Verificació de la connectivitat entre client i servidor

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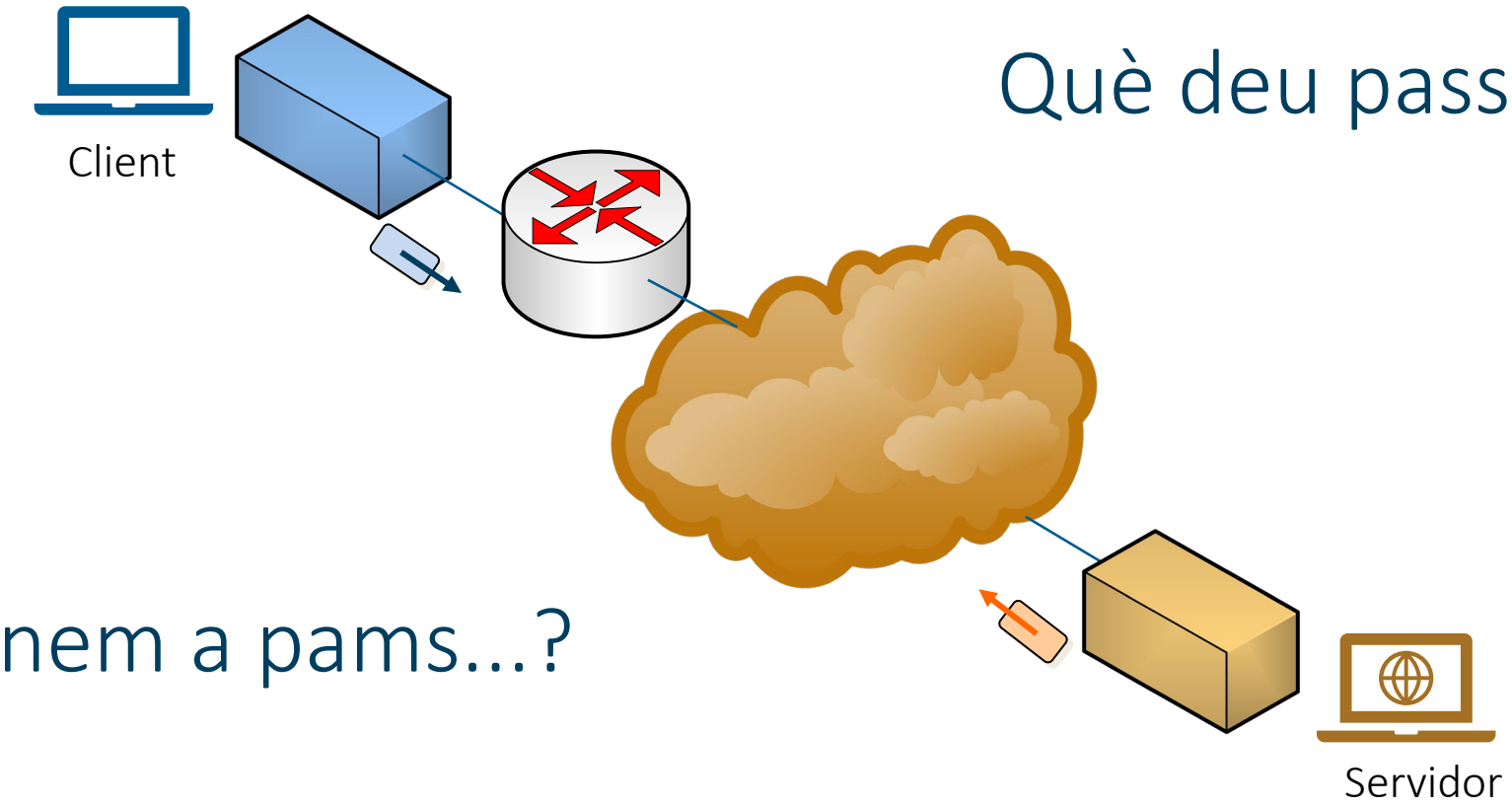
Escenari

Escenari

Hi ha problemes a l'intentar fer una consulta web

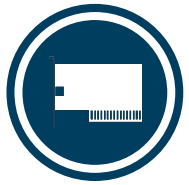


C

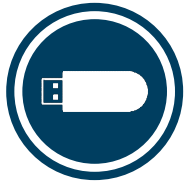
Equip client

Nivell físic

Existeix el dispositiu de xarxa?



```
root@debian:~# lspci | grep -i -e "Ethernet" -e "Wireless"
00:03.0 Ethernet controller: Intel Corporation 82540EM Gigabit Ethernet Controller (rev 02)
00:08.0 Ethernet controller: Intel Corporation 82540EM Gigabit Ethernet Controller (rev 02)
00:09.0 Ethernet controller: Intel Corporation 82540EM Gigabit Ethernet Controller (rev 02)
00:0a.0 Ethernet controller: Intel Corporation 82540EM Gigabit Ethernet Controller (rev 02)
root@debian:~#
```



```
root@debian:~# lsusb | grep -i -e "Ethernet" -e "Wireless"
Bus 001 Device 004: ID 0b05:17d1 ASUSTek Computer, Inc. AC51 802.11a/b/g/n/ac Wireless Adapter [Mediatek MT7610U]
Bus 001 Device 003: ID 0bda:8187 Realtek Semiconductor Corp. RTL8187 Wireless Adapter
Bus 001 Device 002: ID 0b05:17d1 ASUSTek Computer, Inc. AC51 802.11a/b/g/n/ac Wireless Adapter [Mediatek MT7610U]
root@debian:~#
```

