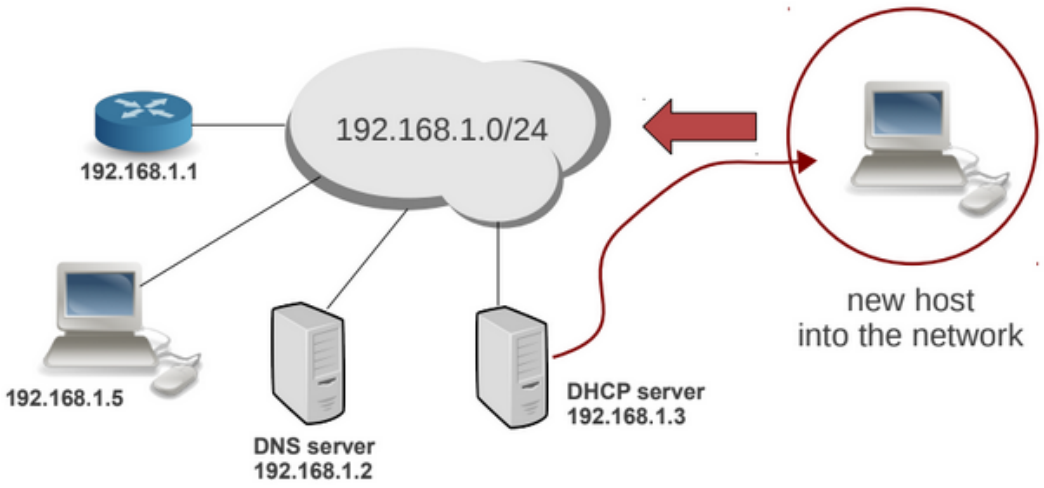


EXERCISE 1

```
phyhost$ simctl dns-basic exec initial
phyhost$ simctl dns-basic exec dhcp
```

1) In joker, check if a DHCP server is running and analyze the DHCP configuration file (/etc/dhcp3/dhcpd.conf).
   joker: ~# /etc/init.d/dhcp3-server status

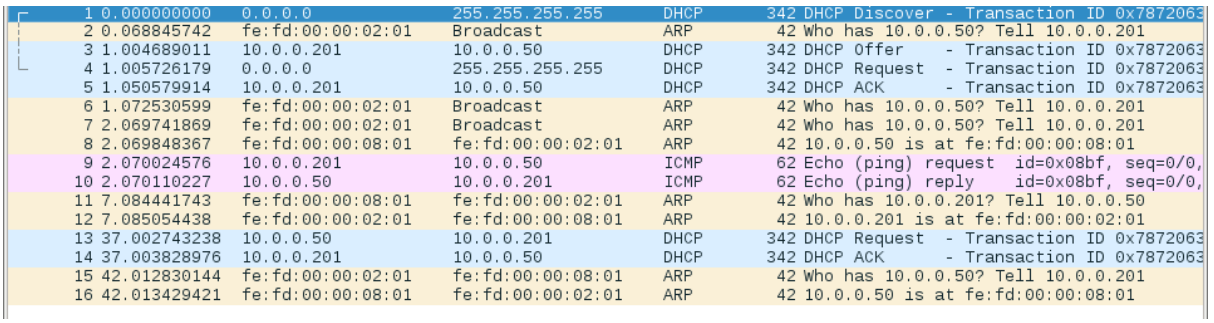
2) Capture with wireshark tap0 and explain the flow of DHCP messages captured when executing the following.

```
alice:~# dhclient3 eth1
```

```
alice:~# dhclient3 eth1
Internet Systems Consortium DHCP Client V3.1.1
Copyright 2004-2008 Internet Systems Consortium.
All rights reserved.
For info, please visit http://www.isc.org/sw/dhcp/

Listening on LPF/eth1/fe:fd:00:00:08:01
Sending on   LPF/eth1/fe:fd:00:00:08:01
Sending on   Socket/fallback
DHCPDISCOVER on eth1 to 255.255.255.255 port 67 interval 6
DHCPOFFER from 10.0.0.201
DHCPREQUEST on eth1 to 255.255.255.255 port 67
DHCPACK from 10.0.0.201
bound to 10.0.0.50 -- renewal in 36 seconds.
```

Capture at least 2 minutes. Which is the assigned IP? Which is the content of the file /etc/resolv.conf of alice.



