



# Laboratorio #1

# Repaso de Redes de Computacion 1

*Redes de Computación 2*

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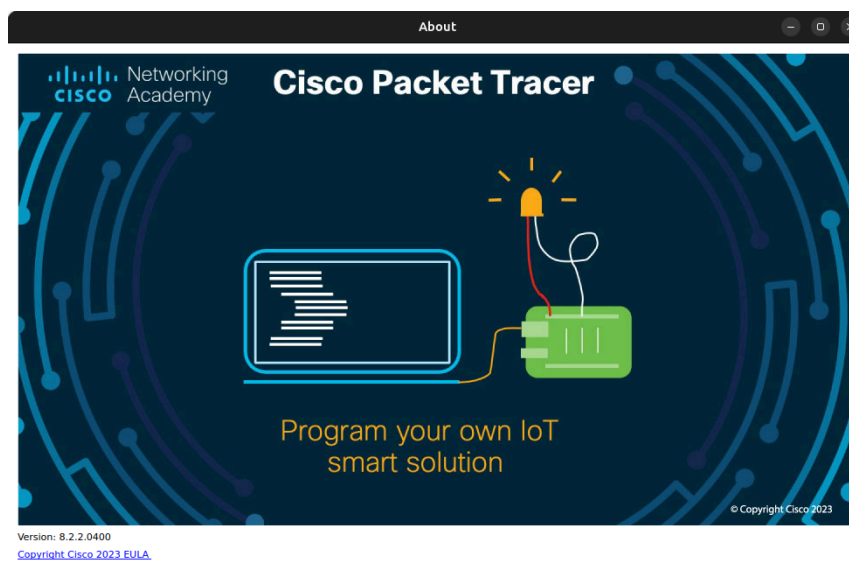
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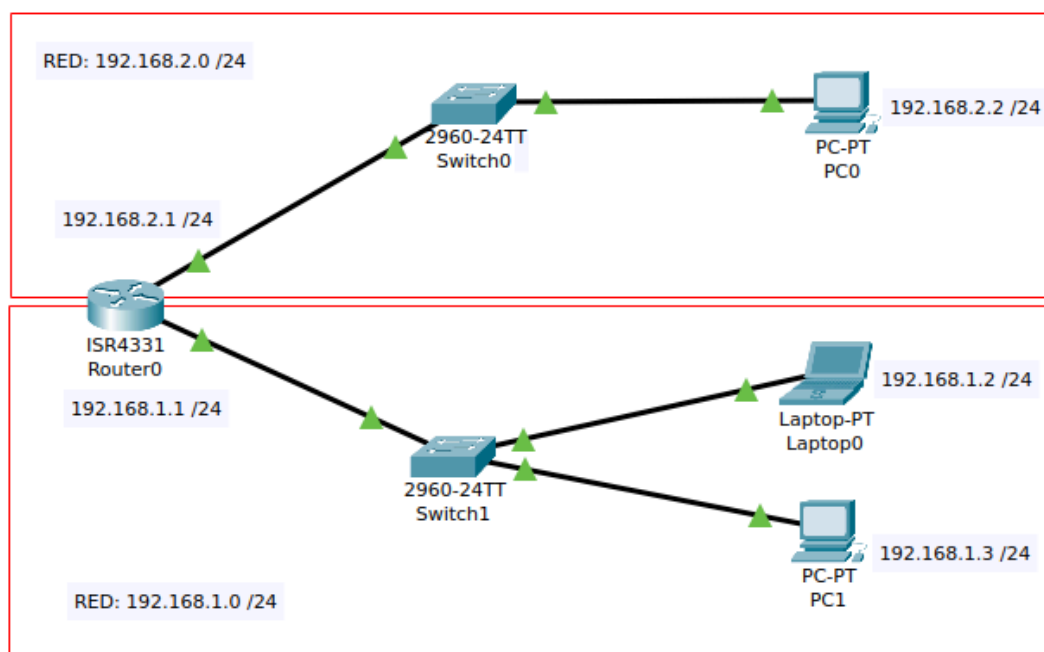
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## Actividad #1 - Diseño de red LAN básica