<< Cal instal·lar el controlador >>

```
root@debian:~# apt install controlador
```

7 Nivell d'aplicació
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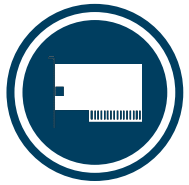
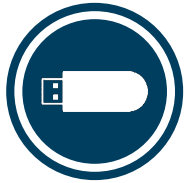
Nivell físic

És el controlador correcte?



```
root@debian:~# lsmod | grep -i ^e100
e1000                  163840  0
...
root@debian:~# modinfo e1000 |grep ^desc
description:    Intel(R) PRO/1000 Network Driver
```



```
root@debian:~# lsmod | grep 802
mac80211               995328  7 mt76,mt76_usb,mt76x02_lib,mt76x02_usb,mt76x0_common,rtl8187,mt76x0u
cfg80211               983040  5 mt76,mt76x02_lib,mac80211,mt76x02_usb,rtl8187
...
root@debian:~# modinfo mac80211 |grep ^desc
description:    IEEE 802.11 subsystem
```

<< Cal instal·lar el controlador >>
root@debian:~# apt install controlador

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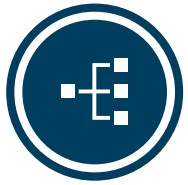
Nivell d'enllaç

La interfície existeix? Està activa?



```
root@debian:~# ip -br link
lo               UNKNOWN        00:00:00:00:00:00 <LOOPBACK,UP,LOWER_UP>
enp0s3           UP             08:00:27:1d:97:61 <BROADCAST,MULTICAST,UP,LOWER_UP>
enp0s8           UP             08:00:27:6e:ed:dd <BROADCAST,MULTICAST,UP,LOWER_UP>
enp0s9           DOWN           08:00:27:84:9c:c0 <NO-CARRIER,BROADCAST,MULTICAST,UP>   (1)
enp0s10          DOWN           08:00:27:cf:7f:6a <BROADCAST,MULTICAST>                 (2)
wlx04d9f511b8c3  UP             04:d9:f5:11:b8:c3 <BROADCAST,MULTICAST,UP,LOWER_UP>
wlx001aef0caebc  DOWN           00:1a:ef:0c:ae:bc <NO-CARRIER,BROADCAST,MULTICAST,UP>   (3)
wlxfc3497286aac  DOWN           fc:34:97:28:6a:ac <BROADCAST,MULTICAST>                 (2)
```

(1) << Cable Ethernet desconnectat >>
(2) << Interfície no aixecada >>
(3) << Interfície no associada a un Punt d'Accés >>

```
root@debian:~# ip link set interfície up
```

Nivell d'enllaç

La interfície Wi-Fi està associada a un AP?

```
root@debian:~# iw wlx001aef0caebc scan
BSS b8:69:f4:3a:6e:10(on wlx001aef0caebc)
        TSF: 61625851770 usec (0d, 17:07:05)
        freq: 2412
        beacon interval: 100 TUs
        capability: ESS Privacy ShortPreamble ShortSlotTime (0x0431)
        signal: -48.00 dBm
        SSID: seax
        DS Parameter set: channel 1
...

root@debian:~# wpa_cli status
Selected interface 'wlx04d9f511b8c3'
bssid=b8:69:f4:3a:6e:10
ssid=seax
mode=station
...
```

<< Cal associar-se a un Punt d'Accés >>
root@debian:~# ifup (wpa-supplicant)

Nivell d'enllaç

La interfície Wi-Fi està bloquejada?

```
root@debian:~# rfkill list all
0: phy0: Wireless LAN
        Soft blocked: no
        Hard blocked: no
1: phy1: Wireless LAN
        Soft blocked: no
        Hard blocked: no
2: phy2: Wireless LAN
        Soft blocked: no
        Hard blocked: no
root@debian:~#
```

```
root@debian:~# iw dev
phy#2
        Interface wlxfc3497286aac···
phy#1
        Interface wlx001aef0caebc···
phy#0
        Interface wlx04d9f511b8c3···
root@debian:~#
```

