Computer Networks Lab

Assignment 1

Network commands

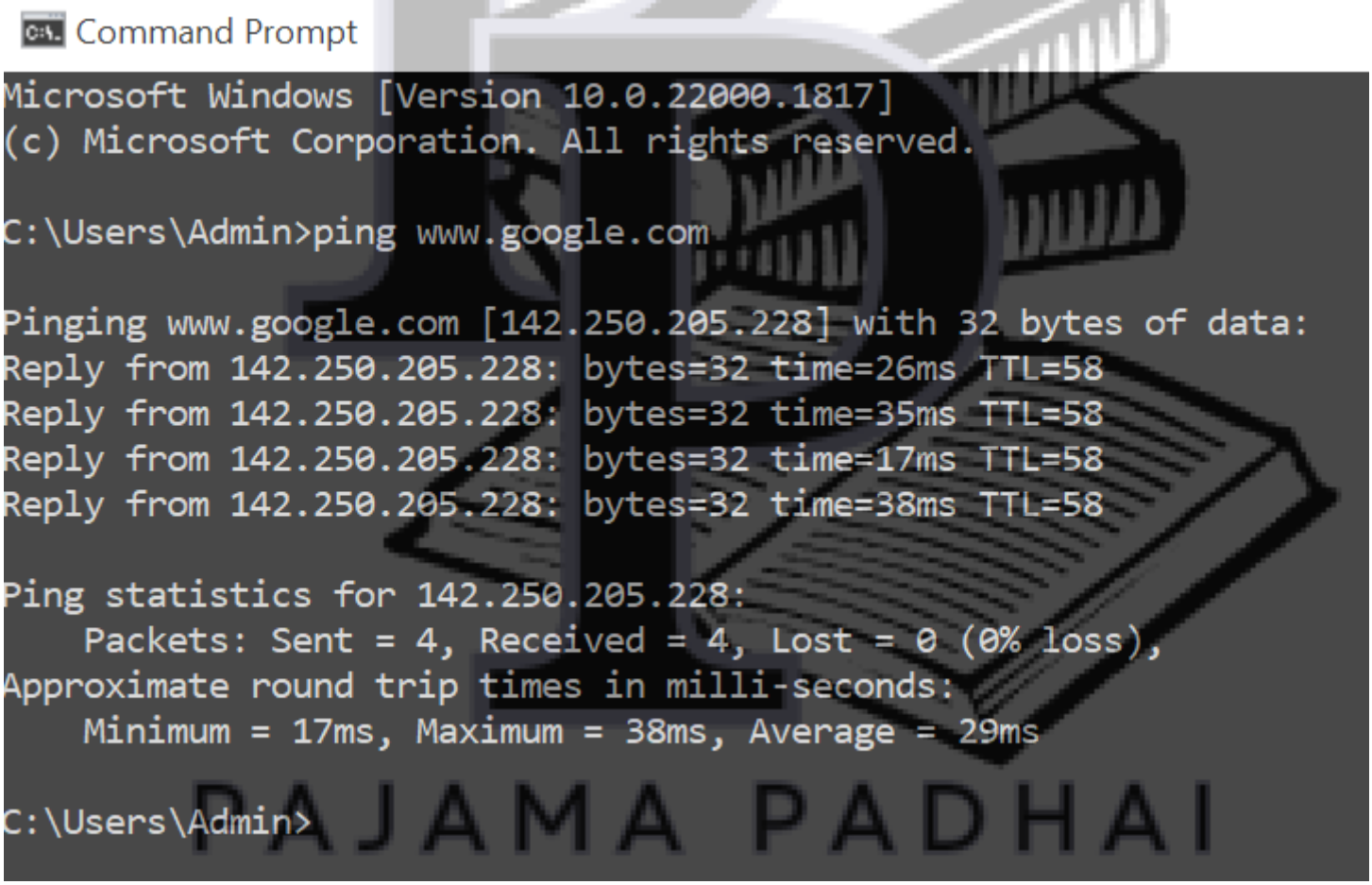
1. Ping Command

The ping command is one of the most often used networking utilities for detecting devices on a network and for troubleshooting network problems.