### Packet Tracer



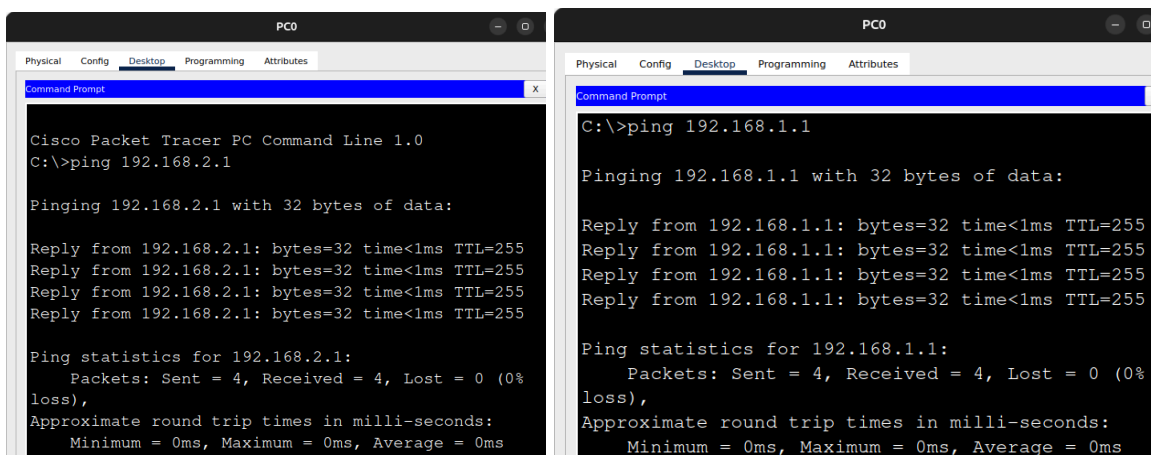
### Topología



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## Conectividad

### PC0 a Router0



The image shows two side-by-side screenshots of the PC0 Command Prompt in Cisco Packet Tracer. Both screenshots show a successful ping command. The left screenshot shows a ping to 192.168.2.1, and the right screenshot shows a ping to 192.168.1.1. Both pings resulted in 4 successful replies with 0% loss.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.2.1

Pinging 192.168.2.1 with 32 bytes of data:

Reply from 192.168.2.1: bytes=32 time<1ms TTL=255
Reply from 192.168.2.1: bytes=32 time<1ms TTL=255
Reply from 192.168.2.1: bytes=32 time<1ms TTL=255
Reply from 192.168.2.1: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.2.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0%
loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