<< Cal desbloquejar la interfície >>
root@debian:~# rfkill unblock all/wlan

Nivell d'enllaç

Hi ha hagut tràfic per les interfícies?

```
root@debian:~# ip -s -h link
...
3: enp0s8: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP mode DEFAULT group default qlen 1000
    link/ether 08:00:27:6e:ed:dd brd ff:ff:ff:ff:ff:ff
    RX: bytes  packets  errors  dropped missed  mcast
    2.52M      2.79k    0       0       0       0
    TX: bytes  packets  errors  dropped carrier collsns
    278k       3.83k    0       0       0       0 ...
6: wlx04d9f511b8c3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP mode DORMANT group default qlen 1000
    link/ether 04:d9:f5:11:b8:c3 brd ff:ff:ff:ff:ff:ff
    RX: bytes  packets  errors  dropped missed  mcast
    24.0M      100.0k   0       0       0       0
    TX: bytes  packets  errors  dropped carrier collsns
    72.7k      523      0       0       0       0

8: wlxfc3497286aac: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN mode DEFAULT group default qlen 1000
    link/ether fc:34:97:28:6a:ac brd ff:ff:ff:ff:ff:ff
    RX: bytes  packets  errors  dropped missed  mcast
    0          0        0       0       0       0
    TX: bytes  packets  errors  dropped carrier collsns
    0          0        0       0       0       0
...
```

<< Cal verificar els estats de les interfícies >>

Nivell de xarxa

El servei de xarxa está actiu?

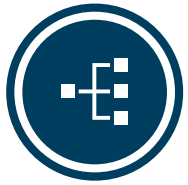

```
root@debian:~# service networking status
● networking.service - Raise network interfaces
     Loaded: loaded (/lib/systemd/system/networking.service; enabled; vendor preset: enabled)
     Active: active (exited) since Tue 2023-03-14 16:36:26 CET; 20min ago
       Docs: man:interfaces(5)
    Process: 345 ExecStart=/sbin/ifup -a --read-environment (code=exited, status=0/SUCCESS)
   Main PID: 345 (code=exited, status=0/SUCCESS)
        CPU: 9ms

mar 14 16:36:26 debian systemd[1]: Starting Raise network interfaces...
mar 14 16:36:26 debian systemd[1]: Finished Raise network interfaces.
                                                        root@debian:~#
```

```
<< Cal activar el servei >>
(/etc/network/interfases -> ifup, ifdown)
root@debian:~# service networking start
root@debian:~# update-rc.d networking enable
```

Nivell de xarxa

La interfície té adreçament IP?



```
root@debian:~# ip -br address
lo               UNKNOWN        127.0.0.1/8   ::1/128
enp0s3           UP             10.1.1.143/24 fdbc:af07:7e18:482c:a00:27ff:fe1d:9761/64
enp0s8           UP             10.0.3.15/24
enp0s9           DOWN
enp0s10          DOWN
wlx04d9f511b8c3  UP             10.1.1.109/24 fdbc:af07:7e18:482c:6d9:f5ff:fe11:b8c3/64
wlx001aef0caebc  DOWN
wlxfc3497286aac  DOWN
root@debian:~#
```

```
<< Cal obtenir adreçament IP >>
root@debian:~# ifup interfície
root@debian:~# ip address add 10.1.1.111/24 broadcast 10.1.1.255
                dev interfície
root@debian:~# dhclient interfície
```

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Nivell de xarxa

Les interfícies de l'equip responen?

```
root@debian:~# ping -c 1 localhost
PING localhost(localhost (::1)) 56 data bytes
64 bytes from localhost (::1): icmp_seq=1 ttl=64 time=0.019 ms
--- localhost ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 0.019/0.019/0.019/0.000 ms

root@debian:~# ping -c 1 10.0.3.15
PING 10.0.3.15 (10.0.3.15) 56(84) bytes of data.
64 bytes from 10.0.3.15: icmp_seq=1 ttl=64 time=0.013 ms
--- 10.0.3.15 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 0.013/0.013/0.013/0.000 ms

root@debian:~# ping -c 1 10.1.1.109
PING 10.1.1.109 (10.1.1.109) 56(84) bytes of data.
64 bytes from 10.1.1.109: icmp_seq=1 ttl=64 time=0.014 ms
--- 10.1.1.109 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 0.014/0.014/0.014/0.000 ms
```

<< Cal verificar l'adreçament >>

Nivell de xarxa

L'equip té un encaminador per defecte?

```
root@debian:~# ip route
default via 10.0.3.2 dev enp0s8
10.0.3.0/24 dev enp0s8 proto kernel scope link src 10.0.3.15
10.1.1.0/24 dev enp0s3 proto kernel scope link src 10.1.1.143
10.1.1.0/24 dev wlx04d9f511b8c3 proto kernel scope link src 10.1.1.109
root@debian:~#
```

```
<< Cal configurar un encaminador per defecte >>
root@debian:~# ip route add default 10.1.1.1 dev interfície
```

Nivell de xarxa

L'equip es pot comunicar amb l'encaminador per defecte?

```
root@debian:~# ping -c 1 10.0.3.2
PING 10.0.3.2 (10.0.3.2) 56(84) bytes of data.
64 bytes from 10.0.3.2: icmp_seq=1 ttl=64 time=0.457 ms

--- 10.0.3.2 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 0.457/0.457/0.457/0.000 ms
root@debian:~#
```

```
<< Cal verificar la correcció de l'adreçament >>
root@debian:~# ip route add default 10.1.1.1 dev interfície
```

Nivell de xarxa

L'equip estableix una ruta cap al servidor destí?

```
root@debian:~# ip route get 147.83.2.135
147.83.2.135 via 10.0.3.2 dev enp0s8 src 10.0.3.15 uid 0
    cache
root@debian:~#
```

```
<< Cal verificar la correcció de les rutes >>
root@debian:~# ip route show
```

Nivell de xarxa

L'equip és capaç d'arribar al servidor destí?

```
root@debian:~# ping -c 1 147.83.2.135
PING 147.83.2.135 (147.83.2.135) 56(84) bytes of data.
64 bytes from 147.83.2.135: icmp_seq=1 ttl=241 time=10.8 ms

--- 147.83.2.135 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 10.846/10.846/10.846/0.000 ms
```

<< Cal verificar la connectivitat >>
Possible tall cap a Internet...
Possible tallafocs al servidor...