The general format is **ping hostname** or **ping IPaddress**.

Example

ping www.google.com or **ping 216.58.208.68**



2. ipconfig Command

Another indispensable and frequently used utility that is used for finding network information about your local machine like IP addresses, DNS addresses etc

Basic Use: Finding Your IP Address and Default Gateway

```
Command Prompt

C:\Users\Admin>ipconfig

Windows IP Configuration


Ethernet adapter Ethernet:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::ae87:c020:71:abf4%16
   IPv4 Address. . . . . . . . . . . : 192.168.56.1
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . :

Wireless LAN adapter Local Area Connection* 1:

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

Wireless LAN adapter Local Area Connection* 10:

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

Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::3f32:d4a4:48a7:9ba%15
   IPv4 Address. . . . . . . . . . . : 172.16.120.34
   Subnet Mask . . . . . . . . . . . : 255.255.248.0
   Default Gateway . . . . . . . . . : 172.16.120.1

C:\Users\Admin>
```

3. Hostname Command

A very simple command that displays the host name of your machine. This is much quicker than going to the control **panel>system** route.

```
C:\Users\Admin>hostname
DESKTOP-K10SJ9U

C:\Users\Admin>
```

4. getmac Command

Another very simple command that shows the MAC address of your network interfaces

```
C:\Users\Admin>getmac

Physical Address    Transport Name
=================== ==========================================================
90-32-4B-90-05-B1   \Device\Tcpip_{D4C8753C-954F-499F-BA19-3517C89D7D51}
0A-00-27-00-00-10   \Device\Tcpip_{E9030EC2-ED9D-4468-A0B8-3FC982EB4911}

C:\Users\Admin>
```


5. arp Command

This is used for showing the **address resolution cache**. This command must be used with a command line switch **arp -a** is the most common.

Command Prompt

```
C:\Users\Admin>arp -a

Interface: 172.16.120.34 --- 0xf
  Internet Address      Physical Address      Type
  172.16.120.1          c8-cb-b8-d4-5e-c9     dynamic
  172.16.120.94         00-e9-3a-de-08-71     dynamic
  172.16.120.99         dc-21-48-bd-40-1b     dynamic
  172.16.120.127        58-96-1d-18-4b-e7     dynamic
  172.16.120.143        cc-6b-1e-98-54-63     dynamic
  172.16.122.89         00-e9-3a-d3-ad-fd     dynamic
  172.16.122.183        34-6f-24-e2-22-9d     dynamic
  172.16.123.78         34-6f-24-2b-86-73     dynamic
  172.16.123.95         80-b6-55-ee-bb-73     dynamic
  172.16.123.193        e0-2b-e9-2b-ce-a6     dynamic
  172.16.124.134        dc-21-5c-3e-8e-4c     dynamic
  172.16.124.157        28-cd-c4-c6-1b-9d     dynamic
  172.16.124.159        ec-63-d7-db-f8-17     dynamic
  172.16.125.40         cc-6b-1e-46-99-63     dynamic
  172.16.125.146        ec-2e-98-e0-fe-27     dynamic
  172.16.125.208        84-1b-77-19-d3-40     dynamic
  172.16.125.227        c8-94-02-a8-50-75     dynamic
  172.16.125.245        c8-b2-9b-0e-b2-b7     dynamic
  172.16.127.239        c4-23-60-ae-0e-02     dynamic
  172.16.127.255        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
  255.255.255.255       ff-ff-ff-ff-ff-ff     static

Interface: 192.168.56.1 --- 0x10
  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

C:\Users\Admin>
```

6. NSlookup

Used for checking DNS record entries.

```
C:\Users\Admin>NSlookup
Default Server:  UnKnown
Address:  172.16.120.1
```

