time=22.1 ms
64 bytes from maa05s20-in-f4.1e100.net (142.250.182.68): icmp_seq=6 ttl=63 time=22.1 ms
64 bytes from maa05s20-in-f4.1e100.net (142.250.182.68): icmp_seq=7 ttl=63 time=22.0 ms
64 bytes from maa05s20-in-f4.1e100.net (142.250.182.68): icmp_seq=8 ttl=63 time=22.3 ms
64 bytes from maa05s20-in-f4.1e100.net (142.250.182.68): icmp_seq=9 ttl=63 time=22.1 ms
64 bytes from maa05s20-in-f4.1e100.net (142.250.182.68): icmp_seq=10 ttl=63 time=22.3 ms
^C
--- www.google.com ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9014ms
rtt min/avg/max/mdev = 21.970/22.227/22.673/0.187 ms
snehav@sneha-v:~$
```

2. **traceroute**:

- **Options**: Common options include **-n** to disable DNS resolution, and **-I** or **-T** to use ICMP or TCP packets for tracing.
    - **Use Cases**: Traceroute helps determine the path that packets take to reach a target host and identifies potential network issues.

      Eg:

```
snehav@sneha-v:~$ sudo apt install inetutils-traceroute
[sudo] password for snehav:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  inetutils-traceroute
0 upgraded, 1 newly installed, 0 to remove and 139 not upgraded.
Need to get 43.1 kB of archives.
After this operation, 115 kB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu jammy-updates/universe amd64 inetutils-traceroute amd64 2:2.2-2ubuntu0.1 [43.1 kB]
Fetched 43.1 kB in 1s (40.7 kB/s)
Selecting previously unselected package inetutils-traceroute.
(Reading database ... 527610 files and directories currently installed.)
Preparing to unpack .../inetutils-traceroute_2%3a2.2-2ubuntu0.1_amd64.deb ...
Unpacking inetutils-traceroute (2:2.2-2ubuntu0.1) ...
Setting up inetutils-traceroute (2:2.2-2ubuntu0.1) ...
update-alternatives: using /usr/bin/inetutils-traceroute to provide /usr/bin/traceroute (traceroute) in auto mode
Processing triggers for man-db (2.10.2-1) ...
snehav@sneha-v:~$ traceroute www.google.com
traceroute to www.google.com (142.250.182.68), 64 hops max
  1   10.0.2.2  0.168ms  0.149ms  0.136ms
  2   10.9.0.1  0.570ms  0.380ms  0.371ms
  3   172.17.17.17  0.302ms  0.242ms  0.238ms
  4   2.2.2.2  0.316ms  0.251ms  0.288ms
  5   14.139.188.81  0.846ms  1.144ms  0.515ms
  6   10.162.68.193  21.526ms  21.118ms  21.401ms
  7   10.255.236.93  21.434ms  21.422ms  21.512ms
  8   10.119.73.122  23.154ms  21.824ms  21.748ms
  9   72.14.213.20  24.174ms  24.043ms  23.802ms
 10   *  *  *
 11   209.85.248.180  24.431ms  24.602ms  23.916ms
 12   142.251.55.245  22.394ms  22.354ms  22.114ms
 13   172.253.75.15  22.235ms  22.067ms  21.796ms
 14   142.251.55.247  21.876ms  24.145ms  21.919ms
 15   142.250.182.68  22.134ms  22.179ms  22.002ms
snehav@sneha-v:~$
```

```
snehav@sneha-v:~$ traceroute www.google.com
traceroute to www.google.com (142.250.182.68), 64 hops max
  1   10.0.2.2  0.168ms  0.149ms  0.136ms
  2   10.9.0.1  0.570ms  0.380ms  0.371ms
  3   172.17.17.17  0.302ms  0.242ms  0.238ms
  4   2.2.2.2  0.316ms  0.251ms  0.288ms
  5   14.139.188.81  0.846ms  1.144ms  0.515ms
  6   10.162.68.193  21.526ms  21.118ms  21.401ms
  7   10.255.236.93  21.434ms  21.422ms  21.512ms
  8   10.119.73.122  23.154ms  21.824ms  21.748ms
  9   72.14.213.20  24.174ms  24.043ms  23.802ms
 10   *  *  *
 11   209.85.248.180  24.431ms  24.602ms  23.916ms
 12   142.251.55.245  22.394ms  22.354ms  22.114ms
 13   172.253.75.15  22.235ms  22.067ms  21.796ms
 14   142.251.55.247  21.876ms  24.145ms  21.919ms
 15   142.250.182.68  22.134ms  22.179ms  22.002ms
```

3. **netstat**:

- **Options**: Common options include **-t** for TCP connections, **-u** for UDP connections, and **-a** to show all connections (listening and established).
- **Use Cases**: Netstat provides information about active network connections, ports, routing tables, and network interface statistics.

Eg:

```
snehav@sneha-v:~$ netstat -u www.google.com
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
udp        0      0 sneha-v:bootpc          _gateway:bootps         ESTABLISHED
snehav@sneha-v:~$
```

4. **tcpdump**:

- **Options**: Numerous options are available to specify filters, capture interfaces, and display formats.
- **Use Cases**: Tcpdump captures and displays network traffic in real-time, aiding in network troubleshooting, packet analysis, and security monitoring.

Eg:

```
snehav@sneha-v:~$ tcpdump -D
1.enp0s3 [Up, Running, Connected]
2.any (Pseudo-device that captures on all interfaces) [Up, Running]
3.lo [Up, Running, Loopback]
4.bluetooth-monitor (Bluetooth Linux Monitor) [Wireless]
5.nflog (Linux netfilter log (NFLOG) interface) [none]
6.nfqueue (Linux netfilter queue (NFQUEUE) interface) [none]
7.dbus-system (D-Bus system bus) [none]
8.dbus-session (D-Bus session bus) [none]
snehav@sneha-v:~$
```

5. **ip route**:

- **Options**: Extensive options are available for configuring networking aspects, including addresses, routes, tunnels, and more.
- **Use Cases**: Ip is a versatile tool for managing network-related configurations and settings on modern Linux systems.

Eg:

```
snehav@sneha-v:~$ ip route
default via 10.0.2.2 dev enp0s3 proto dhcp metric 100
10.0.2.0/24 dev enp0s3 proto kernel scope link src 10.0.2.15 metric 100
169.254.0.0/16 dev enp0s3 scope link metric 1000
snehav@sneha-v:~$
```

6. **nslookup**:

- **Options**: Commonly used for interactive mode, where you can type domain names to obtain DNS information.
- **Use Cases**: Nslookup is used to query DNS records and retrieve information about domain names, IP addresses, and name servers.

Eg:

