

ZADATAK 34.

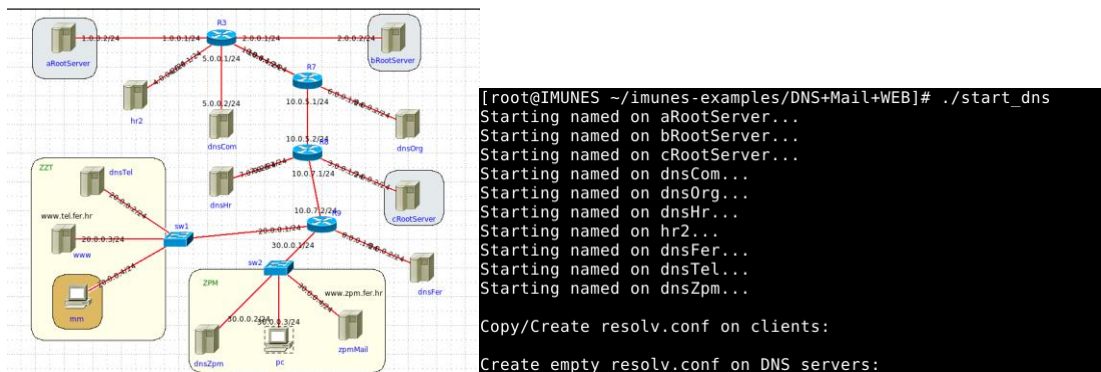
```
[root@IMUNES ~/imunes-examples/DHCP]# ./start_dhcp
Configuring server:

Configuring clients:
DHCPDISCOVER on eth0 to 255.255.255.255 port 67 interval 7
DHCPDISCOVER on eth0 to 255.255.255.255 port 67 interval 14
DHCPOFFER from 10.0.0.1
DHCPREQUEST on eth0 to 255.255.255.255 port 67
DHCPACK from 10.0.0.1
bound to 10.0.0.30 -- renewal in 300 seconds.
    inet 10.0.0.30 netmask 0xffffffff broadcast 10.0.0.255
DHCPDISCOVER on eth0 to 255.255.255.255 port 67 interval 4
DHCPOFFER from 10.0.0.1
DHCPREQUEST on eth0 to 255.255.255.255 port 67
DHCPACK from 10.0.0.1
bound to 10.0.0.10 -- renewal in 300 seconds.
    inet 10.0.0.10 netmask 0xffffffff broadcast 10.0.0.255
DHCPDISCOVER on eth0 to 255.255.255.255 port 67 interval 7
DHCPOFFER from 10.0.0.1
DHCPREQUEST on eth0 to 255.255.255.255 port 67
DHCPACK from 10.0.0.1
bound to 10.0.0.11 -- renewal in 300 seconds.
    inet 10.0.0.11 netmask 0xffffffff broadcast 10.0.0.255
[root@IMUNES ~/imunes-examples/DHCP]#
```

```
root@PC3:/ # dhclient eth0
DHCPDISCOVER on eth0 to 255.255.255.255 port 67 interval 5
DHCPOFFER from 10.0.0.1
DHCPREQUEST on eth0 to 255.255.255.255 port 67
DHCPACK from 10.0.0.1
bound to 10.0.0.12 -- renewal in 300 seconds.
```

IZVOR IP	IZVOR MAC	ODREDISTE IP	ODREDISTE MAC	PORUKA
0.0.0.0	42:00:aa:00:00:02	255.255.255.255	ff:ff:ff:ff:ff:ff	DHCP Discover
10.0.0.1	42:00:aa:00:00:03	10.0.0.12	42:00:aa:00:00:02	DHCP Offer
0.0.0.0.	42:00:aa:00:00:02	255.255.255.255	ff:ff:ff:ff:ff:ff	DHCP Request
10.0.0.1	42:00:aa:00:00:03	10.0.0.12	42:00:aa:00:00:02	DHCP ACK

ZADATAK 35.



```
[root@pc /]# host -t A dnsHr.hr
dnsHr.hr has address 7.0.0.2

[root@pc /]# host -t MX zpm.fer.hr
zpm.fer.hr mail is handled by 10 zpmMail.zpm.fer.hr.

[root@pc /]# host -t MX tel.fer.hr
tel.fer.hr mail is handled by 10 www.tel.fer.hr.

[root@pc /]# host -t NS hr
hr name server hr2.com.
hr name server dnsHr.hr.

[root@pc /]# host -t NS fer.hr
fer.hr name server dnsFer.fer.hr.

[root@pc /]# host -t NS tel.fer.hr
tel.fer.hr name server dnsTel.tel.fer.hr.

[root@pc /]# host -t NS .
name server bRootServer.
name server cRootServer.
name server aRootServer.

[root@pc /]# host -t PTR 20.0.0.4
4.0.0.20.in-addr.arpa domain name pointer mm.tel.fer.hr.
```

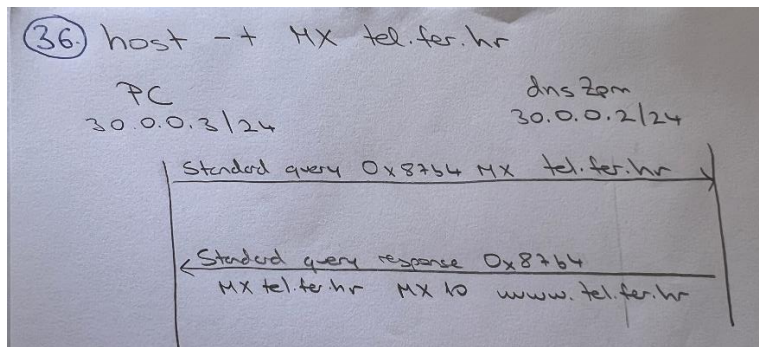
ZADATAK 36.