7. Nbtstat

Diagnostic tool for troubleshooting netBIOS problems.

```
C:\Users\Admin>Nbtstat

Displays protocol statistics and current TCP/IP connections using NBT
(NetBIOS over TCP/IP).

NBTSTAT [ [-a RemoteName] [-A IP address] [-c] [-n]
        [-r] [-R] [-RR] [-s] [-S] [interval] ]

  -a   (adapter status) Lists the remote machine's name table given its name
  -A   (Adapter status) Lists the remote machine's name table given its
                        IP address.
  -c   (cache)          Lists NBT's cache of remote [machine] names and their IP addresses
  -n   (names)          Lists local NetBIOS names.
  -r   (resolved)       Lists names resolved by broadcast and via WINS
  -R   (Reload)         Purges and reloads the remote cache name table
  -S   (Sessions)       Lists sessions table with the destination IP addresses
  -s   (sessions)       Lists sessions table converting destination IP
                        addresses to computer NETBIOS names.
  -RR  (ReleaseRefresh) Sends Name Release packets to WINS and then, starts Refresh

  RemoteName   Remote host machine name.
  IP address   Dotted decimal representation of the IP address.
  interval     Redisplays selected statistics, pausing interval seconds
               between each display. Press Ctrl+C to stop redisplaying
               statistics.
```

8. Netstat Command

Used for displaying information about tcp and udp connections and ports.

```
C:\Users\Admin>Netstat

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    127.0.0.1:49673        DESKTOP-K10SJ9U:49674  ESTABLISHED
  TCP    127.0.0.1:49674        DESKTOP-K10SJ9U:49673  ESTABLISHED
  TCP    127.0.0.1:49675        DESKTOP-K10SJ9U:49676  ESTABLISHED
  TCP    127.0.0.1:49676        DESKTOP-K10SJ9U:49675  ESTABLISHED
```


9. net statistics

Use the net statistics command to show the network statistics log for the *Server* or *Workstation* service.

```
C:\Users\Admin>net statistics
Statistics are available for the following running services:

   Workstation

The command completed successfully.
```

10. net user

The net user command is used to add, delete, and otherwise manage the users on a computer.

```
C:\Users\Admin>net user

User accounts for \\DESKTOP-K10SJ9U

-------------------------------------------------------------------------------
Admin                    Administrator            DefaultAccount
Guest                    WDAGUtilityAccount
The command completed successfully.
```

11. net accounts

The net accounts command is used to set password and logon requirements for users. For example, the net accounts command can be used to set the minimum number of characters that users can set their password to. Also supported is password expiration, minimum number of days before a user can change their password again, and the unique password count before the user can use the same old password.

```
C:\Users\Admin>net accounts
Force user logoff how long after time expires?:       Never
Minimum password age (days):                          0
Maximum password age (days):                          42
Minimum password length:                              0
Length of password history maintained:                None
Lockout threshold:                                    Never
Lockout duration (minutes):                           30
Lockout observation window (minutes):                 30
Computer role:                                        WORKSTATION
The command completed successfully.
```

12. net config

Use the net config command to show information about the configuration of the *Server* or *Workstation* service.

```
C:\Users\Admin>net config
The following running services can be controlled:

   Server
   Workstation

The command completed successfully.
```


13. net start

Executing the net start command without any options following it (e.g., net start "print spooler") is useful if you want to see a list of currently running services. This list can be helpful when managing services because you don't have to leave the command line to see which services are running.

14. net localgroup

The net localgroup command is used to add, delete, and manage local groups on computers.

15. net share

The net share command is used to create, remove, and otherwise manage shared resources on the computer.