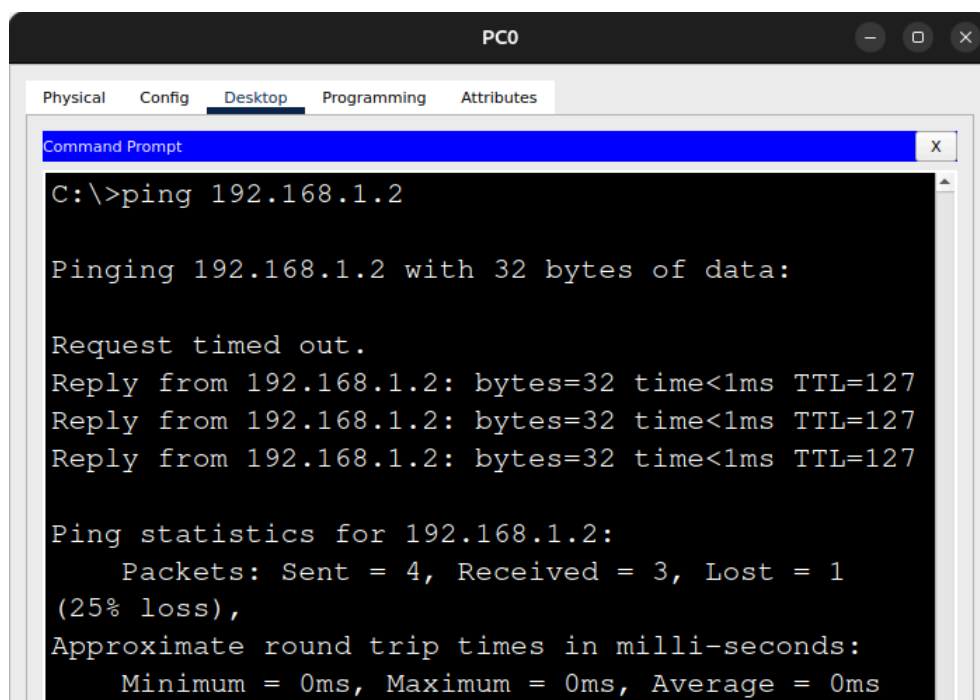
```
C:\>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:

Reply from 192.168.1.1: bytes=32 time<1ms TTL=255
Reply from 192.168.1.1: bytes=32 time<1ms TTL=255
Reply from 192.168.1.1: bytes=32 time<1ms TTL=255
Reply from 192.168.1.1: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0%
loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

### PC0 a Laptop0



The image shows a screenshot of the PC0 Command Prompt in Cisco Packet Tracer. The ping command to 192.168.1.2 failed, resulting in 1 lost packet (25% loss) and a request timeout.

```
C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.1.2: bytes=32 time<1ms TTL=127
Reply from 192.168.1.2: bytes=32 time<1ms TTL=127
Reply from 192.168.1.2: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 3, Lost = 1
(25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