```
snehav@sneha-v:~$ nslookup google.com
Server:         127.0.0.53
Address:        127.0.0.53#53

Non-authoritative answer:
Name:   google.com
Address: 142.250.182.14
Name:   google.com
Address: 2404:6800:4007:828::200e
```

7. **route**:

- **Options**: Options include **-n** to show numeric addresses, **-add** to add a new route, and **-delete** to remove a route.
- **Use Cases**: Route helps manage routing tables and configure network routes on the system.

Eg:

```
snehav@sneha-v:~$ route -n
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
0.0.0.0         10.0.2.2        0.0.0.0         UG    100    0        0 enp0s3
10.0.2.0        0.0.0.0         255.255.255.0   U     100    0        0 enp0s3
169.254.0.0     0.0.0.0         255.255.0.0     U     1000   0        0 enp0s3
```

8. **ifconfig**:

- **Options**: Options include specifying the interface with **-a**, **-s** for a short output, and various flags to configure interface properties.
- **Use Cases**: Ifconfig displays and configures network interfaces, IP addresses, netmasks, and related settings.
  Eg:

```
snehav@sneha-v:~$ ifconfig -v
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.0.2.15  netmask 255.255.255.0  broadcast 10.0.2.255
        inet6 fe80::4189:99eb:8168:bdff  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:69:3d:45  txqueuelen 1000  (Ethernet)
        RX packets 50899  bytes 58696183 (58.6 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 15126  bytes 7825745 (7.8 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 5341  bytes 490180 (490.1 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 5341  bytes 490180 (490.1 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

9. **ifup**, **ifquery**:

- **Options**: Generally used with interface names to bring up, or query status respectively.
- **Use Cases**: These tools are used to control network interfaces, enabling you to start or stop network connectivity for specific interfaces.

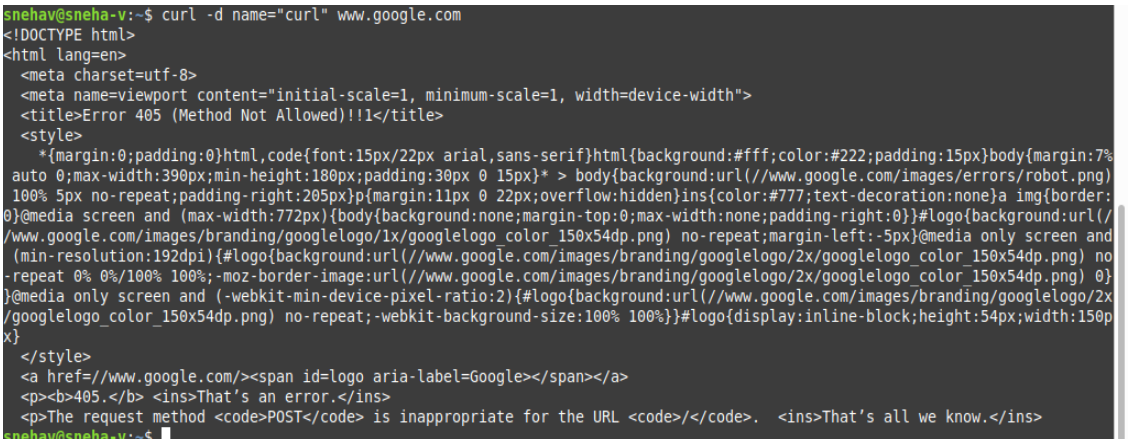
Eg:

```
snehav@sneha-v:~$ ifquery -l
lo
snehav@sneha-v:~$ ifup -V
ifup version 0.8.36+nmu1ubuntu3.1

Copyright (c) 1999-2009 Anthony Towns
              2010-2015 Andrej Shadura
              2015-2017 Guus Sliepen

This program is free software; you can redistribute it and/or modify
it under the terms of the GNU General Public License as published by
the Free Software Foundation; either version 2 of the License, or (at
your option) any later version.
snehav@sneha-v:~$
```

10. **curl**:

- **Options**: Curl supports a wide range of options including **-o** to specify output file, **-X** for HTTP method, and **-H** to set headers.
- **Use Cases**: Curl is used for sending and receiving data with URLs, making it versatile for testing APIs, downloading files, and more.

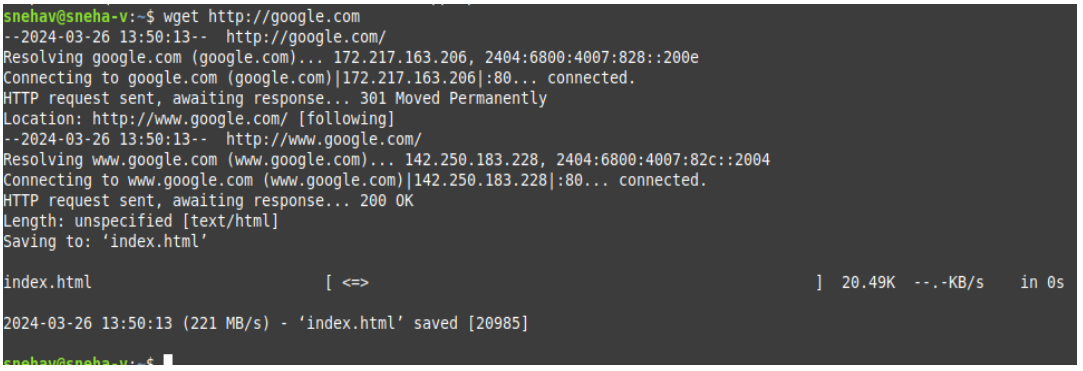
  Eg:



11. **wget**:

- **Options**: Options include **-O** to specify output file, **-r** for recursive downloads, and **-nc** to skip existing files.
- **Use Cases**: Wget is used for non-interactive downloads from the web, supporting recursive downloads, mirroring, and resuming.

  Eg:



RESULT

Command line tools for networking has been executed and the output is verified.

Experiment No : 7 **Date: 26-03-2024**

GNU MAKE TOOLS

AIM

Execute the gnu make tool operations.