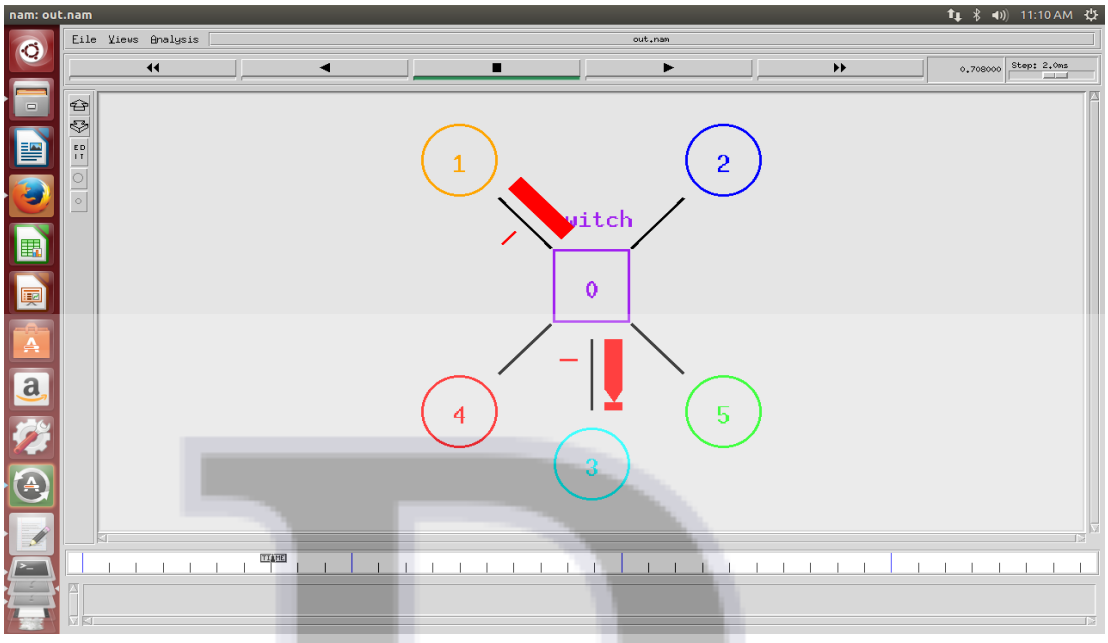
```
C:\Users\Admin>net share

Share name   Resource                        Remark

-------------------------------------------------------------------------------
C$           C:\                             Default share
D$           D:\                             Default share
E$           E:\                             Default share
IPC$                                         Remote IPC
ADMIN$       C:\WINDOWS                      Remote Admin
The command completed successfully.
```

Topology using NS2

Types of Network Topology:

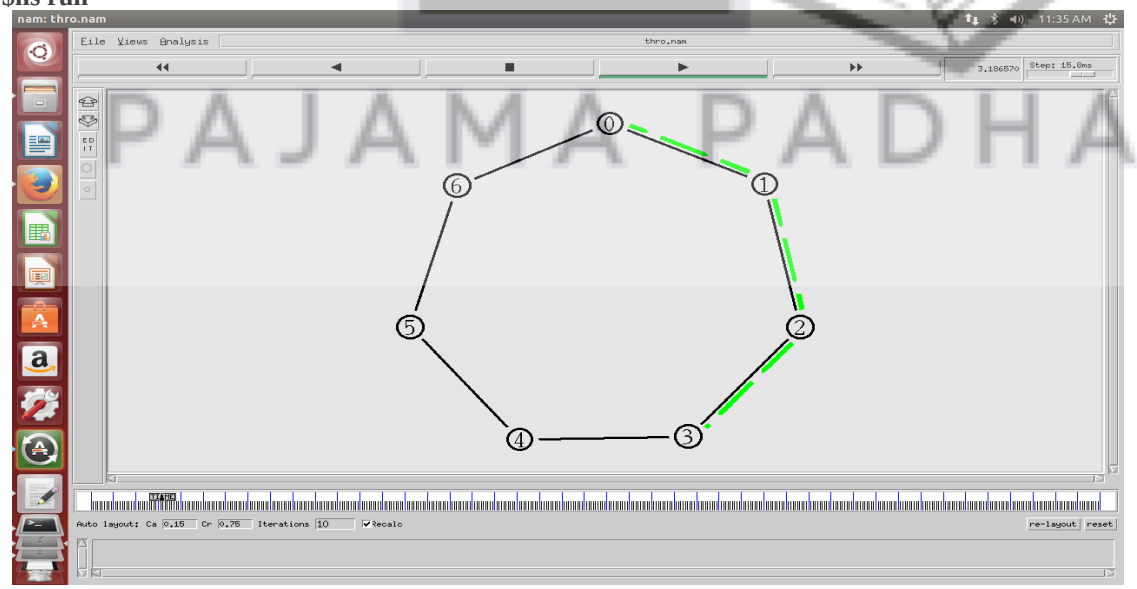
1. **Star Topology:**

```
# Creating nodes
set ns [new Simulator]
set n0 [$ns node]
set n1 [$ns node]
set n2 [$ns node]
set n3 [$ns node]
set n4 [$ns node]

# Creating links
$ns duplex-link $n0 $n1 10Mb 10ms DropTail
$ns duplex-link $n0 $n2 10Mb 10ms DropTail
$ns duplex-link $n0 $n3 10Mb 10ms DropTail
$ns duplex-link $n0 $n4 10Mb 10ms DropTail

# Setting up traffic
set tcp [new Agent/TCP]
$ns attach-agent $n0 $tcp
set sink [new Agent/TCPSink]
$ns attach-agent $n4 $sink
$ns connect $tcp $sink

# Setting simulation parameters
$ns at 0.1 "$tcp set packetSize_ 1000"
$ns at 0.2 "$tcp send 1000"

# Running the simulation
$ns run
```