Nivell de xarxa

L'equip és capaç de resoldre el nom DNS del servidor?


```
root@debian:~# dig www.upc.edu

; <<>> DiG 9.16.37-Debian <<>> www.upc.edu
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 18616
;; flags: qr rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;www.upc.edu.                   IN      A

;; ANSWER SECTION:
www.upc.edu.            66747   IN      CNAME   www.upc.es.
www.upc.es.             2962    IN      A       147.83.2.135

;; Query time: 16 msec
;; SERVER: 10.1.1.1#53(10.1.1.1)
;; WHEN: Wed Mar 15 12:49:41 CET 2023
;; MSG SIZE  rcvd: 69

root@debian:~#
```

<< Cal verificar els servidors DNS configurats >>
root@debian:~# nano /etc/resolv.conf

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Nivell de xarxa

Es pot estar produint fragmentació de datagrames?

```
root@debian:~# ip address show enp0s8
3: enp0s8: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 08:00:27:6e:ed:dd brd ff:ff:ff:ff:ff:ff
    inet 10.0.3.15/24 brd 10.0.3.255 scope global dynamic enp0s8
       valid_lft 74064sec preferred_lft 74064sec
    inet6 fe80::a00:27ff:fe6e:eddd/64 scope link
       valid_lft forever preferred_lft forever

root@debian:~# ping -c 1 -s $((10000-28)) -M do 147.83.2.135
PING 147.83.2.135 (147.83.2.135) 9972(10000) bytes of data.
ping: local error: message too long, mtu=1500

--- 147.83.2.135 ping statistics ---
1 packets transmitted, 0 received, +1 errors, 100% packet loss, time 0ms

root@debian:~#
```

```
<< Reduir la MTU >>
root@debian:~# ip link set mtu 1500 dev enp0s8
```

El servidor respon al port esperat?

```
root@debian:~# nping --tcp-connect -p 80 -c 1 147.83.2.135

Starting Nping 0.7.80 ( https://nmap.org/nping ) at 2023-03-15 13:32 CET
SENT (0.0014s) Starting TCP Handshake > 147.83.2.135:80
RCVD (0.0104s) Handshake with 147.83.2.135:80 completed

Max rtt: 8.954ms | Min rtt: 8.954ms | Avg rtt: 8.954ms
TCP connection attempts: 1 | Successful connections: 1 | Failed: 0 (0.00%)
Nping done: 1 IP address pinged in 0.02 seconds
root@debian:~#
```

<< Verificar el número de port >>

Nivell de transport

El servidor respon amb el servei esperat?

```
root@debian:~# nmap -sS -A -p 80,443 -oG upc 147.83.2.135
Starting Nmap 7.80 ( https://nmap.org ) at 2023-03-15 14:45 CET
Nmap scan report for www.upc.edu (147.83.2.135)
Host is up (0.0035s latency).

PORT     STATE  SERVICE   VERSION
80/tcp   open   http      nginx 1.23.2
443/tcp  open   ssl/http  nginx 1.23.2

...
```

<< Verificar la versió dels protocols >>

Nivell de transport

Hi ha algun tallafocs actiu?

```
root@debian:~# nft list ruleset
...

root@debian:~# iptables -S
...
```

<< Cal revisar les regles del tallafocs >>
Regles d'entrada...
Regles de sortida...

Nivell de transport

Hi ha alguna connexió amb el servidor?

```
root@debian:~# wget www.upc.edu -b ; for i in $(seq 1 100); do ss -apt '( dst = 147.83.2.135 or src = 147.83.2.135 )'; done >fitxer
Continuando en segundo plano, pid 9751.
La salida será escrita a «wget-log.10».
State       Recv-Q  Send-Q  Local Address:Port   Peer Address:Port   Process
SYN-SENT    0       1           10.0.3.15:45240  147.83.2.135:http   users:(("wget",pid=9751,fd=4))
...
State       Recv-Q  Send-Q  Local Address:Port   Peer Address:Port   Process
ESTAB       0       0           10.0.3.15:45240  147.83.2.135:http   users:(("wget",pid=9751,fd=4))
...
State       Recv-Q  Send-Q  Local Address:Port   Peer Address:Port   Process
CLOSE-WAIT  0       0           10.0.3.15:45240  147.83.2.135:http   users:(("wget",pid=9751,fd=4))
...
State       Recv-Q  Send-Q  Local Address:Port   Peer Address:Port   Process
SYN-SENT    0       1           10.0.3.15:35714  147.83.2.135:https  users:(("wget",pid=9751,fd=5))
CLOSE-WAIT  0       0           10.0.3.15:45240 147.83.2.135:http    users:(("wget",pid=9751,fd=4))
...
State       Recv-Q  Send-Q  Local Address:Port   Peer Address:Port   Process
ESTAB       0       517         10.0.3.15:35714  147.83.2.135:https  users:(("wget",pid=9751,fd=5))
CLOSE-WAIT  0       0           10.0.3.15:45240  147.83.2.135:http   users:(("wget",pid=9751,fd=4))
...
State       Recv-Q  Send-Q  Local Address:Port   Peer Address:Port   Process
ESTAB       0       0           10.0.3.15:35714  147.83.2.135:https  users:(("wget",pid=9751,fd=5))
...
State       Recv-Q  Send-Q  Local Address:Port   Peer Address:Port   Process
FIN-WAIT-2  0       0           10.0.3.15:35714  147.83.2.135:https
 ...
State       Recv-Q  Send-Q  Local Address:Port   Peer Address:Port   Process
TIME-WAIT   0       0           10.0.3.15:35714  147.83.2.135:https
```