- Create file named hellomake.c with the below code

```
#include <hellomake.h>
int main() {
 myPrintHelloMake();
 return(0);
}
```

- Create file named hellofunc.c with the below code

```
#include <stdio.h>
#include <hellomake.h>
void myPrintHelloMake(void) {
 printf("Hello makefiles!\n");
 return;
}
```

- Create file named hellomake.c with the below code

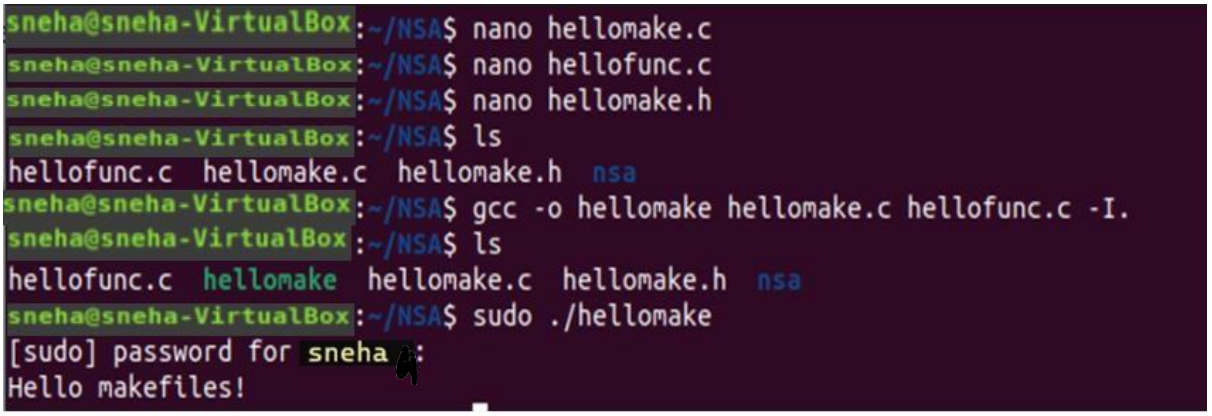
```
void myPrintHelloMake(void);
```

- Create the make file of the 3 files with the following command
  gcc -o hellomake hellomake.c hellofunc.c -I.

This compiles the two .c files and names the executable hellomake. The -I. is included so that gcc will look in the current directory (.) for the include file hellomake.h. Without a makefile, the typical approach to the test/modify/debug cycle is to use the up arrow in a terminal to go back to your last compile command so you don't have to type it each time, especially once you've added a few more .c files to the mix.

- Run the makefile created with the following command
  Sudo ./hellomake

OUTPUT



RESULT

GUN make tool has been executed and the output is verified.