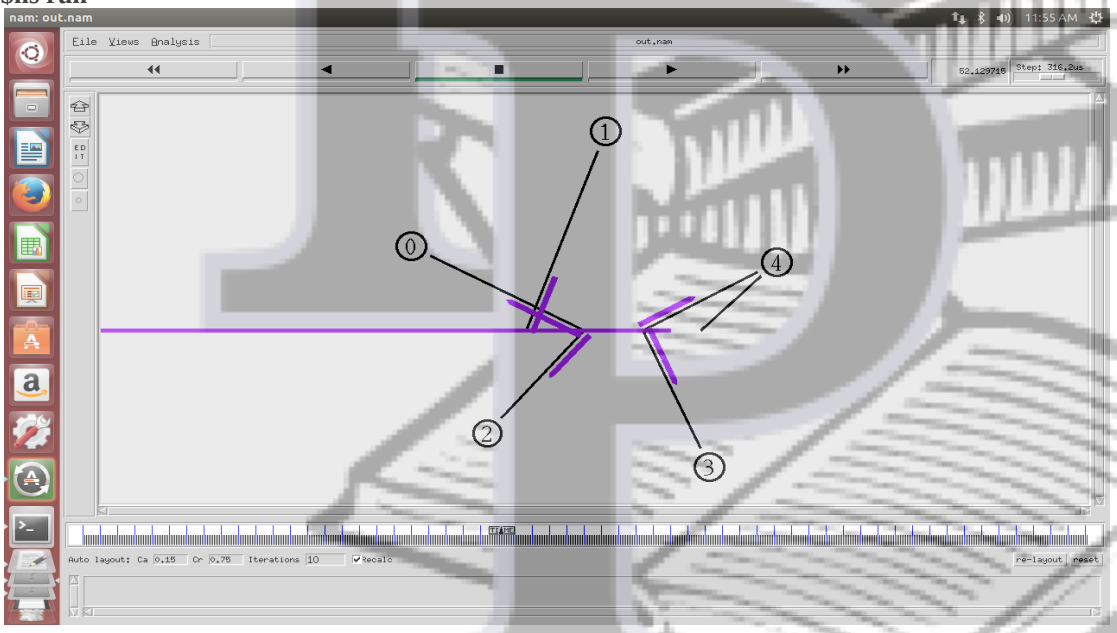
2. **Ring Topology:**

```
# Creating nodes
set ns [new Simulator]
set n0 [$ns node]
set n1 [$ns node]
set n2 [$ns node]
set n3 [$ns node]
set n4 [$ns node]

# Creating links
$ns duplex-link $n0 $n1 10Mb 10ms DropTail
$ns duplex-link $n1 $n2 10Mb 10ms DropTail
$ns duplex-link $n2 $n3 10Mb 10ms DropTail
$ns duplex-link $n3 $n4 10Mb 10ms DropTail
$ns duplex-link $n4 $n0 10Mb 10ms DropTail

# Setting up traffic
set tcp [new Agent/TCP]
$ns attach-agent $n0 $tcp
set sink [new Agent/TCPSink]
$ns attach-agent $n2 $sink
$ns connect $tcp $sink

# Setting simulation parameters
$ns at 0.1 "$tcp set packetSize_ 1000"
$ns at 0.2 "$tcp send 1000"

# Running the simulation
$ns run
```