2	0.839605456	30.0.0.3	30.0.0.2	DNS	70 Standard query 0x87b4 MX tel.fer.hr
3	1.058116937	30.0.0.2	30.0.0.3	DNS	90 Standard query response 0x87b4 MX tel.fer.hr MX 10 www.tel.fer.hr

Pc (30.0.0.3) šalje DNS upit dnsZpm-u (30.0.0.2) s pitanjem tko je zadužen za tel.fer.

DnsZpm vraća DNS odgovor na upit te informira pc da je zadužen www.tel.fer.hr.

Ne dolazi do izmjene poruka s vršnim DNS poslužiteljem zato što izvodimo naredbu po drugi put te lokalni server već ima spremljene podatke.



ZADATAK 37.

- ▶ User Datagram Protocol, Src Port: 26772, Dst Port: 53
- ▶ User Datagram Protocol, Src Port: 53, Dst Port: 26772

PC koristi vrata 26772.

dnsZpm koristi default vrata 53 koja se inače koriste za uslugu DNS.

ZADATAK 38.

```

[root@IMUNES ~/imunes-examples/DNS+Mail+WEB]# ./start_mail
postfix: Postfix is running with backwards-compatible default settings
postfix: See http://www.postfix.org/COMPATIBILITY_README.html for details
postfix: To disable backwards compatibility use "postconf compatibility_level=2"
and "postfix reload"
postfix/postfix-script: starting the Postfix mail system
postfix: Postfix is running with backwards-compatible default settings
postfix: See http://www.postfix.org/COMPATIBILITY_README.html for details
postfix: To disable backwards compatibility use "postconf compatibility_level=2"
and "postfix reload"
postfix/postfix-script: starting the Postfix mail system
  