Experiment No : 8 **Date: 04-04-2024**

SETTING UP WEBSERVER AND WORDPRESS

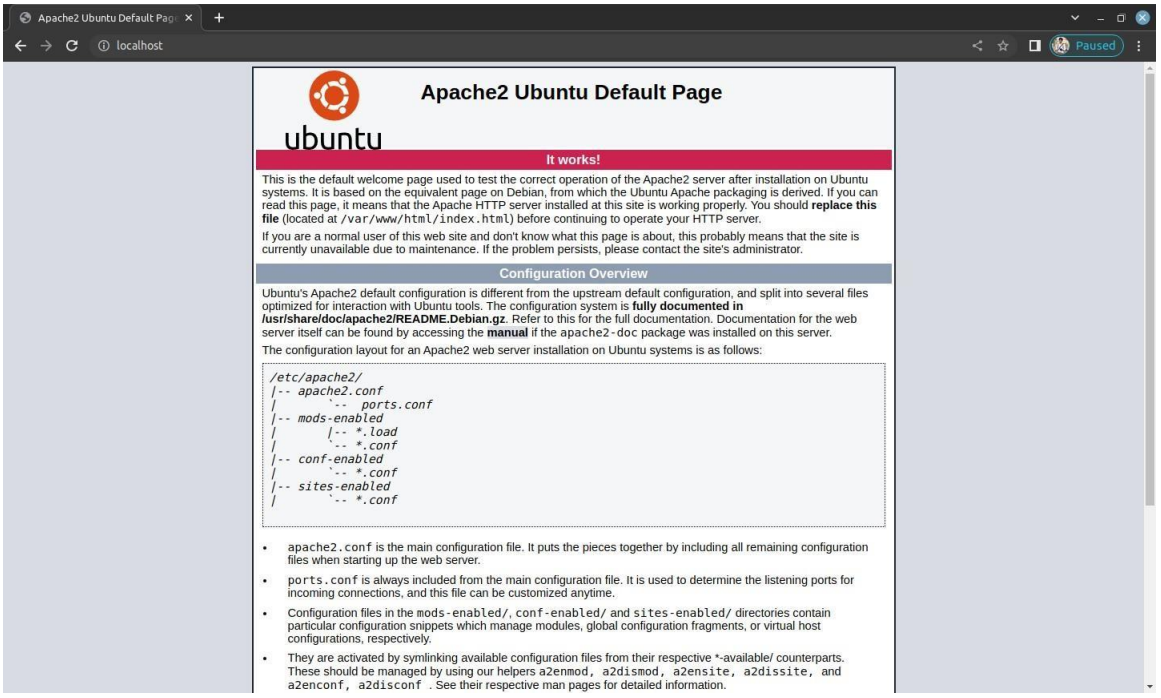
AIM

Setting up webserver and WordPress

Install the Apache2

```
sneha@sneha-VirtualBox:~$ sudo apt install apache2
[sudo] password for sneha:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  apache2-bin apache2-data apache2-utils libapr1 libaprutil1 libaprutil1-dbd-sqlite3 libaprutil1-ldap liblua5.3-0
Suggested packages:
  apache2-doc apache2-suexec-pristine | apache2-suexec-custom
The following NEW packages will be installed:
  apache2 apache2-bin apache2-data apache2-utils libapr1 libaprutil1 libaprutil1-dbd-sqlite3 libaprutil1-ldap liblua5.3-0
0 upgraded, 9 newly installed, 0 to remove and 127 not upgraded.
Need to get 2,058 kB of archives.
After this operation, 8,231 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libapr1 amd64 1.7.0-8ubuntu0.22.04.1 [108 kB]
Get:2 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libaprutil1 amd64 1.6.1-5ubuntu4.22.04.2 [92.8 kB]
Get:3 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libaprutil1-dbd-sqlite3 amd64 1.6.1-5ubuntu4.22.04.2 [11.3 kB]
Get:4 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libaprutil1-ldap amd64 1.6.1-5ubuntu4.22.04.2 [9,170 B]
Get:5 http://archive.ubuntu.com/ubuntu jammy/main amd64 liblua5.3-0 amd64 5.3.6-1build1 [140 kB]
Get:6 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 apache2-bin amd64 2.4.52-1ubuntu4.8 [1,346 kB]
Get:7 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 apache2-data all 2.4.52-1ubuntu4.8 [165 kB]
Get:8 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 apache2-utils amd64 2.4.52-1ubuntu4.8 [88.6 kB]
Get:9 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 apache2 amd64 2.4.52-1ubuntu4.8 [97.9 kB]
Fetched 2,058 kB in 5s (389 kB/s)
Selecting previously unselected package libapr1:amd64.
(Reading database ... 528133 files and directories currently installed.)
Preparing to unpack .../0-libapr1_1.7.0-8ubuntu0.22.04.1_amd64.deb ...
Unpacking libapr1:amd64 (1.7.0-8ubuntu0.22.04.1) ...
Selecting previously unselected package libaprutil1:amd64.
Preparing to unpack .../1-libaprutil1_1.6.1-5ubuntu4.22.04.2_amd64.deb ...
Unpacking libaprutil1:amd64 (1.6.1-5ubuntu4.22.04.2) ...
Selecting previously unselected package libaprutil1-dbd-sqlite3:amd64.
```

Verify that the localhost page is available



Install Mysql and mysql secure installation

```
sneha@sneha-VirtualBox:~$ sudo apt install mysql-server
[sudo] password for sneha:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  libevent-core-2.1-7 libevent-pthreads-2.1-7 libhtml-template-perl libmecab2 libprotobuf-lite23 mecab-ipadic mecab-ipadic-utf8 mecab-utils mysql-client-8.0
  mysql-client-core-8.0 mysql-common mysql-server-8.0 mysql-server-core-8.0
Suggested packages:
  libipc-sharedcache-perl mailx tinyca
The following NEW packages will be installed:
  libevent-core-2.1-7 libevent-pthreads-2.1-7 libhtml-template-perl libmecab2 libprotobuf-lite23 mecab-ipadic mecab-ipadic-utf8 mecab-utils mysql-client-8.0
  mysql-client-core-8.0 mysql-common mysql-server mysql-server-8.0 mysql-server-core-8.0
0 upgraded, 14 newly installed, 0 to remove and 160 not upgraded.
Need to get 29.0 MB of archives.
After this operation, 241 MB 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 mysql-common all 5.8+1.0.8 [7,212 B]
Get:2 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 mysql-client-core-8.0 amd64 8.0.36-0ubuntu0.22.04.1 [2,692 kB]
Get:3 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 mysql-client-8.0 amd64 8.0.36-0ubuntu0.22.04.1 [22.7 kB]
Get:4 http://archive.ubuntu.com/ubuntu jammy/main amd64 libevent-core-2.1-7 amd64 2.1.12-stable-1build3 [93.9 kB]
Get:5 http://archive.ubuntu.com/ubuntu jammy/main amd64 libevent-pthreads-2.1-7 amd64 2.1.12-stable-1build3 [7,642 B]
Get:6 http://archive.ubuntu.com/ubuntu jammy/main amd64 libmecab2 amd64 0.996-14build9 [199 kB]
Get:7 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libprotobuf-lite23 amd64 3.12.4-1ubuntu7.22.04.1 [209 kB]
Get:8 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 mysql-server-core-8.0 amd64 8.0.36-0ubuntu0.22.04.1 [17.5 MB]
Get:9 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 mysql-server-8.0 amd64 8.0.36-0ubuntu0.22.04.1 [1,437 kB]
Get:10 http://archive.ubuntu.com/ubuntu jammy/main amd64 libhtml-template-perl all 2.97-1.1 [59.1 kB]
Get:11 http://archive.ubuntu.com/ubuntu jammy/main amd64 mecab-utils amd64 0.996-14build9 [4,850 B]
Get:12 http://archive.ubuntu.com/ubuntu jammy/main amd64 mecab-ipadic all 2.7.0-20070801+main-3 [6,718 kB]
Get:13 http://archive.ubuntu.com/ubuntu jammy/main amd64 mecab-ipadic-utf8 all 2.7.0-20070801+main-3 [4,384 B]
Get:14 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 mysql-server all 8.0.36-0ubuntu0.22.04.1 [9,460 B]
Fetched 29.0 MB in 22s (1,297 kB/s)
```

```
sneha@sneha-VirtualBox:~$ sudo mysql_secure_installation

Securing the MySQL server deployment.

Connecting to MySQL using a blank password.

VALIDATE PASSWORD COMPONENT can be used to test passwords
and improve security. It checks the strength of password
and allows the users to set only those passwords which are
secure enough. Would you like to setup VALIDATE PASSWORD component?

Press y|Y for Yes, any other key for No: y

There are three levels of password validation policy:

LOW    Length >= 8
MEDIUM Length >= 8, numeric, mixed case, and special characters
STRONG Length >= 8, numeric, mixed case, special characters and dictionary                 file

Please enter 0 = LOW, 1 = MEDIUM and 2 = STRONG: 1

Skipping password set for root as authentication with auth_socket is used by default.
If you would like to use password authentication instead, this can be done with the "ALTER_USER" command.
See https://dev.mysql.com/doc/refman/8.0/en/alter-user.html#alter-user-password-management for more information.

By default, a MySQL installation has an anonymous user,
allowing anyone to log into MySQL without having to have
a user account created for them. This is intended only for
testing, and to make the installation go a bit smoother.
You should remove them before moving into a production
environment.

Remove anonymous users? (Press y|Y for Yes, any other key for No) : y
Success.
```

```
Normally, root should only be allowed to connect from
'localhost'. This ensures that someone cannot guess at
the root password from the network.

Disallow root login remotely? (Press y|Y for Yes, any other key for No) : y
Success.

By default, MySQL comes with a database named 'test' that
anyone can access. This is also intended only for testing,
and should be removed before moving into a production
environment.


Remove test database and access to it? (Press y|Y for Yes, any other key for No) : y
 - Dropping test database...
Success.

 - Removing privileges on test database...
Success.

Reloading the privilege tables will ensure that all changes
made so far will take effect immediately.

Reload privilege tables now? (Press y|Y for Yes, any other key for No) : y
Success.

All done!
```