3. **Bus Topology:**

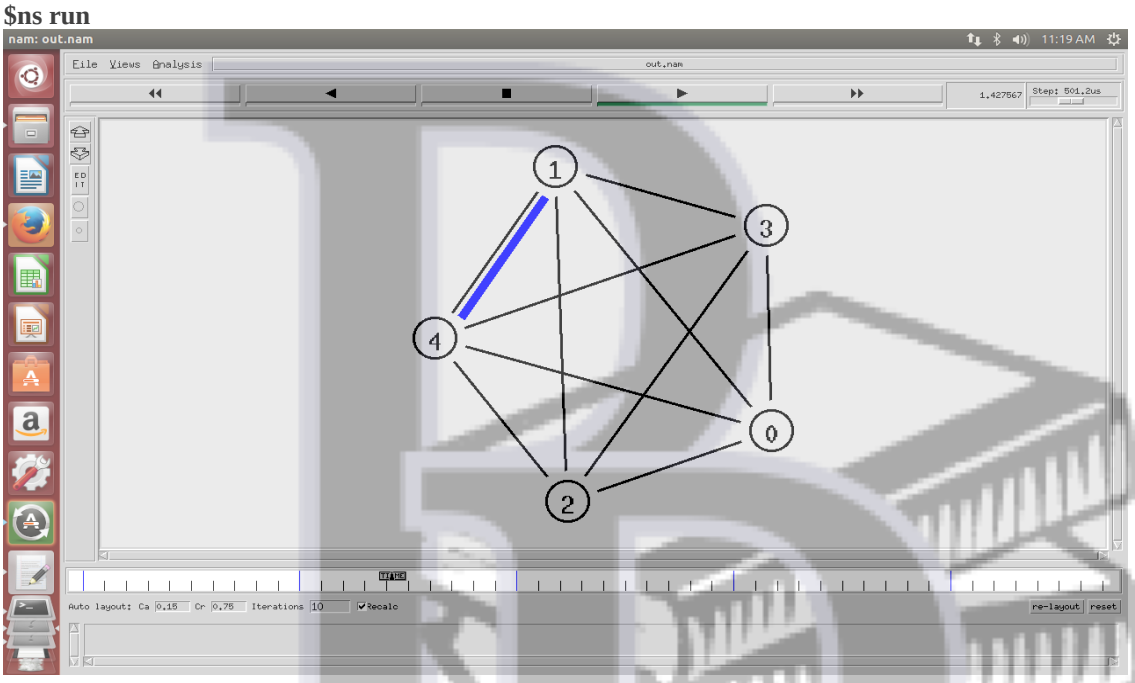
```
# Creating nodes
set ns [new Simulator]
set n0 [$ns node]
set n1 [$ns node]
set n2 [$ns node]
set n3 [$ns node]
set n4 [$ns node]

# Creating links
$ns duplex-link $n0 $n1 10Mb 10ms DropTail
$ns duplex-link $n1 $n2 10Mb 10ms DropTail
$ns duplex-link $n2 $n3 10Mb 10ms DropTail
$ns duplex-link $n3 $n4 10Mb 10ms DropTail

# Setting up traffic
set tcp [new Agent/TCP]
$ns attach-agent $n0 $tcp
set sink [new Agent/TCPSink]
$ns attach-agent $n4 $sink
$ns connect $tcp $sink

# Setting simulation parameters
$ns at 0.1 "$tcp set packetSize_ 1000"
$ns at 0.2 "$tcp send 1000"

# Running the simulation
$ns run
```