```

Display name: Kristo Palić

E-mail address: root@tel.fer.hr

User ID: root

POP3 server: www.tel.fer.hr:110

SMTP server: www.tel.fer.hr:25

WWW

5 93.479328975	42:00:aa:00:00:18	Broadcast	ARP	42 Who has 20.0.0.3? Tell 20.0.0.4
6 93.479446131	42:00:aa:00:00:17		ARP	42 20.0.0.3 is at 42:00:aa:00:00:17
7 93.519081527	20.0.0.3	20.0.0.4	TCP	74 15730 - 25 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=64 SACK_PERM=1 TSval=986679911 TSecr=0
8 93.519389196	20.0.0.3	20.0.0.4	TCP	74 25 - 15730 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=64 SACK_PERM=1 TSval=2612207226 TSecr=986679911
9 93.559980833	20.0.0.4	20.0.0.3	TCP	66 15730 - 25 [ACK] Seq=1 Ack=1 Win=65728 Len=0 TSval=986679990 TSecr=2612207226
10 93.615901463	20.0.0.3	20.0.0.2	DNS	81 Standard query 0xbde0 PTR 4.0.0.20.in-addr.arpa
11 93.649683130	20.0.0.2	20.0.0.3	DNS	108 Standard query response 0xbde0 PTR 4.0.0.20.in-addr.arpa PTR mm.tel.fer.hr
12 93.649955232	20.0.0.3	20.0.0.2	DNS	73 Standard query 0x57f8 A mm.tel.fer.hr
13 93.691666679	20.0.0.2	20.0.0.3	DNS	89 Standard query response 0x57f8 A mm.tel.fer.hr A 20.0.0.4
14 93.692649790	20.0.0.3	20.0.0.4	SMTP	108 S: 220 www.tel.fer.hr ESMTP Postfix (3.6.2)
15 93.760073417	20.0.0.4	20.0.0.3	TCP	66 15730 - 25 [ACK] Seq=1 Ack=43 Win=65728 Len=0 TSval=986680202 TSecr=2612207398
16 93.769477905	20.0.0.4	20.0.0.3	SMTP	86 C: HELO mm.tel.fer.hr
17 93.769751742	20.0.0.3	20.0.0.4	SMTP	86 S: 250 www.tel.fer.hr
18 93.809527468	20.0.0.4	20.0.0.3	SMTP	95 C: MAIL FROM:<root@tel.fer.hr>
19 93.836420551	20.0.0.3	20.0.0.4	SMTP	80 S: 250 2.1.0 Ok
20 93.869651590	20.0.0.4	20.0.0.3	SMTP	95 C: RCPT TO:<imunes@zpm.fer.hr>
21 93.909788814	20.0.0.3	20.0.0.4	TCP	66 25 - 15730 [ACK] Seq=77 Ack=79 Win=65728 Len=0 TSval=2612207615 TSecr=986680301
22 93.914028459	20.0.0.3	20.0.0.4	SMTP	80 S: 250 2.1.5 Ok
23 93.949919334	20.0.0.4	20.0.0.3	SMTP	72 C: DATA
24 93.952083956	20.0.0.3	20.0.0.4	SMTP	103 S: 354 End data with <CR><LF>.<CR><LF>
25 93.988066876	20.0.0.4	20.0.0.3	SMTP	463 C: DATA Fragment, 397 bytes
26 94.032302150	20.0.0.3	20.0.0.4	TCP	66 25 - 15730 [ACK] Seq=128 Ack=482 Win=65728 Len=0 TSval=2612207739 TSecr=986680423
27 94.069504005	20.0.0.4	20.0.0.3	SMTP/I.	69 from: Kristo Palic <root@tel.fer.hr>, subject: lab3, (text/plain)
28 94.074883261	20.0.0.3	20.0.0.4	SMTP	103 S: 250 2.0.0 Ok: queued as 4CCA0150A54
29 94.109315570	20.0.0.4	20.0.0.3	SMTP	72 C: QUIT
30 94.112332434	20.0.0.3	20.0.0.4	SMTP	81 S: 221 2.0.0 Bye
31 94.112332434	20.0.0.3	20.0.0.4	TCP	66 25 - 15730 [FIN, ACK] Seq=180 Ack=491 Win=65728 Len=0 TSval=2612207816 TSecr=986680540
32 94.138629000	20.0.0.4	20.0.0.3	TCP	66 15730 - 25 [ACK] Seq=491 Ack=181 Win=65728 Len=0 TSval=986680581 TSecr=2612207816
33 94.148878978	20.0.0.4	20.0.0.3	TCP	66 15730 - 25 [FIN, ACK] Seq=491 Ack=181 Win=65728 Len=0 TSval=986680581 TSecr=2612207816
34 94.150185018	20.0.0.3	20.0.0.4	TCP	66 25 - 15730 [ACK] Seq=181 Ack=492 Win=65664 Len=0 TSval=2612207855 TSecr=986680581
35 94.226553375	20.0.0.3	20.0.0.2	DNS	70 Standard query 0xb793 MX zpm.fer.hr
36 94.439604196	20.0.0.2	20.0.0.3	DNS	94 Standard query response 0xb793 MX zpm.fer.hr MX 10 zpmMail.zpm.fer.hr
37 94.440494532	20.0.0.3	20.0.0.2	DNS	78 Standard query 0xabdc A zpmMail.zpm.fer.hr
38 94.559893786	20.0.0.2	20.0.0.3	DNS	94 Standard query response 0xabdc A zpmMail.zpm.fer.hr A 30.0.0.4
39 94.560367688	20.0.0.3	20.0.0.2	DNS	78 Standard query 0x9016 AAAA zpmMail.zpm.fer.hr
40 94.678999706	20.0.0.2	20.0.0.3	DNS	154 Standard query response 0x9016 AAAA zpmMail.zpm.fer.hr SOA dnsZpm.zpm.fer.hr
41 94.679453394	42:00:aa:00:00:17	Broadcast	ARP	42 Who has 20.0.0.1? Tell 20.0.0.3
42 94.719620511	42:00:aa:00:00:14		ARP	42 20.0.0.1 is at 42:00:aa:00:00:14
43 94.719919990	20.0.0.3	20.0.0.4	TCP	74 36215 - 25 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=64 SACK_PERM=1 TSval=837611856 TSecr=0
44 94.839922951	20.0.0.4	20.0.0.3	TCP	74 25 - 36215 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=64 SACK_PERM=1 TSval=2669786595 TSecr=837611856
45 94.839976590	20.0.0.3	20.0.0.4	TCP	66 36215 - 25 [ACK] Seq=1 Ack=1 Win=65728 Len=0 TSval=837612017 TSecr=2669786595
46 95.979732620	30.0.0.4	20.0.0.3	SMTP	104 S: 220 zpmMail.zpm.fer.hr ESMTP Postfix
47 95.979911972	20.0.0.3	30.0.0.4	SMTP	87 C: EHLO www.tel.fer.hr
48 96.050711221	30.0.0.4	20.0.0.3	SMTP	207 S: 250 zpmMail.zpm.fer.hr PIPELINING SIZE 10240000 VRFY ETRN ENHANCEDSTATUSCODES 8BITMIME DSN CHUNKING
49 96.060525011	20.0.0.3	30.0.0.4	SMTP	170 C: MAIL FROM:<root@tel.fer.hr> SIZE=574 RCPT TO:<imunes@zpm.fer.hr> ORCPT=rfc822;imunes@zpm.fer.hr DATA
50 96.149440502	30.0.0.4	20.0.0.3	SMTP	131 S: 250 2.1.0 Ok 250 2.1.5 Ok 354 End data with <CR><LF>.<CR><LF>
51 96.149624324	20.0.0.3	30.0.0.4	SMTP/I.	649 from: Kristo Palic <root@tel.fer.hr>, subject: lab3, (text/plain)
52 96.21885082	30.0.0.4	20.0.0.3	SMTP	118 S: 250 2.0.0 Ok: queued as 8062f150A54 221 2.0.0 Bye
53 96.218934809	30.0.0.4	20.0.0.3	TCP	66 25 - 36215 [FIN, ACK] Seq=297 Ack=789 Win=65728 Len=0 TSval=2669787985 TSecr=837613326
54 96.219136790	20.0.0.3	30.0.0.4	TCP	66 36215 - 25 [ACK] Seq=789 Ack=298 Win=65728 Len=0 TSval=837613395 TSecr=2669787985
55 96.219420623	20.0.0.4	20.0.0.3	TCP	66 36215 - 25 [FIN, ACK] Seq=789 Ack=298 Win=65728 Len=0 TSval=837613395 TSecr=2669787985
56 96.289771466	30.0.0.4	20.0.0.3	TCP	66 25 - 36215 [ACK] Seq=298 Ack=710 Win=65664 Len=0 TSval=2669788045 TSecr=837613395
57 115.730004154	50.0.0.1	774.0.0.0	RTSP	286 Response