<< Verificar múltiples connexions >>
Poc pràctic en connexions curtes...

Nivell de transport

Què succeeix durant la connexió amb el servidor?

```
root@toc:~# tcpdump -n host 147.83.2.135
tcpdump: verbose output suppressed, use -v[v]... for full protocol decode
listening on ens18, link-type EN10MB (Ethernet), snapshot length 262144 bytes
15:46:57.366725 IP 10.0.3.15.47556 > 147.83.2.135.80: Flags [S], seq 3550533459, win 64240, options [mss 1460,sackOK,TS val 1512823040 ecr 0,nop,wscale 7], length 0
15:46:57.368412 IP 147.83.2.135.80 > 10.0.3.15.47556: Flags [S.], seq 3417459063, ack 3550533460, win 14600, options [mss 1460,nop,wscale 0,sackOK,TS val 3854371925 ecr 1512823040], length 0
15:46:57.368458 IP 10.0.3.15.47556 > 147.83.2.135.80: Flags [.], ack 1, win 502, options [nop,nop,TS val 1512823041 ecr 3854371925], length 0
15:46:57.368513 IP 10.0.3.15.47556 > 147.83.2.135.80: Flags [P.], seq 1:125, ack 1, win 502, options [nop,nop,TS val 1512823041 ecr 3854371925], length 124: HTTP: GET / HTTP/1.1
15:46:57.369908 IP 147.83.2.135.80 > 10.0.3.15.47556: Flags [P.], seq 1:110, ack 125, win 14600, options [nop,nop,TS val 3854371927 ecr 1512823041], length 109: HTTP: HTTP/1.0 302 Moved Temporarily
15:46:57.369909 IP 147.83.2.135.80 > 10.0.3.15.47556: Flags [F.], seq 110, ack 125, win 14724, options [nop,nop,TS val 3854371927 ecr 1512823041], length 0
15:46:57.369914 IP 10.0.3.15.47556 > 147.83.2.135.80: Flags [.], ack 110, win 502, options [nop,nop,TS val 1512823043 ecr 3854371927], length 0
15:46:57.377624 IP 10.0.3.15.37468 > 147.83.2.135.443: Flags [S], seq 673605146, win 64240, options [mss 1460,sackOK,TS val 1512823050 ecr 0,nop,wscale 7], length 0
15:46:57.379259 IP 147.83.2.135.443 > 10.0.3.15.37468: Flags [S.], seq 3293003581, ack 673605147, win 14600, options [mss 1460,nop,wscale 0,sackOK,TS val 3854371936 ecr 1512823050], length 0
15:46:57.379302 IP 10.0.3.15.37468 > 147.83.2.135.443: Flags [.], ack 1, win 502, options [nop,nop,TS val 1512823052 ecr 3854371936], length 0
15:46:57.380165 IP 10.0.3.15.37468 > 147.83.2.135.443: Flags [P.], seq 1:518, ack 1, win 502, options [nop,nop,TS val 1512823053 ecr 3854371936], length 517
15:46:57.381488 IP 147.83.2.135.443 > 10.0.3.15.37468: Flags [.], ack 518, win 15117, options [nop,nop,TS val 3854371938 ecr 1512823053], length 0
15:46:57.382659 IP 147.83.2.135.443 > 10.0.3.15.37468: Flags [P.], seq 1:5734, ack 518, win 15117, options [nop,nop,TS val 3854371939 ecr 1512823053], length 5733
15:46:57.382681 IP 10.0.3.15.37468 > 147.83.2.135.443: Flags [.], ack 5734, win 485, options [nop,nop,TS val 1512823056 ecr 3854371939], length 0
15:46:57.383838 IP 10.0.3.15.37468 > 147.83.2.135.443: Flags [P.], seq 518:644, ack 5734, win 501, options [nop,nop,TS val 1512823057 ecr 3854371939], length 126
15:46:57.385065 IP 147.83.2.135.443 > 10.0.3.15.37468: Flags [.], ack 644, win 15243, options [nop,nop,TS val 3854371942 ecr 1512823057], length 0
15:46:57.385749 IP 147.83.2.135.443 > 10.0.3.15.37468: Flags [P.], seq 5734:5785, ack 644, win 15243, options [nop,nop,TS val 3854371943 ecr 1512823057], length 51
15:46:57.387579 IP 10.0.3.15.37468 > 147.83.2.135.443: Flags [P.], seq 644:797, ack 5785, win 501, options [nop,nop,TS val 1512823060 ecr 3854371943], length 153
15:46:57.388957 IP 147.83.2.135.443 > 10.0.3.15.37468: Flags [.], ack 797, win 15396, options [nop,nop,TS val 3854371946 ecr 1512823060], length 0
15:46:57.410219 IP 147.83.2.135.443 > 10.0.3.15.37468: Flags [P.], seq 5785:7567, ack 797, win 15396, options [nop,nop,TS val 3854371967 ecr 1512823060], length 1782
15:46:57.410383 IP 10.0.3.15.37468 > 147.83.2.135.443: Flags [.], ack 7567, win 497, options [nop,nop,TS val 1512823083 ecr 3854371967], length 0