4. **Mesh Topology:**

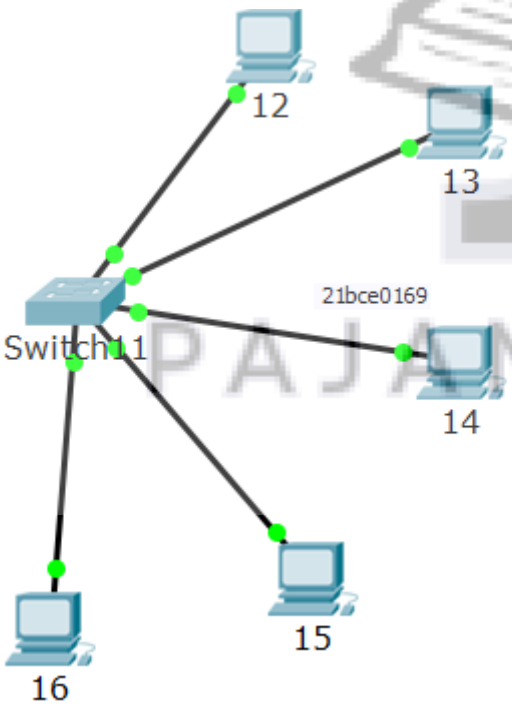
```
# Creating nodes
set ns [new Simulator]
set n0 [$ns node]
set n1 [$ns node]
set n2 [$ns node]
set n3 [$ns node]
set n4 [$ns node]

# Creating links
$ns duplex-link $n0 $n1 10Mb 10ms DropTail
$ns duplex-link $n0 $n2 10Mb 10ms DropTail
$ns duplex-link $n0 $n3 10Mb 10ms DropTail
$ns duplex-link $n0 $n4 10Mb 10ms DropTail
$ns duplex-link $n1 $n2 10Mb 10ms DropTail
$ns duplex-link $n1 $n3 10Mb 10ms DropTail
$ns duplex-link $n1 $n4 10Mb 10ms DropTail
$ns duplex-link $n2 $n3 10Mb 10ms DropTail
$ns duplex-link $n2 $n4 10Mb 10ms DropTail
$ns duplex-link $n3 $n4 10Mb 10ms DropTail
```

```
# Setting up traffic
set tcp [new Agent/TCP]
$ns attach-agent $n0 $tcp
set sink [new Agent/TCPSink]
$ns attach-agent $n4 $sink
$ns connect $tcp $sink

# Setting simulation parameters
$ns at 0.1 "$tcp set packetSize_ 1000"
$ns at 0.2 "$tcp send 1000"

# Running the simulation
$ns run
```