Mm

21 123.548986254	20.0.0.4	20.0.0.2	DNS	74 Standard query 0xb9b9 AAAA www.tel.fer.hr
22 123.589817878	20.0.0.2	20.0.0.4	DNS	150 Standard query response 0xb9b9 AAAA www.tel.fer.hr SOA dnsTel.tel.fer.hr
23 123.591676076	42:00:aa:00:00:18	Broadcast	ARP	42 Who has 20.0.0.3? Tell 20.0.0.4
24 123.629145684	42:00:aa:00:00:17		ARP	42 20.0.0.3 is at 42:00:aa:00:00:17
25 123.629288800	20.0.0.4	20.0.0.3	TCP	74 15730 - 25 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=64 SACK_PERM=1 TSval=986679911 TSecr=0
26 123.668488974	20.0.0.3	20.0.0.4	TCP	74 25 - 15730 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=64 SACK_PERM=1 TSval=2612207226 TSecr=986679911
27 123.668902054	20.0.0.4	20.0.0.3	TCP	66 15730 - 25 [ACK] Seq=1 Ack=1 Win=65728 Len=0 TSval=986679990 TSecr=2612207226
28 123.839940770	20.0.0.3	20.0.0.4	SMTP	108 S: 220 www.tel.fer.hr ESMTP Postfix (3.6.2)
29 123.841264183	20.0.0.4	20.0.0.2	DNS	73 Standard query 0xb7089 A mm.tel.fer.hr
30 123.879904108	20.0.0.2	20.0.0.3	DNS	89 Standard query response 0xb7089 A mm.tel.fer.hr A 20.0.0.4
31 123.880828328	20.0.0.4	20.0.0.3	TCP	66 15730 - 25 [ACK] Seq=1 Ack=43 Win=65728 Len=0 TSval=986680202 TSecr=2612207398
32 123.880188125	20.0.0.4	20.0.0.3	SMTP	86 C: HELO mm.tel.fer.hr
33 123.919958822	20.0.0.3	20.0.0.4	SMTP	86 S: 250 www.tel.fer.hr
34 123.921309552	20.0.0.4	20.0.0.3	SMTP	95 C: MAIL FROM:<root@tel.fer.hr>
35 123.979642385	20.0.0.3	20.0.0.4	SMTP	80 S: 250 2.1.0 Ok
36 123.980060398	20.0.0.4	20.0.0.3	SMTP	95 C: RCPT TO:<imunes@zpm.fer.hr>
37 124.049787813	20.0.0.3	20.0.0.4	TCP	66 25 - 15730 [ACK] Seq=77 Ack=79 Win=65728 Len=0 TSval=2612207615 TSecr=986680301
38 124.059597240	20.0.0.3	20.0.0.4	SMTP	80 S: 250 2.1.5 Ok
39 124.060067691	20.0.0.4	20.0.0.3	SMTP	72 C: DATA
40 124.101064242	20.0.0.3	20.0.0.4	SMTP	103 S: 354 End data with <CR><LF>.<CR><LF>
41 124.101080028	20.0.0.4	20.0.0.3	SMTP	463 C: DATA Fragment, 397 bytes
42 124.179667528	20.0.0.3	20.0.0.4	TCP	66 25 - 15730 [ACK] Seq=128 Ack=482 Win=65728 Len=0 TSval=2612207739 TSecr=986680423
43 124.179829560	20.0.0.4	20.0.0.3	SMTP/I.	69 from: Kristo Palic <root@tel.fer.hr>, subject: lab3, (text/plain)
44 124.218962466	20.0.0.3	20.0.0.4	SMTP	103 S: 250 2.0.0 Ok: queued as 4CCA0150A54
45 124.219468676	20.0.0.4	20.0.0.3	SMTP	72 C: QUIT
46 124.249327778	20.0.0.3	20.0.0.4	SMTP	81 S: 221 2.0.0 Bye
47 124.259641108	20.0.0.3	20.0.0.4	TCP	66 25 - 15730 [FIN, ACK] Seq=180 Ack=491 Win=65728 Len=0 TSval=2612207816 TSecr=986680540
48 124.261786524	20.0.0.4	20.0.0.3	TCP	66 15730 - 25 [ACK] Seq=491 Ack=181 Win=65728 Len=0 TSval=986680581 TSecr=2612207816
49 124.262316580	20.0.0.4	20.0.0.3	TCP	66 15730 - 25 [FIN, ACK] Seq=491 Ack=181 Win=65728 Len=0 TSval=986680581 TSecr=2612207816
50 124.300217207	20.0.0.3	20.0.0.4	TCP	66 25 - 15730 [ACK] Seq=181 Ack=492 Win=65664 Len=0 TSval=2612207855 TSecr=986680581
51 124.829026315	42:00:aa:00:00:17	Broadcast	ARP	42 Who has 20.0.0.1? Tell 20.0.0.3
52 145.369923831	20.0.0.1	224.0.0.9	RIPv2	286 Response

a)