Install php,php-mysql and libapache2-mod-php

```
File  Edit  View  Search  Terminal  Help
All done!
root@rahul-VirtualBox:/home/rahul# sudo apt install php libapache2-mod-php php-mysql
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libapache2-mod-php7.4 php-common php7.4 php7.4-cli php7.4-common php7.4-json php7.4-mysql php7.4-opcache php7.4-readline
Suggested packages:
  php-pear
The following NEW packages will be installed:
  libapache2-mod-php libapache2-mod-php7.4 php php-common php-mysql php7.4 php7.4-cli php7.4-common php7.4-json php7.4-mysql php7.4-opcache php7.4-readline
0 upgraded, 12 newly installed, 0 to remove and 534 not upgraded.
Need to get 4,157 kB of archives.
After this operation, 18.5 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://archive.ubuntu.com/ubuntu focal/main amd64 php-common all 2:75 [11.9 kB]
Get:2 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 php7.4-common amd64 7.4.3-4ubuntu2.19 [983 kB]
Get:3 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 php7.4-json amd64 7.4.3-4ubuntu2.19 [19.2 kB]
Get:4 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 php7.4-opcache amd64 7.4.3-4ubuntu2.19 [198 kB]
Get:5 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 php7.4-readline amd64 7.4.3-4ubuntu2.19 [12.6 kB]
Get:6 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 php7.4-cli amd64 7.4.3-4ubuntu2.19 [1,426 kB]
Get:7 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 libapache2-mod-php7.4 amd64 7.4.3-4ubuntu2.19 [1,369 kB]
Get:8 http://archive.ubuntu.com/ubuntu focal/main amd64 libapache2-mod-php all 2:7.4+75 [2,836 B]
Get:9 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 php7.4 all 7.4.3-4ubuntu2.19 [9,236 B]
Get:10 http://archive.ubuntu.com/ubuntu focal/main amd64 php all 2:7.4+75 [2,712 B]
Get:11 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 php7.4-mysql amd64 7.4.3-4ubuntu2.19 [121 kB]
Get:12 http://archive.ubuntu.com/ubuntu focal/main amd64 php-mysql all 2:7.4+75 [2,000 B]
Fetched 4,157 kB in 14s (294 kB/s)
Selecting previously unselected package php-common.
(Reading database ... 276511 files and directories currently installed.)
Preparing to unpack .../00-php-common_2%3a75_all.deb ...
Unpacking php-common (2:75) ...
Selecting previously unselected package php7.4-common.
Preparing to unpack .../01-php7.4-common_7.4.3-4ubuntu2.19_amd64.deb ...
Unpacking php7.4-common (7.4.3-4ubuntu2.19) ...
Selecting previously unselected package php7.4-json.
Preparing to unpack .../02-php7.4-json_7.4.3-4ubuntu2.19_amd64.deb ...
Unpacking php7.4-json (7.4.3-4ubuntu2.19) ...
Selecting previously unselected package php7.4-opcache.
Preparing to unpack .../03-php7.4-opcache_7.4.3-4ubuntu2.19_amd64.deb ...
Unpacking php7.4-opcache (7.4.3-4ubuntu2.19) ...
Selecting previously unselected package php7.4-readline.
Preparing to unpack .../04-php7.4-readline_7.4.3-4ubuntu2.19_amd64.deb ...
Unpacking php7.4-readline (7.4.3-4ubuntu2.19) ...
Selecting previously unselected package php7.4-cli.
Preparing to unpack .../05-php7.4-cli_7.4.3-4ubuntu2.19_amd64.deb ...
```

Check the status apache2 server after performing the restart

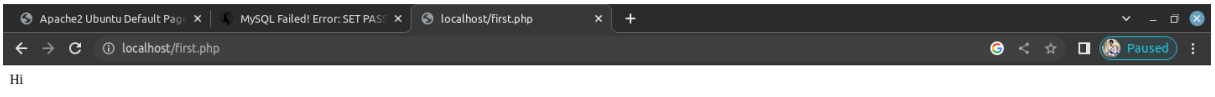
```
File  Edit  View  Search  Terminal  Help
rahul@rahul-VirtualBox:~$ sudo systemctl restart apache2
rahul@rahul-VirtualBox:~$ sudo systemctl status apache2
● apache2.service - The Apache HTTP Server
     Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor prese>
     Active: active (running) since Mon 2023-07-24 13:58:55 IST; 6s ago
       Docs: https://httpd.apache.org/docs/2.4/
    Process: 16418 ExecStart=/usr/sbin/apachectl start (code=exited, status=0/S>
   Main PID: 16440 (apache2)
      Tasks: 6 (limit: 4613)
     Memory: 9.8M
     CGroup: /system.slice/apache2.service
             ├─16440 /usr/sbin/apache2 -k start
             ├─16441 /usr/sbin/apache2 -k start
             ├─16442 /usr/sbin/apache2 -k start
             ├─16443 /usr/sbin/apache2 -k start
             ├─16444 /usr/sbin/apache2 -k start
             └─16445 /usr/sbin/apache2 -k start

Jul 24 13:58:55 rahul-VirtualBox systemd[1]: apache2.service: Succeeded.
Jul 24 13:58:55 rahul-VirtualBox systemd[1]: Stopped The Apache HTTP Server.
Jul 24 13:58:55 rahul-VirtualBox systemd[1]: Starting The Apache HTTP Server...
Jul 24 13:58:55 rahul-VirtualBox apachectl[16432]: AH00558: apache2: Could not >
Jul 24 13:58:55 rahul-VirtualBox systemd[1]: Started The Apache HTTP Server.
 ESCOC
```

Install php-cli

```
test@test-VirtualBox:~$ sudo apt install php-cli
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  php-cli
0 upgraded, 1 newly installed, 0 to remove and 320 not upgraded.
Need to get 2,792 B of archives.
After this operation, 13.3 kB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu focal/main amd64 php-cli all 2:7.4+75 [2,792 B]
Fetched 2,792 B in 0s (7,001 B/s)
Selecting previously unselected package php-cli.
(Reading database ... 276642 files and directories currently installed.)
Preparing to unpack .../php-cli_2%3a7.4+75_all.deb ...
Unpacking php-cli (2:7.4+75) ...
Setting up php-cli (2:7.4+75) ...
```