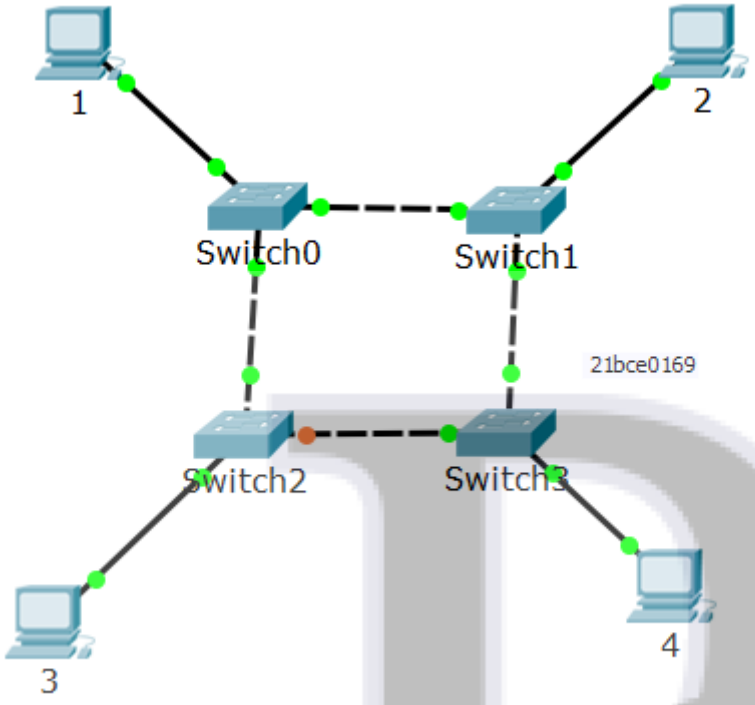


Topology using Packet Tracer

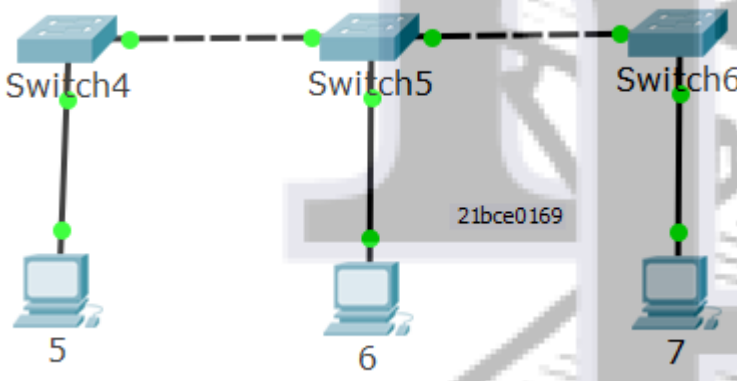
Star topology



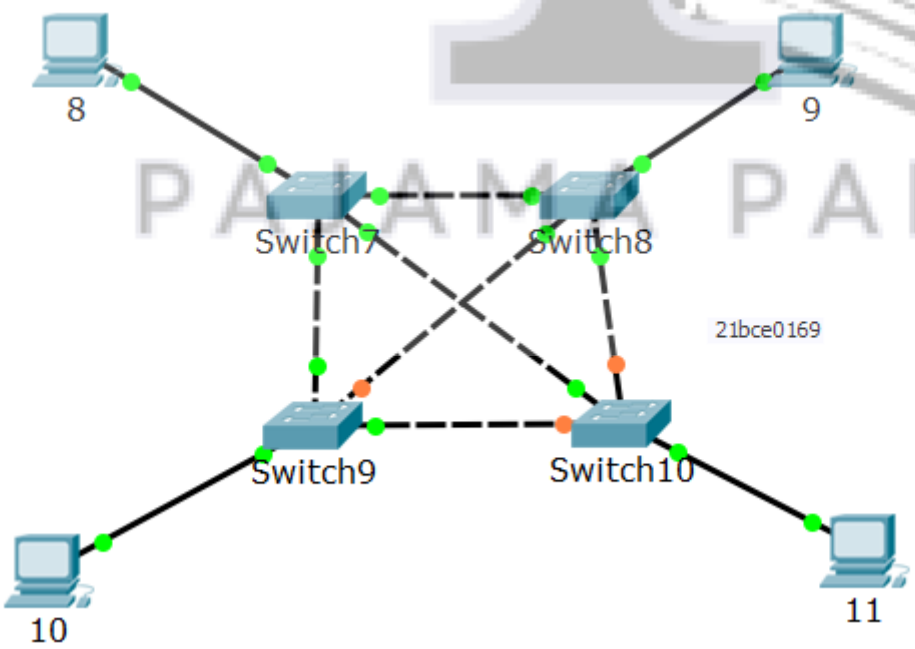
Ring topology



Bus topology



Mesh topology



Hybrid topology