PROTOKOL	ULOGA	SLOJ TCP/IP
ARP	Iz IP adrese saznaje MAC adresu.	Sloj podatkovne poveznice
TCP	Prijenos podataka.	Transportni sloj
DNS	Iz simboličke adrese saznaje IP adresu.	Aplikacijski sloj
SMTP	Protokol za slanje elektroničkih poruka.	Aplikacijski sloj
SMTP/IMF	SMTP-ov protokol s informacijom o pošiljatelju, subjektu i tijelu poruke.	

b) Prvo mm preko ARP-a saznaje MAC adresu dnsTel DNS poslužitelja. Zatim DNS traži IP adresu za www.tel.fer.hr. Nakon toga uspostavlja se TCP veza između mm i www. Prenosi se poruka protokolom SMTP I SMTP/IMF. Te se nakon toga prekida TCP veza.

c) Protokol DNS se koristi da bi mm preko simboličke adrese saznao IP adresu od www.tel.fer.hr i obratno.

Nadležni poslužitelj za tel.fer.hr – dnsTel.tel.fer.hr

Nadležni poslužitelj za zpm.fer.hr – dnsZpm.zpm.fer.hr

Sve saznaju DNS upitom.

e)

```
220 www.tel.fer.hr ESMTP Postfix (3.6.2)
HELO mm.tel.fer.hr
250 www.tel.fer.hr
MAIL FROM:<root@tel.fer.hr>
250 2.1.0 Ok
RCPT TO:<imunes@zpm.fer.hr>
250 2.1.5 Ok
DATA
354 End data with <CR><LF>.<CR><LF>
Date: Sun, 4 Jun 2023 00:46:37 +0000
From: Kristo Palic <root@tel.fer.hr>
To: imunes@zpm.fer.hr
Subject: lab3
Message-Id: <20230604004637.d607fbf70515a59b393e16af@tel.fer.hr>
X-Mailer: Sylpheed 3.7.0 (GTK+ 2.24.33; amd64-portbld-freebsd12.2)
Mime-Version: 1.0
Content-Type: text/plain; charset=US-ASCII
Content-Transfer-Encoding: 7bit

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Kristo Palic <root@tel.fer.hr>
.
250 2.0.0 Ok: queued as 4CCA0150A54
QUIT
221 2.0.0 Bye
```

ZADATAK 39.

Display name: Kristov asistent

E-mail address: imunes@zpm.fer.hr

User ID: imunes

POP3 server: zpmMail@zpm.fer.hr:110

SMTP server: zpmMail@zpm.fer.hr:25

Back Forward Close

imunes@zpm.fer.hr - Sylpheed 3.7.0 (on pc)

File Edit View Message Tools Configuration Help

Get Get all Send Compose Reply Reply all Forward Junk

Folder: Mailbox (MH) Inbox (1) Sent Drafts Queue Trash Junk

All Search: Search for Subject or From

✓	✉	Subject	From	Date	Size
		lab3	Kristo Palic	23/06/04(Sun) 18:38	

inbox 1 item(s) selected (883B) 1 new, 1 unread, 1 total (883B)

From: Kristo Palic <root@tel.fer.hr> **To:** imunes@zpm.fer.hr
Subject: lab3

From: Kristo Palic <root@tel.fer.hr>
To: imunes@zpm.fer.hr
Subject: lab3
Date: Sun, 4 Jun 2023 00:46:37 +0000
X-Mailer: Sylpheed 3.7.0 (GTK+ 2.24.33; amd64-portbld-freebsd12.2)

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--
 Kristo Palic <root@tel.fer.hr>

Done. imunes@zpm.fer.hr

time	Source	Destination	Protocol	Length	Info
82	316.969091881	30.0.0.4	POP	71	S: +OK
83	317.011408433	30.0.0.4	TCP	66	47971 → 110 [ACK] Seq=45 Ack=84 Win=65728 Len=0 TSval=395638047 TSecr=2002973685
84	317.049505733	30.0.0.4	POP/IMF	76	1 908 , ,
85	317.049999371	30.0.0.4	POP	74	C: RETR 1
86	317.089397116	30.0.0.4	POP	71	S: +OK
87	317.131188461	30.0.0.4	TCP	66	47971 → 110 [ACK] Seq=53 Ack=99 Win=65728 Len=0 TSval=395638167 TSecr=2002973804
88	317.169305596	30.0.0.4	POP/IMF	978	from: Kristo Palic <root@tel.fer.hr>, subject: lab3, (text/plain)
89	317.171071462	30.0.0.4	POP	72	C: QUIT
90	317.199438476	30.0.0.4	POP	71	S: +OK
91	317.199612799	30.0.0.4	TCP	66	47971 → 110 [FIN, ACK] Seq=59 Ack=1016 Win=65728 Len=0 TSval=395638235 TSecr=2002973924
92	317.208934996	30.0.0.4	TCP	66	110 → 47971 [FIN, ACK] Seq=1016 Ack=59 Win=65728 Len=0 TSval=2002973924 TSecr=395638205
93	317.208979074	30.0.0.4	TCP	66	[TCP Out-Of-Order] 47971 → 110 [FIN, ACK] Seq=59 Ack=1017 Win=65728 Len=0 TSval=395638244 TSecr=2002973924
94	317.228647495	30.0.0.4	TCP	66	[TCP Out-Of-Order] 110 → 47971 [FIN, ACK] Seq=1016 Ack=60 Win=65728 Len=0 TSval=2002973953 TSecr=395638235
95	317.228741362	30.0.0.4	TCP	66	[TCP Dup ACK 93#1] 47971 → 110 [ACK] Seq=60 Ack=1017 Win=65728 Len=0 TSval=395638265 TSecr=2002973924
96	317.228497071	30.0.0.4	TCP	65	[TCP Dup ACK 94#1] 110 → 47971 [ACK] Seq=1017 Ack=60 Win=65728 Len=0 TSval=2002973953 TSecr=395638235
97	332.259407550	30.0.0.1	RIPV2	286	Response
98	362.324659139	30.0.0.1	RIPV2	286	Response

a)