15:46:57.410569 IP 10.0.3.15.47556 > 147.83.2.135.80: Flags [F.], seq 125, ack 111, win 502, options [nop,nop,TS val 1512823083 ecr 3854371927], length 0
15:46:57.411050 IP 10.0.3.15.37468 > 147.83.2.135.443: Flags [P.], seq 797:1097, ack 7567, win 501, options [nop,nop,TS val 1512823084 ecr 3854371967], length 300
15:46:57.411843 IP 147.83.2.135.80 > 10.0.3.15.47556: Flags [.], ack 126, win 14724, options [nop,nop,TS val 3854371969 ecr 1512823083], length 0
15:46:57.412378 IP 147.83.2.135.443 > 10.0.3.15.37468: Flags [.], ack 1097, win 15696, options [nop,nop,TS val 3854371969 ecr 1512823084], length 0
15:46:57.413956 IP 147.83.2.135.443 > 10.0.3.15.37468: Flags [P.], seq 7567:23965, ack 1097, win 15696, options [nop,nop,TS val 3854371971 ecr 1512823084], length 16398
15:46:57.413996 IP 147.83.2.135.443 > 10.0.3.15.37468: Flags [P.], seq 23965:27824, ack 1097, win 15696, options [nop,nop,TS val 3854371971 ecr 1512823084], length 3859
15:46:57.413997 IP 147.83.2.135.443 > 10.0.3.15.37468: Flags [P.], seq 27824:27972, ack 1097, win 15696, options [nop,nop,TS val 3854371971 ecr 1512823084], length 148
15:46:57.414013 IP 10.0.3.15.37468 > 147.83.2.135.443: Flags [.], ack 27824, win 414, options [nop,nop,TS val 1512823087 ecr 3854371971], length 0
15:46:57.415372 IP 147.83.2.135.443 > 10.0.3.15.37468: Flags [P.], seq 27972:50992, ack 1097, win 15696, options [nop,nop,TS val 3854371972 ecr 1512823087], length 23020
15:46:57.415377 IP 10.0.3.15.37468 > 147.83.2.135.443: Flags [.], ack 50992, win 417, options [nop,nop,TS val 1512823088 ecr 3854371971], length 0
15:46:57.416800 IP 147.83.2.135.443 > 10.0.3.15.37468: Flags [.], seq 50992:75608, ack 1097, win 15696, options [nop,nop,TS val 3854371973 ecr 1512823088], length 24616
15:46:57.416802 IP 147.83.2.135.443 > 10.0.3.15.37468: Flags [P.], seq 75608:77056, ack 1097, win 15696, options [nop,nop,TS val 3854371973 ecr 1512823088], length 1448
15:46:57.416809 IP 10.0.3.15.37468 > 147.83.2.135.443: Flags [.], ack 75608, win 886, options [nop,nop,TS val 1512823090 ecr 3854371973], length 0
15:46:57.418456 IP 147.83.2.135.443 > 10.0.3.15.37468: Flags [.], seq 77056:100224, ack 1097, win 15696, options [nop,nop,TS val 3854371975 ecr 1512823090], length 23168
15:46:57.418459 IP 147.83.2.135.443 > 10.0.3.15.37468: Flags [P.], seq 100224:104568, ack 1097, win 15696, options [nop,nop,TS val 3854371975 ecr 1512823090], length 4344
15:46:57.418465 IP 10.0.3.15.37468 > 147.83.2.135.443: Flags [.], ack 100224, win 1270, options [nop,nop,TS val 1512823091 ecr 3854371973], length 0
15:46:57.418492 IP 10.0.3.15.37468 > 147.83.2.135.443: Flags [.], ack 104568, win 1338, options [nop,nop,TS val 1512823091 ecr 3854371975], length 0
15:46:57.420020 IP 147.83.2.135.443 > 10.0.3.15.37468: Flags [P.], seq 104568:127374, ack 1097, win 15696, options [nop,nop,TS val 3854371977 ecr 1512823091], length 22806
15:46:57.420024 IP 10.0.3.15.37468 > 147.83.2.135.443: Flags [.], ack 127374, win 1695, options [nop,nop,TS val 1512823093 ecr 3854371977], length 0
15:46:57.420665 IP 10.0.3.15.37468 > 147.83.2.135.443: Flags [F.], seq 1097, ack 127374, win 1695, options [nop,nop,TS val 1512823094 ecr 3854371977], length 0
15:46:57.421837 IP 147.83.2.135.443 > 10.0.3.15.37468: Flags [.], ack 1098, win 15696, options [nop,nop,TS val 3854371979 ecr 1512823094], length 0
15:46:57.422158 IP 147.83.2.135.443 > 10.0.3.15.37468: Flags [F.], seq 127374, ack 1098, win 15696, options [nop,nop,TS val 3854371979 ecr 1512823094], length 0
15:46:57.422170 IP 10.0.3.15.37468 > 147.83.2.135.443: Flags [.], ack 127375, win 1695, options [nop,nop,TS val 1512823095 ecr 3854371979], length 0
^C
44 packets captured
44 packets received by filter
0 packets dropped by kernel
root@toc:~#
```