### PC0 a PC1

---

The screenshot shows a PC0 desktop environment with a window titled 'PC0'. Inside the window, there are tabs for 'Physical', 'Config', 'Desktop', 'Programming', and 'Attributes'. The 'Desktop' tab is active, and a 'Command Prompt' window is open. The Command Prompt shows the following output:

```
C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

Request timed out.
Reply from 192.168.1.3: bytes=32 time<1ms TTL=127
Reply from 192.168.1.3: bytes=32 time<1ms TTL=127
Reply from 192.168.1.3: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 3, Lost = 1
    (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

## Actividad #2 - Diseño de red LAN extendida

### Segmentación

Propósito	Red + Mascara	Ultima Dirección	Direcciones
Coliseum	192.168.0.0/18	192.168.63.255	16384
Lab Ingenieria	192.169.64.0/19	192.169.95.255	8192
Lab Medicina	192.168.96.0/19	192.168.127.255	8192
Librería	192.168.128.0/20	192.168.143.255	4096
P. Ejecutiva	192.168.144.0/23	192.168.145.255	512
Ad. Ingenieria	192.168.146.0/24	192.168.146.255	256
Ad. Medicina	192.168.147.0/24	192.168.147.255	256
Servidores	192.168.148.0/28	192.168.148.15	16
R. Admin - Servers	10.10.1.0/30	10.10.1.3	4

R. Servers - Labs	10.10.1.4/30	10.10.1.7	4
R. Labs - Campus	10.10.1.8/30	10.10.1.11	4
R. Campus - Admin	10.10.1.12/30	10.10.1.15	4
R. Campus - Servers	10.10.1.16/30	10.10.1.19	4

## DHCP Server' Pools

### Coliseum

DHCP

---

Interface FastEthernet0 ▾ Service ☒ On ☐ Off

Pool Name COLISEUM

Default Gateway 192.168.0.1

DNS Server 192.168.148.3

Start IP Address : 192 168 0 2

Subnet Mask: 255 255 192 0

Maximum Number of Users : 16382

TFTP Server: 0.0.0.0

WLC Address: 0.0.0.0

### Laboratory of Engineering

DHCP

---

Interface FastEthernet0 ▾ Service ☒ On ☐ Off

Pool Name LAB\_ENG

Default Gateway 192.168.64.1

DNS Server 192.168.148.3

Start IP Address : 192 168 64 2

Subnet Mask: 255 255 224 0

Maximum Number of Users : 8190

TFTP Server: 0.0.0.0

WLC Address: 0.0.0.0

---

## Laboratory of Medicine

DHCP

---

Interface	FastEthernet0	Service	<input checked="" type="radio"/> On	<input type="radio"/> Off
Pool Name	LAB_MED			
Default Gateway	192.168.96.1			
DNS Server	192.168.148.3			
Start IP Address :	192	168	96	2
Subnet Mask:	255	255	224	0
Maximum Number of Users :	8190			
TFTP Server:	0.0.0.0			
WLC Address:	0.0.0.0			

## Library

DHCP

---

Interface	FastEthernet0	Service	<input checked="" type="radio"/> On	<input type="radio"/> Off
Pool Name	LIBRARY			
Default Gateway	192.168.128.1			
DNS Server	192.168.148.3			
Start IP Address :	192	168	128	2
Subnet Mask:	255	255	240	0
Maximum Number of Users :	4094			
TFTP Server:	0.0.0.0			
WLC Address:	0.0.0.0			

## Executive

DHCP

---

Interface	FastEthernet0	Service	<input checked="" type="radio"/> On	<input type="radio"/> Off
Pool Name	EXECUTIVE			
Default Gateway	192.168.144.1			
DNS Server	192.168.148.3			
Start IP Address :	192	168	144	2
Subnet Mask:	255	255	254	0
Maximum Number of Users :	510			
TFTP Server:	0.0.0.0			
WLC Address:	0.0.0.0			

---



## Administration of Engineering

**DHCP**

---

Interface FastEthernet0 ▾ Service ☒ On ☐ Off

Pool Name AD\_ENG

Default Gateway 192.168.146.1

DNS Server 192.168.148.3

Start IP Address : 192 168 146 2

Subnet Mask: 255 255 255 0

Maximum Number of Users : 254

TFTP Server: 0.0.0.0

WLC Address: 0.0.0.0

## Administration of Medicine

**DHCP**

---

Interface FastEthernet0 ▾ Service ☒ On ☐ Off

Pool Name AD\_MED

Default Gateway 192.168.147.1

DNS Server 192.168.148.3

Start IP Address : 192 168 147 2

Subnet Mask: 255 255 255 0

Maximum Number of Users : 254

TFTP Server: 0.0.0.0

WLC Address: 0.0.0.0

## DNS Server

**DNS**

---

DNS Service ☒ On ☐ Off

---

Resource Records

Name capioso.com Type A Record ▾

Address 192.168.148.6

Add Save Remove

No.	Name	Type	Detail
0	capioso.com	A Record	192.168.148.6

## Email Server

EMAIL

SMTP Service

☒ ON ☐ OFF

POP3 Service

☒ ON ☐ OFF

Domain Name:

User Setup

User  Password

ing1

doc1

## Router SERVERS

```
SERVERS#show running-config
Building configuration...
!
hostname SERVERS
!
interface GigabitEthernet0/0/0
 ip address 192.168.148.1 255.255.255.240
 duplex auto
 speed auto
!
interface Serial0/1/0
 ip address 10.10.1.6 255.255.255.252
 clock rate 2000000
!
interface Serial0/1/1
 ip address 10.10.1.2 255.255.255.252
!
interface Serial0/2/0
 ip address 10.10.1.18 255.255.255.252
!
router rip
 version 2
 network 10.0.0.0
 network 192.168.148.0
!
end
```

---

## Router LABS