PROTOKOL	ULOGA	SLOJ TCP/IP
ARP	Iz IP adrese saznaje MAC adresu.	Sloj podatkovne poveznice
TCP	Prijenos podataka.	Transportni sloj
DNS	Iz simboličke adrese saznaje IP adresu.	Aplikacijski sloj
POP	Preuzima elektroničku poštu s udaljenog računala.	Aplikacijski sloj
POP/IMF	Format poruke.	Aplikacijski sloj

b)

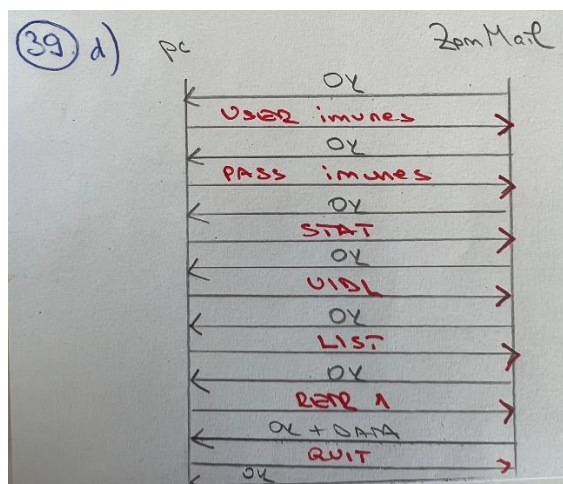
Wireshark · Conversations · eth0											
Ethernet · 4		IPv4 · 3		IPv6		TCP · 1		UDP · 9			
Address A	Port A	Address B	Port B	Packets	Bytes	Packets A → B	Bytes A → B	Packets B → A	Bytes B → A	Rel Start	Duration
30.0.0.3	40955	30.0.0.4	110	30	3131	15	1056	15	2075	92.621572	0.8180

1 TCP konekcija s vratima 40955(pc) i 110 (standard za POP3 protokol).

c)

DNS protokol služi kako bi se doznala IP adresa računala zpmMail.zpm.fer.hr.

d)



LIST - koliko ima mailova na poslužitelju te njihove duljine (u bajtovima) u ovom slučaju jedan mail duljine 978

RETR n - vraća n-ti od navedenih m mailova (1 od 1)

e)

Poruka je stigla na zpmMail od računala mm.tel.fer.hr preko poslužitelja www.tel.fer.hr.

f)

Komunikacija između računala NIJE šifrirana jer se u poruci vidljivo šalje password u izvornom obliku.

ZADATAK 40.