<< Cal analitzar el tràfic >>

root@debian:~# tcpdump -n host 147.83.2.135

Nivell d'aplicació

Què succeeix durant la connexió amb el servidor?

```
root@debian:~# wget www.upc.edu –b

--2023-03-15 15:46:57--  http://www.upc.edu/
Resolviendo www.upc.edu (www.upc.edu)... 147.83.2.135, 2001:40b0:7500:1::21
Conectando con www.upc.edu (www.upc.edu)[147.83.2.135]:80... conectado.
Petición HTTP enviada, esperando respuesta... 302 Moved Temporarily
Localización: https://www.upc.edu/ [siguiendo]
--2023-03-15 15:46:57--  https://www.upc.edu/
Conectando con www.upc.edu (www.upc.edu)[147.83.2.135]:443... conectado.
Petición HTTP enviada, esperando respuesta... 301 Moved Permanently
Localización: https://www.upc.edu/ca [siguiendo]
--2023-03-15 15:46:57--  https://www.upc.edu/ca
Reutilizando la conexión con www.upc.edu:443.
Petición HTTP enviada, esperando respuesta... 200 OK
Longitud: 117942 (115K) [text/html]
Grabando a: «index.html»

     0K ..........  ..........  ..........  ..........  .......... 43% 3,95M 0s
    50K ..........  ..........  ..........  ..........  .......... 86% 3,73M 0s
   100K ..........  .....                                         100% 60,1M=0,03s

2023-03-15 15:46:57 (4,38 MB/s) - «index.html» guardado [117942/117942]
```

<< Cal verificar el registre amb el del servidor >>

Equip Servidor

Casuística equivalent

També cal aplicar al servidor totes les consideracions anteriors analitzades al client de forma recíproca.

7 Nivell d'aplicació
6 Nivell de presentació
5 Nivell de sessió
4 Nivell de transport
3 Nivell de xarxa
2 Nivell d'enllaç
1 Nivell físic

<< Cal aplicar les mesures equivalents >>

Nivell de transport

Els ports associats al servei estan en mode escolta?

```
root@www:~# ss -tlp
State    Recv-Q    Send-Q       Local Address:Port        Peer Address:Port   Process
LISTEN   0         4096               0.0.0.0:https            0.0.0.0:*      users:(("docker-proxy",pid=2593,fd=4))
LISTEN   0         4096               0.0.0.0:http             0.0.0.0:*      users:(("docker-proxy",pid=2615,fd=4))
LISTEN   0         128                0.0.0.0:ssh              0.0.0.0:*      users:(("sshd",pid=455,fd=3))
LISTEN   0         4096                  [::]:https               [::]:*      users:(("docker-proxy",pid=2600,fd=4))
LISTEN   0         4096                  [::]:http                [::]:*      users:(("docker-proxy",pid=2622,fd=4))
LISTEN   0         128                   [::]:ssh                 [::]:*      users:(("sshd",pid=455,fd=4))
root@www:~#
```

<< Cal configurar els ports en mode LISTEN >>

Nivell de transport

Els ports associats al servei responen?

```
root@www:~# nping  --tcp-connect -p 80 -c 1 localhost

Starting Nping 0.7.80 ( https://nmap.org/nping ) at 2023-03-15 17:06 CET
SENT (0.0015s) Starting TCP Handshake > localhost:80 (127.0.0.1:80)
RCVD (0.0015s) Handshake with localhost:80 (127.0.0.1:80) completed

Max rtt: 0.017ms | Min rtt: 0.017ms | Avg rtt: 0.017ms
TCP connection attempts: 1 | Successful connections: 1 | Failed: 0 (0.00%)
Nping done: 1 IP address pinged in 0.00 seconds
root@www:~# nping  --tcp-connect -p 443 -c 1 localhost

Starting Nping 0.7.80 ( https://nmap.org/nping ) at 2023-03-15 17:06 CET
SENT (0.0015s) Starting TCP Handshake > localhost:443 (127.0.0.1:443)
RCVD (0.0015s) Handshake with localhost:443 (127.0.0.1:443) completed

Max rtt: 0.014ms | Min rtt: 0.014ms | Avg rtt: 0.014ms
TCP connection attempts: 1 | Successful connections: 1 | Failed: 0 (0.00%)
Nping done: 1 IP address pinged in 0.00 seconds
root@www:~#
```