1	0.000000000	0.0.0.0	255.255.255.255	DHCP	342 DHCP Discover - Transaction ID 0x7872063
2	0.068845742	fe:fd:00:00:02:01	Broadcast	ARP	42 Who has 10.0.0.50? Tell 10.0.0.201
3	1.004689011	10.0.0.201	10.0.0.50	DHCP	342 DHCP Offer - Transaction ID 0x7872063
4	1.005726179	0.0.0.0	255.255.255.255	DHCP	342 DHCP Request - Transaction ID 0x7872063
5	1.050579914	10.0.0.201	10.0.0.50	DHCP	342 DHCP ACK - Transaction ID 0x7872063
6	1.072530599	fe:fd:00:00:02:01	Broadcast	ARP	42 Who has 10.0.0.50? Tell 10.0.0.201
7	2.069741869	fe:fd:00:00:02:01	Broadcast	ARP	42 Who has 10.0.0.50? Tell 10.0.0.201
8	2.069848367	fe:fd:00:00:08:01	fe:fd:00:00:02:01	ARP	42 10.0.0.50 is at fe:fd:00:00:08:01
9	2.070024576	10.0.0.201	10.0.0.50	ICMP	62 Echo (ping) request id=0x08bf, seq=0/0,
10	2.070110227	10.0.0.50	10.0.0.201	ICMP	62 Echo (ping) reply id=0x08bf, seq=0/0,
11	7.084441743	fe:fd:00:00:08:01	fe:fd:00:00:02:01	ARP	42 Who has 10.0.0.201? Tell 10.0.0.50
12	7.085054438	fe:fd:00:00:02:01	fe:fd:00:00:08:01	ARP	42 10.0.0.201 is at fe:fd:00:00:02:01
13	37.002743238	10.0.0.50	10.0.0.201	DHCP	342 DHCP Request - Transaction ID 0x7872063
14	37.003828976	10.0.0.201	10.0.0.50	DHCP	342 DHCP ACK - Transaction ID 0x7872063
15	42.012830144	fe:fd:00:00:02:01	fe:fd:00:00:08:01	ARP	42 Who has 10.0.0.50? Tell 10.0.0.201
16	42.013429421	fe:fd:00:00:08:01	fe:fd:00:00:02:01	ARP	42 10.0.0.50 is at fe:fd:00:00:08:01

@IPserver: 10.0.0.201
@IPclient: 10.0.0.50

```
  GNU nano 2.0.7            File: /etc/resolv.conf

domain example.com
search example.com
nameserver 10.0.0.21
```

Take a look at the file /var/lib/dhcp3/dhclient.leases and explain the content of this file.

```
lease {
  interface "eth1";
  fixed-address 10.0.0.50;
  option subnet-mask 255.255.255.0;
  option dhcp-lease-time 70;
  option dhcp-message-type 5;
  option domain-name-servers 10.0.0.21;
  option dhcp-server-identifier 10.0.0.201;
  option domain-name "example.com";
  renew 2 2021/03/23 17:02:57;
  rebind 2 2021/03/23 17:03:22;
  expire 2 2021/03/23 17:03:31;
```

Explain the renew, rebind and expire fields. To do so, you can use the manual page of dhclient.conf.
Renew: última vez que se ha renovado el lease time.
Rebind: momento en que hay que volver a renovar.
Expire: tiempo en el que expirará la @ ip si no renueva. (enviar request cliente a DHCP server).
Podem veure que en el lease últim del servidor el END està posat en el moment que ha d'expirar el client si no renova. També és curiós veure que el start es el renew del client en el penúltim lease.

Can you access now to alice by her name? why?
No, la @IP no esta asignada a alis

3) Capture with wireshark tap0 and explain the flow of DHCP messages captured when executing the following command line:

slides 08-09
https://drive.google.com/drive/folders/1ugbAayGfGTtjjVX0rLdREecVnr-qNXcN?usp=sharing

```
alice:~# dhclient3 -r eth1
```

```
alice:~# dhclient3 -r eth1
There is already a pid file /var/run/dhclient.pid with pid 1185
killed old client process, removed PID file
Internet Systems Consortium DHCP Client V3.1.1
Copyright 2004-2008 Internet Systems Consortium.
All rights reserved.
For info, please visit http://www.isc.org/sw/dhcp/

Listening on LPF/eth1/fe:fd:00:00:08:01
Sending on   LPF/eth1/fe:fd:00:00:08:01
Sending on   Socket/fallback
DHCPRELEASE on eth1 to 10.0.0.201 port 67
alice:~#
```