719 42.2008137062	30.0.0.3	30.0.0.2	DNS	74 Standard query 0x2517 AAAA www.zpm.fer.hr
720 42.329862852	30.0.0.2	30.0.0.3	DNS	172 Standard query response 0x2517 AAAA www.zpm.fer.hr CNAME zpmMail.zpm.fer.hr SOA dnsZpm.zpm.fer.hr
721 42.331483294	42:00:aa:00:00:1c	Broadcast	ARP	42 Who has 30.0.0.4? Tell 30.0.0.3
722 42.367597391	42:00:aa:00:00:1d	42:00:aa:00:00:1c	ARP	42 30.0.0.4 is at 42:00:aa:00:00:1d
723 42.367628605	30.0.0.3	30.0.0.4	TCP	74 10001 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=64 SACK_PERM=1 TSval=367166367 TSecr=0
724 42.408493139	30.0.0.4	30.0.0.3	TCP	74 80 → 10001 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=64 SACK_PERM=1 TSval=3747830768 TSecr=367166367
725 42.408545669	30.0.0.3	30.0.0.4	TCP	66 10001 → 80 [ACK] Seq=1 Ack=1 Win=65664 Len=0 TSval=367166446 TSecr=3747830768
726 42.410814534	30.0.0.3	30.0.0.4	HTTP	380 GET / HTTP/1.1
727 42.454425986	30.0.0.4	30.0.0.3	TCP	281 80 → 10001 [PSH, ACK] Seq=1 Ack=315 Win=65664 Len=0 TSval=3747830811 TSecr=367166446 [TCP segment of a reassembled PDU]
728 42.475848783	30.0.0.4	30.0.0.3	HTTP	375 HTTP/1.1 200 OK (text/html)
729 42.476122445	30.0.0.3	30.0.0.4	TCP	66 10001 → 80 [ACK] Seq=315 Ack=525 Win=65344 Len=0 TSval=367166513 TSecr=3747830811
730 42.613140632	30.0.0.3	30.0.0.4	TCP	74 10002 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=64 SACK_PERM=1 TSval=3144301408 TSecr=0
731 42.658580827	30.0.0.4	30.0.0.3	TCP	74 80 → 10002 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=64 SACK_PERM=1 TSval=246165284 TSecr=3144301408
732 42.658608590	30.0.0.3	30.0.0.4	TCP	66 10002 → 80 [ACK] Seq=1 Ack=1 Win=65664 Len=0 TSval=3144301459 TSecr=246165284
733 42.667537312	30.0.0.3	30.0.0.4	HTTP	347 GET /powerlogo.gif HTTP/1.1
734 42.688459945	30.0.0.4	30.0.0.3	TCP	281 80 → 10002 [PSH, ACK] Seq=1 Ack=282 Win=65664 Len=0 TSval=246165334 TSecr=3144301459 [TCP segment of a reassembled PDU]
735 42.698309530	30.0.0.4	30.0.0.3	TCP	1514 80 → 10002 [ACK] Seq=216 Ack=282 Win=65664 Len=1448 TSval=246165334 TSecr=3144301459 [TCP segment of a reassembled PDU]
736 42.698394102	30.0.0.3	30.0.0.4	TCP	66 10002 → 80 [ACK] Seq=282 Ack=1664 Win=64192 Len=0 TSval=3144301499 TSecr=246165334
737 42.698399019	30.0.0.4	30.0.0.3	TCP	1514 80 → 10002 [ACK] Seq=1664 Ack=282 Win=65664 Len=1448 TSval=246165334 TSecr=3144301459 [TCP segment of a reassembled PDU]
738 42.698405674	30.0.0.4	30.0.0.3	TCP	1514 80 → 10002 [ACK] Seq=3112 Ack=282 Win=65664 Len=1448 TSval=246165334 TSecr=3144301459 [TCP segment of a reassembled PDU]
739 42.698413009	30.0.0.4	30.0.0.3	HTTP	1081 HTTP/1.1 200 OK (GIF89a)
740 42.698416074	30.0.0.3	30.0.0.4	TCP	66 10002 → 80 [ACK] Seq=282 Ack=4560 Win=61312 Len=0 TSval=3144301499 TSecr=246165334
741 42.711875491	30.0.0.3	30.0.0.2	DNS	74 Standard query 0x5b28 A www.tel.fer.hr
742 42.714567792	30.0.0.3	30.0.0.4	HTTP	312 GET /favicon.ico HTTP/1.1
743 42.751235340	30.0.0.4	30.0.0.3	HTTP/X..	541 HTTP/1.1 404 Not Found
744 42.851870874	30.0.0.3	30.0.0.4	TCP	66 10002 → 80 [ACK] Seq=528 Ack=5970 Win=65664 Len=0 TSval=3144301652 TSecr=246165382
745 43.038298483	30.0.0.2	30.0.0.3	DNS	90 Standard query response 0x5b28 A www.tel.fer.hr A 20.0.0.3
746 43.038502142	30.0.0.3	30.0.0.2	DNS	74 Standard query 0xc397 AAAA www.tel.fer.hr

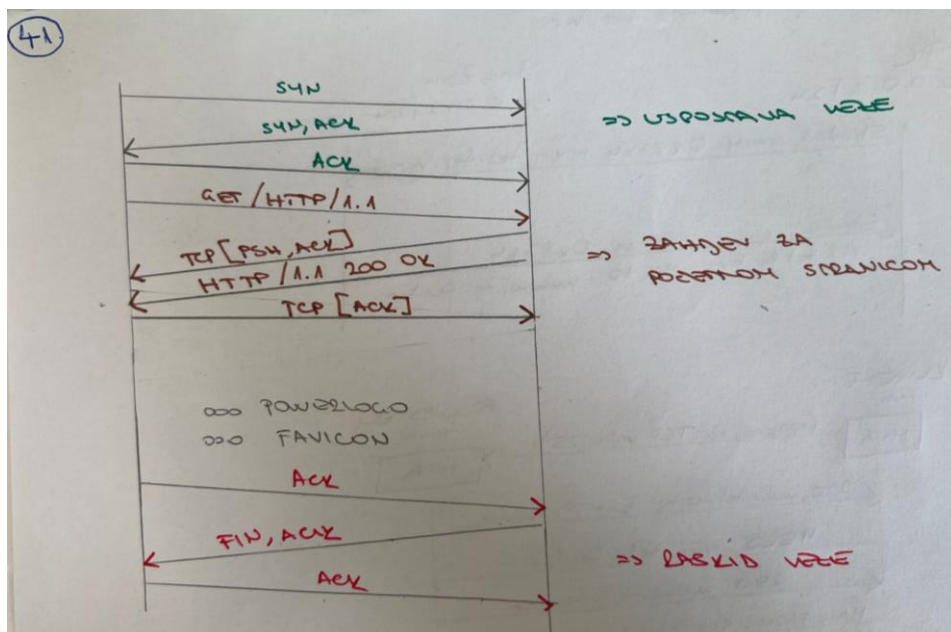
Ethernet · 4		IPv4 · 3	IPv6	TCP · 3	UDP · 574										
Address A	Port A	Address B	Port B	Packets	Bytes	Packets A → B	Bytes A → B	Packets B → A	Bytes B → A	Rel Start	Duration	Bits/s A → B	Bits/s B → A		
30.0.0.3	10001	30.0.0.4	80	11	1580	6	718	5	862	42.367629	6.1836	928			
30.0.0.3	10002	30.0.0.4	80	18	7700	9	1129	9	6571	42.613141	5.9848	1509			
30.0.0.3	10000	30.0.0.4	80	7	478	4	272	3	206	45.328845	5.1602	421			

Uspostave se 3 HTTP konekcije koje služe da dohvaćanje resursa (pc zahtijeva, zpmMail poslužuje)

ZAHTJEV	ODGOVOR	
GET/HTTP/1.1	HTTP/1.1 200 OK (text/html)	Zahtjev za početnom stranicom. Resurs dostavljena.
GET/powerlogo.gif HTTP/1.1	HTTP/1.1 200 OK (GIF89a)	Zahtijevana slika. Resurs dostavljen.
GET/favicon.ico HTTP/1.1	HTTP/1.1 404 Not Found	Zahtijevana slika. Resurs nije pronađen.