<< Cal verificar els processos corresponents >>

7 Nivell d'aplicació
6 Nivell de presentació
5 Nivell de sessió
4 Nivell de transport
3 Nivell de xarxa
2 Nivell d'enllaç
1 Nivell físic

Nivell d'aplicació

El servei a oferir está actiu?

```
root@www:~# systemctl status docker
● docker.service - Docker Application Container Engine
     Loaded: loaded (/lib/systemd/system/docker.service; enabled; vendor preset: enabled)
     Active: active (running) since Sun 2022-12-11 10:12:19 CET; 3 months 2 days ago
TriggeredBy: ● docker.socket
       Docs: https://docs.docker.com
   Main PID: 454 (dockerd)
      Tasks: 52
     Memory: 238.3M
        CPU: 57min 26.983s
     CGroup: /system.slice/docker.service
             ├─ 454 /usr/bin/dockerd -H fd:// --containerd=/run/containerd/containerd.sock
             ├─2593 /usr/bin/docker-proxy -proto tcp -host-ip 0.0.0.0 -host-port 443 -container-ip 172.18.0.3 -contai>
             ├─2600 /usr/bin/docker-proxy -proto tcp -host-ip :: -host-port 443 -container-ip 172.18.0.3 -container-p>
             ├─2615 /usr/bin/docker-proxy -proto tcp -host-ip 0.0.0.0 -host-port 80 -container-ip 172.18.0.3 -contain>
             └─2622 /usr/bin/docker-proxy -proto tcp -host-ip :: -host-port 80 -container-ip 172.18.0.3 -container-po>

dic 11 10:12:17 www dockerd[454]: time="2022-12-11T10:12:17.919042671+01:00" level=info msg="Default bridge (docker0)>
dic 11 10:12:18 www dockerd[454]: time="2022-12-11T10:12:18.661180816+01:00" level=info msg="Loading containers: done>
dic 11 10:12:18 www dockerd[454]: time="2022-12-11T10:12:18.708025273+01:00" level=info msg="Docker daemon" commit=30>
dic 11 10:12:18 www dockerd[454]: time="2022-12-11T10:12:18.708423038+01:00" level=info msg="Daemon has completed ini>
dic 11 10:12:19 www systemd[1]: Started Docker Application Container Engine.
root@www:~#
```



```
<< Cal activar el servei >>
root@debian:~# service servei start
root@debian:~# update-rc.d servei enable
```

Nivell d'aplicació

Els processos associats al servei estan actius?


```
root@www:~#  ps aux | grep docker-proxy
root        2593  0.0  0.1 1592008 15468 ?       Sl    2022   0:49 /usr/bin/docker-proxy -proto tcp -
host-ip 0.0.0.0 -host-port 443 -container-ip 172.18.0.3 -container-port 443
root        2600  0.0  0.1 1222196 13216 ?       Sl    2022   0:08 /usr/bin/docker-proxy -proto tcp -
host-ip :: -host-port 443 -container-ip 172.18.0.3 -container-port 443
root        2615  0.0  0.1 1296184 15128 ?       Sl    2022   0:08 /usr/bin/docker-proxy -proto tcp -
host-ip 0.0.0.0 -host-port 80 -container-ip 172.18.0.3 -container-port 80
root        2622  0.0  0.1 1148464 15096 ?       Sl    2022   0:08 /usr/bin/docker-proxy -proto tcp -
host-ip :: -host-port 80 -container-ip 172.18.0.3 -container-port 80
root      811943  0.0  0.0   6252   640 pts/0    S+   16:52   0:00 grep docker-proxy
root@www:~#
```


<< Cal verificar els processos corresponents >>

Nivell d'aplicació

Quina informació hi ha al registre del servei?

```
root@www:/var/log# docker ps
CONTAINER ID   IMAGE                COMMAND                  CREATED        STATUS       PORTS
NAMES
f7c883ff6c68   wordpress-wordpress   "docker-entrypoint.s…"   3 months ago   Up 6 hours   0.0.0.0:80->80/tcp,
:::80->80/tcp, 0.0.0.0:443->443/tcp, :::443->443/tcp   catac_wordpress
35ecd8ceba52   mysql:5.7             "docker-entrypoint.s…"   3 months ago   Up 6 hours   3306/tcp, 33060/tcp
catac_wordpress_db
root@www:/var/log#
root@www:/var/log# docker logs f7c883ff6c68 | grep 147.83.158.232
...
www.catac.upc.edu:80 147.83.158.232 - - [15/Mar/2023:15:46:57 +0000] "GET / HTTP/1.1" 302 301 580 "-" "Wget/1.21"
```


<< Cal verificar el registre amb el del client >>

0

Conclusió

Conclusió

I si malgrat tot encara no s'ha resolt la connectivitat entre client i servidor…

Cal repassar les pràctiques de

SEAX