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	fe:fd:00:00:08:01	fe:fd:00:00:02:01	ARP	42	Who has 10.0.0.201? Tell 10.0.0.50
2	0.000216043	fe:fd:00:00:02:01	fe:fd:00:00:08:01	ARP	42	10.0.0.201 is at fe:fd:00:00:02:01
3	10.662153003	10.0.0.50	10.0.0.201	DHCP	342	DHCP Release - Transaction ID 0xf389422

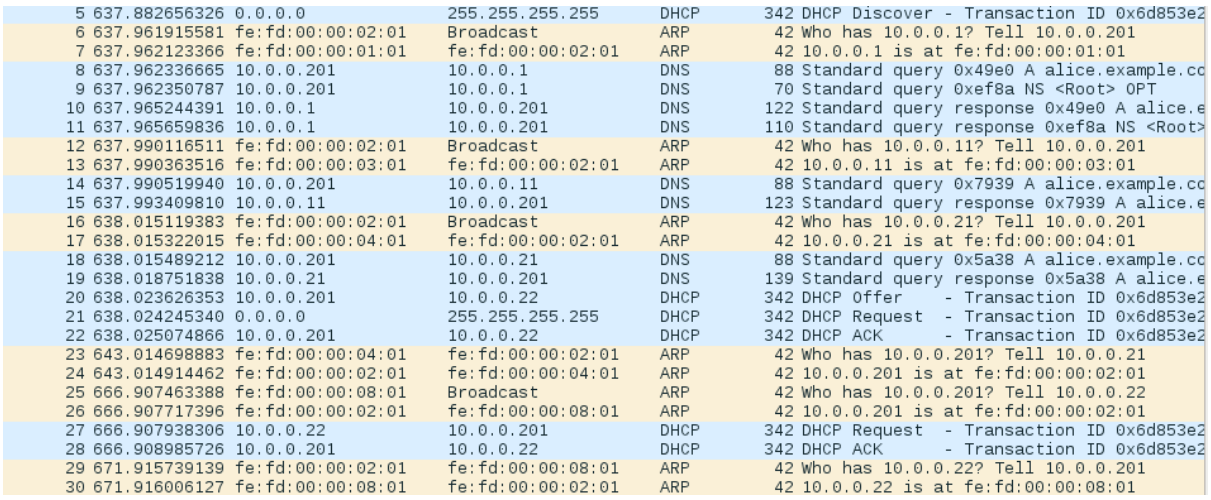
Podem veure que en el arxiu /var/lib/dhcp3/dhclient.leases per hores surt la hora en la que s'ha desconnectat del servidor i en els tres temps (start, renew, bind) surt la mateixa hora en el últim lease.

4) Capture with wireshark tap0 and explain the flow of DHCP and DNS messages captured when you modify the configuration of the DHCP server in the joker to activate the manual allocation for alice.example.com. Restart the DHCP server of joker and try the configuration.

```
host alice {
  hardware ethernet  fe:fd:00:00:08:01;
  fixed-address alice.example.com;
}
```

```
alice:~# dhclient3 eth1
Internet Systems Consortium DHCP Client V3.1.1
Copyright 2004-2008 Internet Systems Consortium.
All rights reserved.
For info, please visit http://www.isc.org/sw/dhcp/

Listening on LPF/eth1/fe:fd:00:00:08:01
Sending on   LPF/eth1/fe:fd:00:00:08:01
Sending on   Socket/fallback
DHCPDISCOVER on eth1 to 255.255.255.255 port 67 interval 3
DHCPOFFER from 10.0.0.201
DHCPREQUEST on eth1 to 255.255.255.255 port 67
DHCPACK from 10.0.0.201
bound to 10.0.0.22 -- renewal in 29 seconds.
alice:~#
```