```
LABS#show running-config
!
hostname LABS
!
interface GigabitEthernet0/0/0
 ip address 192.168.64.1 255.255.224.0
 ip helper-address 192.168.148.2
 duplex auto
 speed auto
!
interface GigabitEthernet0/0/1
 ip address 192.168.96.1 255.255.224.0
 ip helper-address 192.168.148.2
 duplex auto
 speed auto
!
interface Serial0/1/0
 ip address 10.10.1.10 255.255.255.252
!
interface Serial0/1/1
 ip address 10.10.1.5 255.255.255.252
!
router rip
 version 2
 network 10.0.0.0
 network 192.168.64.0
 network 192.168.96.0
!
end
```

## Router CAMPUS

```
CAMPUS#show running-config
!
hostname CAMPUS
!
interface GigabitEthernet0/0/0
 ip address 192.168.128.1 255.255.240.0
 ip helper-address 192.168.148.2
 duplex auto
 speed auto
```

---

---

```
!  
interface GigabitEthernet0/0/1  
  ip address 192.168.0.1 255.255.192.0  
  ip helper-address 192.168.148.2  
  duplex auto  
  speed auto  
!  
interface Serial0/1/0  
  ip address 10.10.1.13 255.255.255.252  
!  
interface Serial0/1/1  
  ip address 10.10.1.9 255.255.255.252  
  clock rate 2000000  
!  
interface Serial0/2/0  
  ip address 10.10.1.17 255.255.255.252  
  clock rate 2000000  
!  
router rip  
  version 2  
  network 10.0.0.0  
  network 192.168.0.0  
  network 192.168.128.0  
!  
end
```

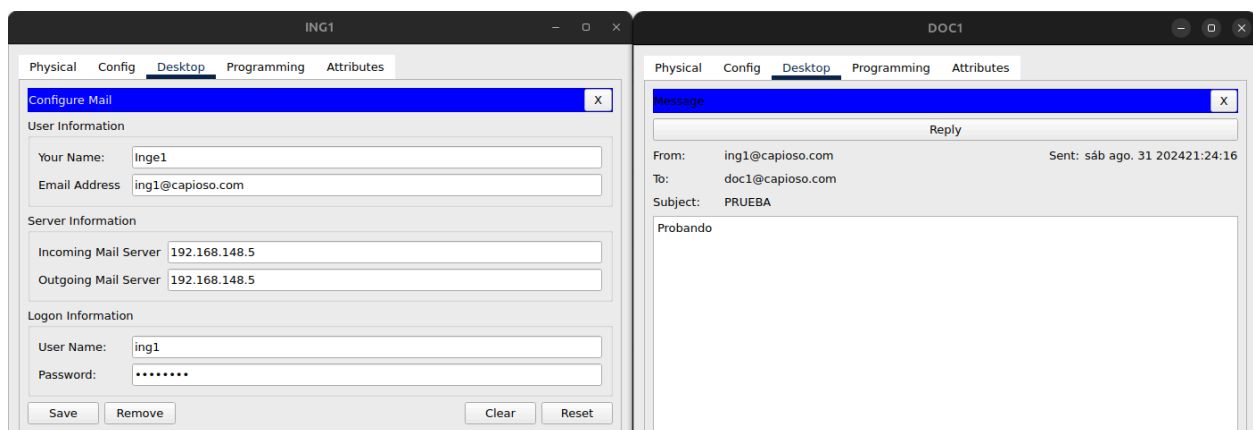
## Router ADMIN