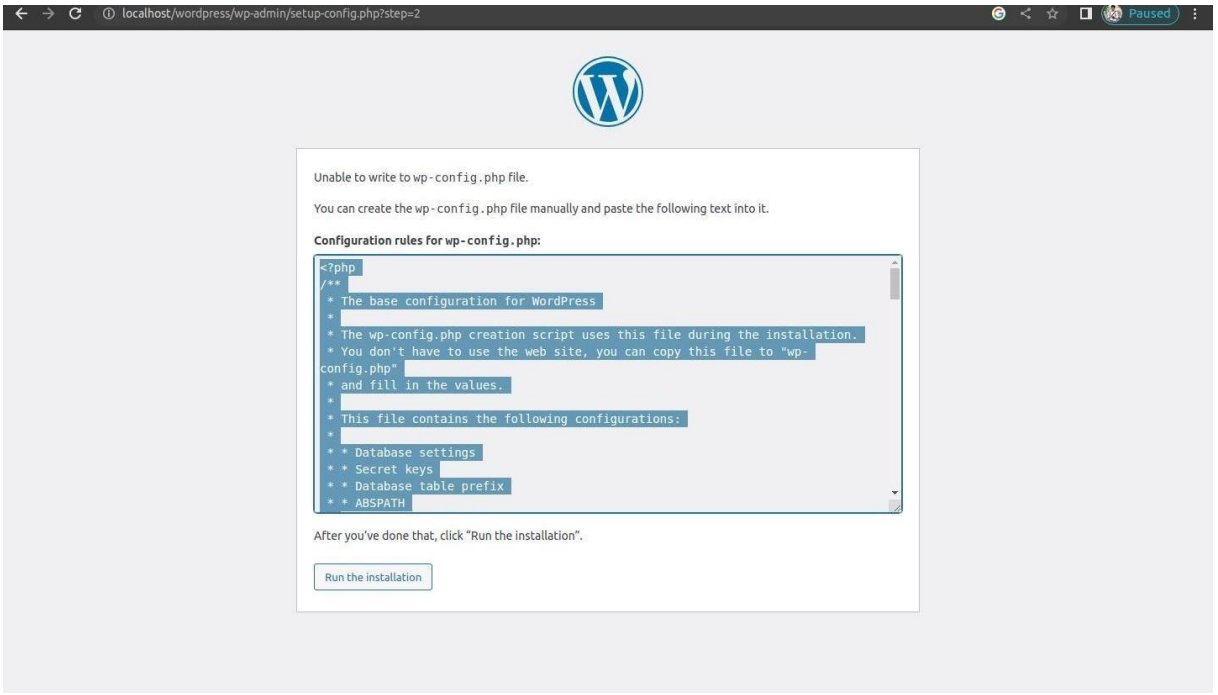
Create a php file in the server folder to check the webserver and run in browser.

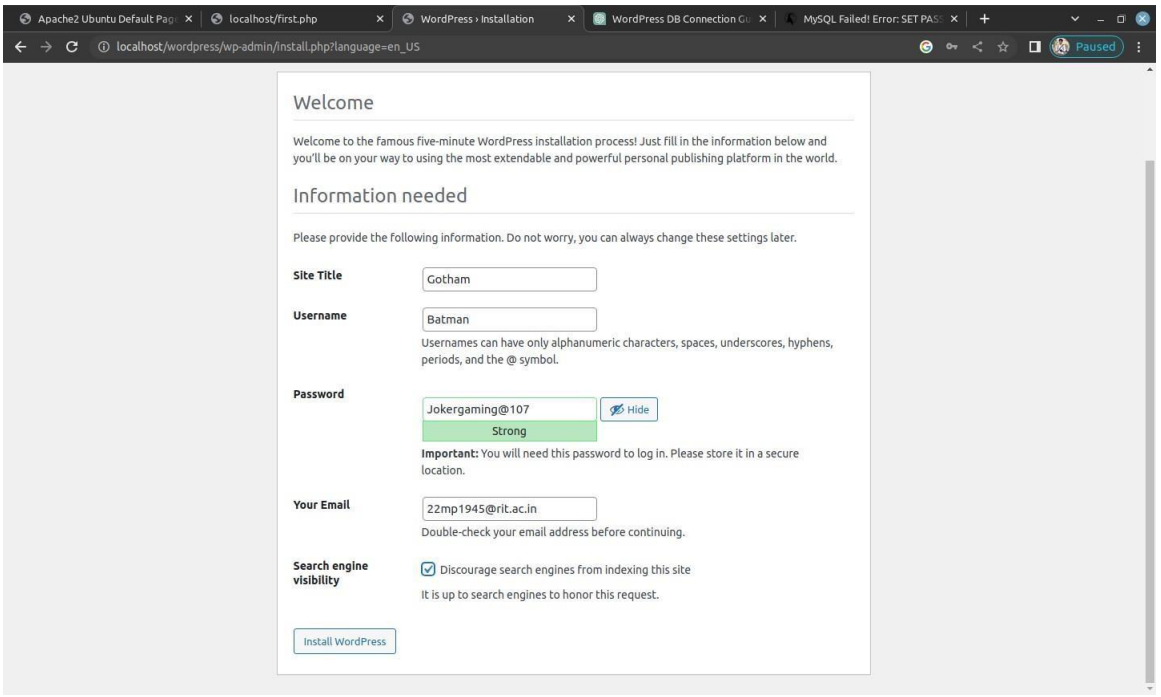
```
test@test-VirtualBox:/var/www/html$ cd ..
test@test-VirtualBox:/var/www$ sudo chmod -R 777 html
[sudo] password for test:
test@test-VirtualBox:/var/www$ cd html
test@test-VirtualBox:/var/www/html$ nano hello.html
test@test-VirtualBox:/var/www/html$ nano hello.html
test@test-VirtualBox:/var/www/html$ nano hello.php
test@test-VirtualBox:/var/www/html$
```



Hi

Download the WordPress file from internet and run the installation file through browser. Fill the required details and click on Install at last.





RESULT

Webserver setup has been done tried the WordPress for creating the websites.