5	637.882656326	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x6d853e2
6	637.961915581	fe:fd:00:00:02:01	Broadcast	ARP	42	Who has 10.0.0.1? Tell 10.0.0.201
7	637.962123366	fe:fd:00:00:01:01	fe:fd:00:00:02:01	ARP	42	10.0.0.1 is at fe:fd:00:00:01:01
8	637.962336665	10.0.0.201	10.0.0.1	DNS	88	Standard query 0x49e0 A alice.example.cc
9	637.962350787	10.0.0.201	10.0.0.1	DNS	70	Standard query 0xef8a NS <Root> OPT
10	637.965244391	10.0.0.1	10.0.0.201	DNS	122	Standard query response 0x49e0 A alice.e
11	637.965659836	10.0.0.1	10.0.0.201	DNS	110	Standard query response 0xef8a NS <Root>
12	637.990116511	fe:fd:00:00:02:01	Broadcast	ARP	42	Who has 10.0.0.11? Tell 10.0.0.201
13	637.990363516	fe:fd:00:00:03:01	fe:fd:00:00:02:01	ARP	42	10.0.0.11 is at fe:fd:00:00:03:01
14	637.990519940	10.0.0.201	10.0.0.11	DNS	88	Standard query 0x7939 A alice.example.cc
15	637.993409810	10.0.0.11	10.0.0.201	DNS	123	Standard query response 0x7939 A alice.e
16	638.015119383	fe:fd:00:00:02:01	Broadcast	ARP	42	Who has 10.0.0.21? Tell 10.0.0.201
17	638.015322015	fe:fd:00:00:04:01	fe:fd:00:00:02:01	ARP	42	10.0.0.21 is at fe:fd:00:00:04:01
18	638.015489212	10.0.0.201	10.0.0.21	DNS	88	Standard query 0x5a38 A alice.example.cc
19	638.018751838	10.0.0.21	10.0.0.201	DNS	139	Standard query response 0x5a38 A alice.e
20	638.023626353	10.0.0.201	10.0.0.22	DHCP	342	DHCP Offer - Transaction ID 0x6d853e2
21	638.024245340	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0x6d853e2
22	638.025074866	10.0.0.201	10.0.0.22	DHCP	342	DHCP ACK - Transaction ID 0x6d853e2
23	643.014698883	fe:fd:00:00:04:01	fe:fd:00:00:02:01	ARP	42	Who has 10.0.0.201? Tell 10.0.0.21
24	643.014914462	fe:fd:00:00:02:01	fe:fd:00:00:04:01	ARP	42	10.0.0.201 is at fe:fd:00:00:02:01
25	666.907463388	fe:fd:00:00:08:01	Broadcast	ARP	42	Who has 10.0.0.201? Tell 10.0.0.22
26	666.907717396	fe:fd:00:00:02:01	fe:fd:00:00:08:01	ARP	42	10.0.0.201 is at fe:fd:00:00:02:01
27	666.907938306	10.0.0.22	10.0.0.201	DHCP	342	DHCP Request - Transaction ID 0x6d853e2
28	666.908985726	10.0.0.201	10.0.0.22	DHCP	342	DHCP ACK - Transaction ID 0x6d853e2
29	671.915739139	fe:fd:00:00:02:01	fe:fd:00:00:08:01	ARP	42	Who has 10.0.0.22? Tell 10.0.0.201
30	671.916006127	fe:fd:00:00:08:01	fe:fd:00:00:02:01	ARP	42	10.0.0.22 is at fe:fd:00:00:08:01

Veiem que si fiquem en el fitxer /etc/dhcp3/dhcpd.conf de joker:

```
Host Alice {
        Hardware ethernet fe:fd:00:00:08:01
        Fixed-address Alice.example.com
}
```

Fem un restart del servidor: /etc/init.d/dhcp3-server restart

I després a Alice tornem a fer un dhclient3 eth1

Ara la IP que se li assigna a Alice es 10.0.0.22 que és la que tenia configurada en el escenari com tocaba.

Veiem un diàleg on, al configurar el fitxer dhcpd.conf i veure que Alice és Alice.example.com, i aquesta enviar un broadcast dient que es vol connectar a el servidor dh, el servidor de joker li vol fer una oferta. Aquest doncs va a buscar al root on pot trobar Alice.example.com., llavors aquest l'envia al següent servidor, al .11, que aquest l'envia al següent servidor, el .21 que aquest ja és el de la zona d'alice. Aqui aquest li idu que Alice.example.com té la IP 10.0.0.22 i ara el servidor ja es pot connectar directament amb Alice, oferint-li la IP que a ella li toca, que tenia al DNS el seu servidor.