```
ADMIN#show running-config  
!  
hostname ADMIN  
!  
interface GigabitEthernet0/0  
  ip address 192.168.144.1 255.255.254.0  
  ip helper-address 192.168.148.2  
  duplex auto  
  speed auto  
!  
interface GigabitEthernet0/1  
  ip address 192.168.146.1 255.255.255.0  
  ip helper-address 192.168.148.2  
  duplex auto  
  speed auto  
!
```

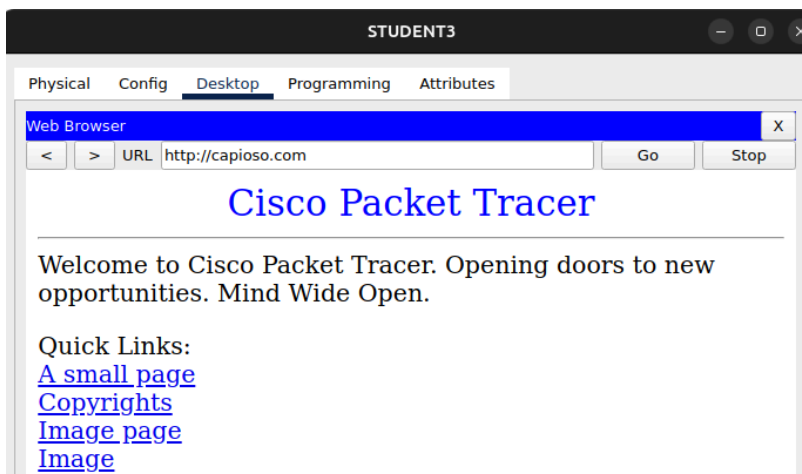
---

```
interface GigabitEthernet0/2
 ip address 192.168.147.1 255.255.255.0
 ip helper-address 192.168.148.2
 duplex auto
 speed auto
!
interface Serial0/3/0
 ip address 10.10.1.1 255.255.255.252
 clock rate 2000000
!
interface Serial0/3/1
 ip address 10.10.1.14 255.255.255.252
 clock rate 2000000
!
router rip
 version 2
 network 10.0.0.0
 network 192.168.144.0
 network 192.168.146.0
 network 192.168.147.0
!
end
```

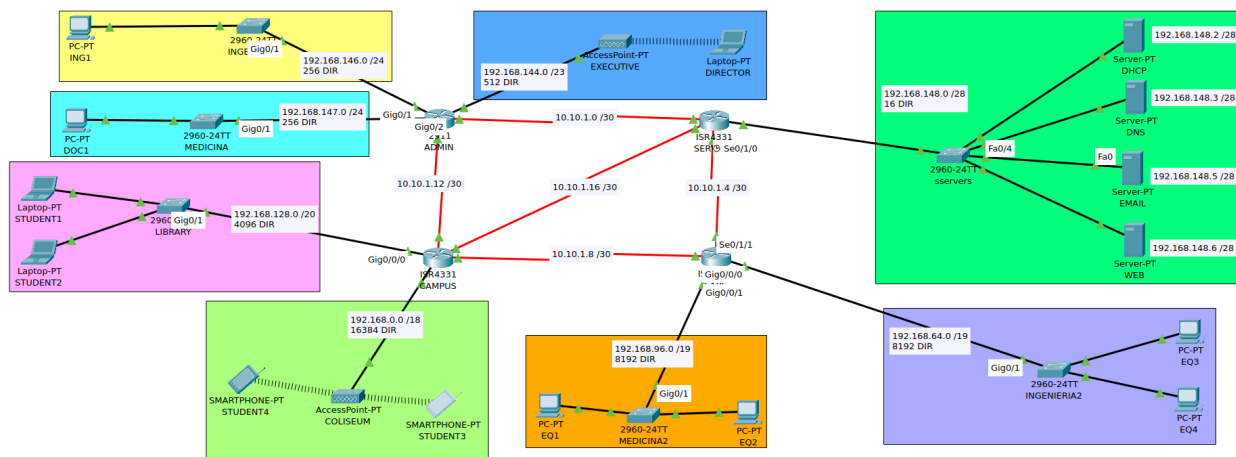
## Servicio de Email



## Prueba de servicio Web



## Topología



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## Actividad #3 - Herramienta de monitoreo

### Host (Ubuntu)