Experiment No : 9 **Date: 04-04-2024**

NETWORK PACKET STREAM ANALYSIS USING WIRESHARK

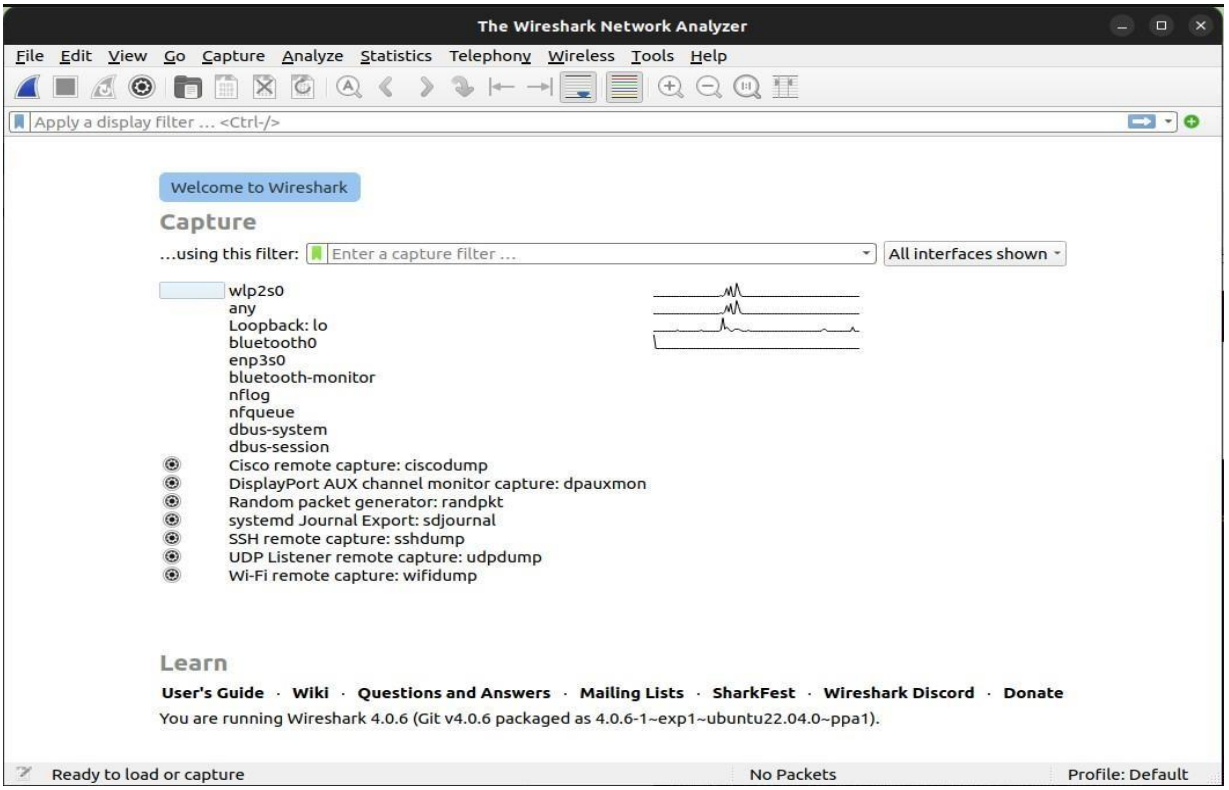
AIM

Network packet stream analysis using Wireshark

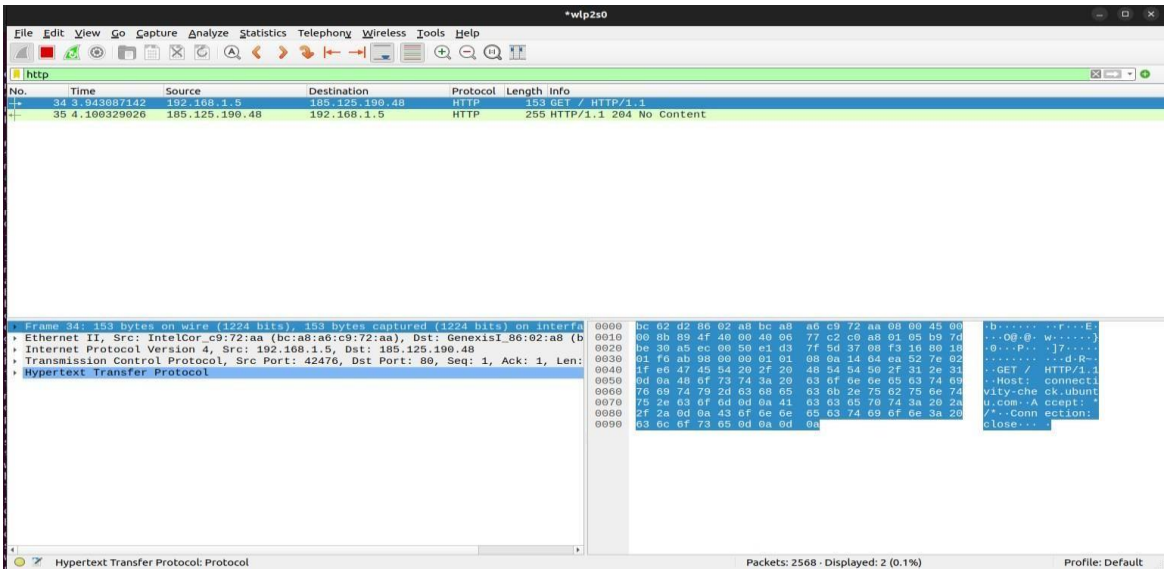
Install Wireshark

```
sneha@sneha-VirtualBox:~$ sudo apt install wireshark-qt
[sudo] password for sneha:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  libbcg729-0 libc-ares2 libminizip1 libqt5multimedia5 libqt5multimedia5-plugins libqt5multimediagsttools5 libqt5multimediawidgets5 libqt5printsupport5
  libsmi2ldbl libspandsp2 libwireshark-data libwireshark15 libwiretap12 libwsutil13 wireshark wireshark-common
Suggested packages:
  snmp-mibs-downloader geoipupdate geoip-database-extra libjs-leaflet libjs-leaflet.markercluster wireshark-doc
The following NEW packages will be installed:
  libbcg729-0 libc-ares2 libminizip1 libqt5multimedia5 libqt5multimedia5-plugins libqt5multimediagsttools5 libqt5multimediawidgets5 libqt5printsupport5
  libsmi2ldbl libspandsp2 libwireshark-data libwireshark15 libwiretap12 libwsutil13 wireshark wireshark-common wireshark-qt
0 upgraded, 17 newly installed, 0 to remove and 127 not upgraded.
Need to get 27.6 MB of archives.
After this operation, 132 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libbcg729-0 amd64 1.1.1-2 [32.9 kB]
Get:2 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libminizip1 amd64 1.1-8build1 [20.2 kB]
Get:3 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libqt5multimedia5 amd64 5.15.3-1 [320 kB]
Get:4 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libqt5multimediawidgets5 amd64 5.15.3-1 [42.6 kB]
Get:5 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libqt5multimediagsttools5 amd64 5.15.3-1 [112 kB]
Get:6 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libqt5multimedia5-plugins amd64 5.15.3-1 [178 kB]
Get:7 http://archive.ubuntu.com/ubuntu jammy-updates/universe amd64 libqt5printsupport5 amd64 5.15.3+dfsg-2ubuntu0.2 [214 kB]
Get:8 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libsmi2ldbl amd64 0.4.8+dfsg2-16 [100 kB]
Get:9 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libspandsp2 amd64 0.0.6+dfsg-2 [272 kB]
Get:10 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libwireshark-data all 3.6.2-2 [1,647 kB]
Get:11 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libc-ares2 amd64 1.18.1-1ubuntu0.22.04.3 [45.1 kB]
Get:12 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libwsutil13 amd64 3.6.2-2 [99.2 kB]
Get:13 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libwiretap12 amd64 3.6.2-2 [255 kB]
Get:14 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libwireshark15 amd64 3.6.2-2 [19.5 MB]
Get:15 http://archive.ubuntu.com/ubuntu jammy/universe amd64 wireshark-common amd64 3.6.2-2 [473 kB]
Get:16 http://archive.ubuntu.com/ubuntu jammy/universe amd64 wireshark-qt amd64 3.6.2-2 [4,269 kB]
```