Sve konekcije su između pc (30.0.0.3, port 10000/10001/10002) i zpmMail – www.zpm.fer.hr (30.0.0.4, port 80)

ZADATAK 41.



ZADATAK 42.

7	0.473803448	30.0.0.3	20.0.0.3	HTTP	491 GET / HTTP/1.1
8	0.498297773	30.0.0.2	30.0.0.3	DNS	90 Standard query response 0xcff5 A www.tel.fer.hr A 20.0.0.3
9	0.498383769	30.0.0.3	30.0.0.2	DNS	74 Standard query 0x9f33 AAAA www.tel.fer.hr
10	0.546806100	20.0.0.3	30.0.0.3	TCP	269 80 → 10009 [PSH, ACK] Seq=1 Ack=426 Win=65664 Len=203 TSval=3852486612 TSecr=1914807466 [TCP segment of a reassembled PDU]
11	0.584026440	30.0.0.3	20.0.0.3	HTTP	423 GET /freebsd.gif HTTP/1.1
12	0.627334806	30.0.0.2	30.0.0.3	DNS	150 Standard query response 0x9f33 AAAA www.tel.fer.hr SOA dnsTel.tel.fer.hr
13	0.660767386	20.0.0.3	30.0.0.3	TCP	269 80 → 10009 [PSH, ACK] Seq=204 Ack=783 Win=65664 Len=203 TSval=3852486722 TSecr=1914807582 [TCP segment of a reassembled PDU]
14	0.750707927	30.0.0.3	20.0.0.3	TCP	66 10009 → 80 [ACK] Seq=783 Ack=407 Win=65664 Len=0 TSval=1914807758 TSecr=3852486722
15	0.789404758	30.0.0.3	30.0.0.2	DNS	74 Standard query 0x021e A www.zpm.fer.hr
16	0.817399168	30.0.0.2	30.0.0.3	DNS	112 Standard query response 0x021e A www.zpm.fer.hr CNAME zpmMail.zpm.fer.hr A 30.0.0.4
17	0.817458473	30.0.0.3	30.0.0.2	DNS	74 Standard query 0x5099 AAAA www.zpm.fer.hr
18	0.856642370	30.0.0.2	30.0.0.3	DNS	172 Standard query response 0x5099 AAAA www.zpm.fer.hr CNAME zpmMail.zpm.fer.hr SOA dnsZpm.zpm.fer.hr

Hypertext Transfer Protocol, Src IP: 498383769, Src Port: 80, Seq: 4, Len: 4, ESN: 745					
▼	Hypertext Transfer Protocol				
▶	GET / HTTP/1.1\r\n				
	Host: www.tel.fer.hr\r\n				
	User-Agent: Mozilla/5.0 (X11; FreeBSD i386; rv:67.0) Gecko/20100101 Firefox/67.0\r\n				
	Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8\r\n				
	Accept-Language: en-US,en;q=0.5\r\n				
	Accept-Encoding: gzip, deflate\r\n				
	Referer: http://www.zpm.fer.hr/\r\n				
	Connection: keep-alive\r\n				
	Upgrade-Insecure-Requests: 1\r\n				
	If-Modified-Since: Fri, 27 May 2022 10:44:57 GMT\r\n				
63	5.009572180	30.0.0.3	30.0.0.2	DNS	91 Standard query 0x5c71 A detectportal.firefox.com.fer.hr
64	5.719745950	20.0.0.3	30.0.0.3	HTTP	66 HTTP/1.1 304 Not Modified HTTP/1.1 304 Not Modified
65	5.719786469	30.0.0.3	20.0.0.3	TCP	66 10009 → 80 [ACK] Seq=783 Ack=408 Win=65664 Len=0 TSval=1914812719 TSecr=3852491780
66	5.727717456	30.0.0.3	20.0.0.3	TCP	66 10009 → 80 [FIN, ACK] Seq=783 Ack=408 Win=65664 Len=0 TSval=1914812727 TSecr=3852491780
67	5.797392243	20.0.0.3	30.0.0.3	TCP	66 80 → 10009 [ACK] Seq=408 Ack=784 Win=65664 Len=0 TSval=3852491860 TSecr=1914812727
68	5.838848234	30.0.0.2	30.0.0.3	DNS	165 Standard query response 0x5c71 No such name A detectportal.firefox.com.fer.hr SOA dnsFer.fer.hr

Nakon odabira poveznice „Link on ZYT“ ne dolazi do DNS protokola jer dnsZpm već zna traženu IP adresu.

If-Modified-Since zahtjev HTTP headera označava da će server poslati natrag tražene podatke sa statusom 200 (OK) ako i samo ako su modificirani nakon danog datuma. U slučaju da resurs nije bio modificiran od danog datuma, odgovor će biti 304 (Not Modified) bez tijela.