```
university@capioso:~$ nc -h
OpenBSD netcat (Debian patchlevel 1.226-1ubuntu2)
usage: nc [-46CDdFhI length [-i interval] [-M ttl]
          [-m minttl] [-O length] [-P proxy_username] [-p source_port]
          [-q seconds] [-s sourceaddr] [-T keyword] [-V rtable] [-W recvlimit]
          [-w timeout] [-X proxy_protocol] [-x proxy_address[:port]]
          [destination] [port]
Command Summary:
    -4                Use IPv4
    -6                Use IPv6
    -b                Allow broadcast
    -C                Send CRLF as line-ending
    -D                Enable the debug socket option
    -d                Detach from stdin
    -F                Pass socket fd
    -h                This help text
    -I length         TCP receive buffer length
    -i interval       Delay interval for lines sent, ports scanned
    -k                Keep inbound sockets open for multiple connects
    -l                Listen mode, for inbound connects
    -M ttl            Outgoing TTL / Hop Limit
    -m minttl         Minimum incoming TTL / Hop Limit
    -N                Shutdown the network socket after EOF on stdin
    -n                Suppress name/port resolutions
    -O length         TCP send buffer length
    -P proxyuser      Username for proxy authentication
    -p port            Specify local port for remote connects
    -q secs           quit after EOF on stdin and delay of secs
    -r                Randomize remote ports
    -S                Enable the TCP MD5 signature option
    -s sourceaddr     Local source address
    -T keyword        TOS value
    -t                Answer TELNET negotiation
    -U                Use UNIX domain socket
    -u                UDP mode
    -V rtable         Specify alternate routing table
    -v                Verbose
    -W recvlimit      Terminate after receiving a number of packets
    -w timeout        Timeout for connects and final net reads
    -X proto          Proxy protocol: "4", "5" (SOCKS) or "connect"
    -x addr[:port]    Specify proxy address and port
    -Z                DCCP mode
    -z                Zero-I/O mode [used for scanning]
Port numbers can be individual or ranges: lo-hi [inclusive]
```

---

## Resultados

```

university@capioso:~$ sudo lsof -i :8080
COMMAND PID  USER   FD TYPE DEVICE SIZE/OFF NODE NAME
nc       8841  university  3u  IPv4  50999  0t0  TCP  *:http-alt (LISTEN)
nc       8841  university  4u  IPv4  51000  0t0  TCP  localhost:http-alt->localhost:40394 (ESTABLISHED)
nc       9059  university  3u  IPv4  48867  0t0  TCP  localhost:40394->localhost:http-alt (ESTABLISHED)

```

The image shows two terminal windows side-by-side. The left window is a netcat listener on port 8080, and the right window is a netcat client connecting to localhost:8080. They exchange a series of messages: 'Hello', 'How are You?', 'Thanks!', 'Closing Ubuntu', and 'Gonna try with Windows'. The client then sends '^Z' and '[1]+ Detenido', after which the listener sends 'nc localhost 8080' and the client sends 'university@capioso:~\$'.

```

university@capioso:~$ nc -l -p 8080
Hello
How are You?
Thanks!
Closing Ubuntu
Gonna try with Windows
^Z
[1]+  Detenido
university@capioso:~$

university@capioso:~$ nc localhost 8080
Hello
How are You?
Thanks!
Closing Ubuntu
Gonna try with Windows
^Z
[1]+  Detenido
university@capioso:~$

```

Como se expresa, se intento conectar con una VM windows con interfaz de red tipo bridge y con ambos firewall apagado con tal de probar rápidamente. Sin embargo, no fue exitoso.

## Conexion Three way handshake

*Cliente a Servidor: SYN*

El cliente envía un segmento con la bandera SYN para iniciar la conexión.

*Servidor a Cliente: SYN-ACK*

El servidor responde con un segmento que tiene tanto las banderas SYN como ACK, indicando que ha recibido el SYN y está listo para sincronizar.

*Cliente a Servidor: ACK*

El cliente responde con un segmento ACK, confirmando la recepción del SYN-ACK y completando el establecimiento de la conexión.