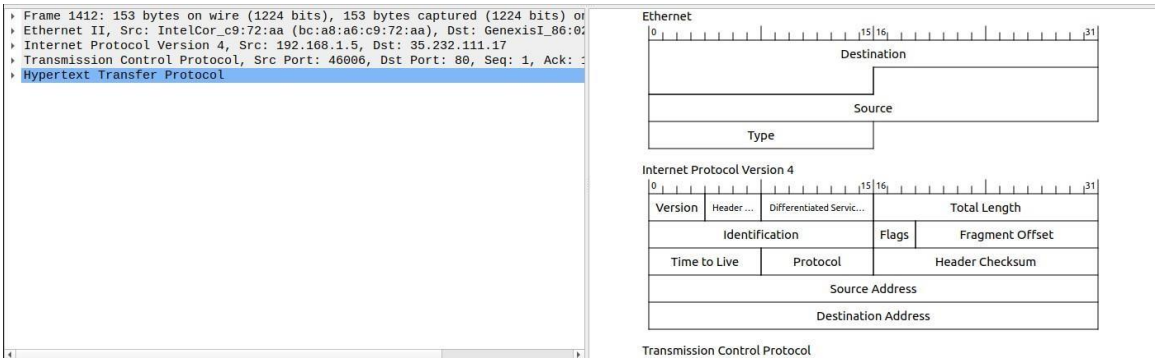
Open Wireshark and you will be able to see the list of interfaces available in your system like wlp2s0,any,loopback etc.. (wlp2s0 is interface for WiFi and enp3s0 is interface for Ethernet.). You can click on the respective interface name. In the below list i have clicked on WiFi interface.

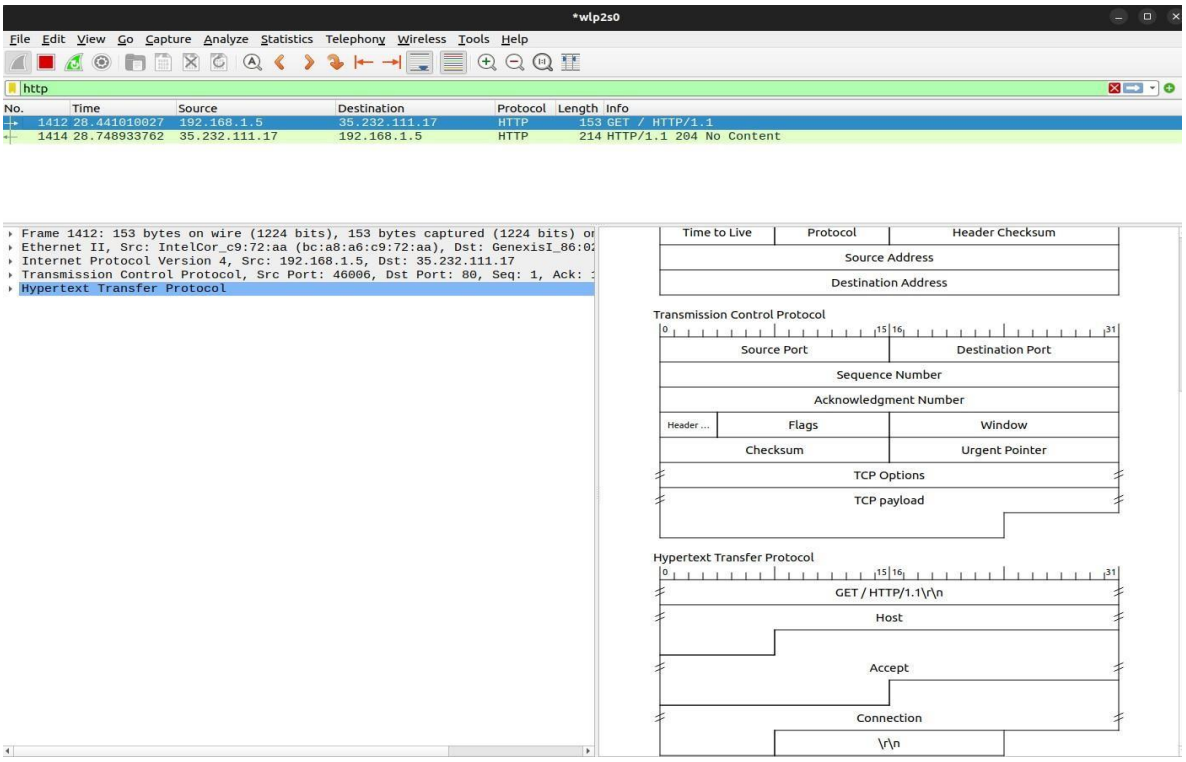


In this page you can see all the traffic going out and coming to the interface. Also you can use the filter option for seeing only the specific type requests like HTTP



If you check at the bottom you can identify the data's in each layers of TCP/IP





RESULT

Network packet stream analysis using Wireshark has been done and the output is verified.