ТЕХНОАТОМ

Тестирование backend
Лекция 3

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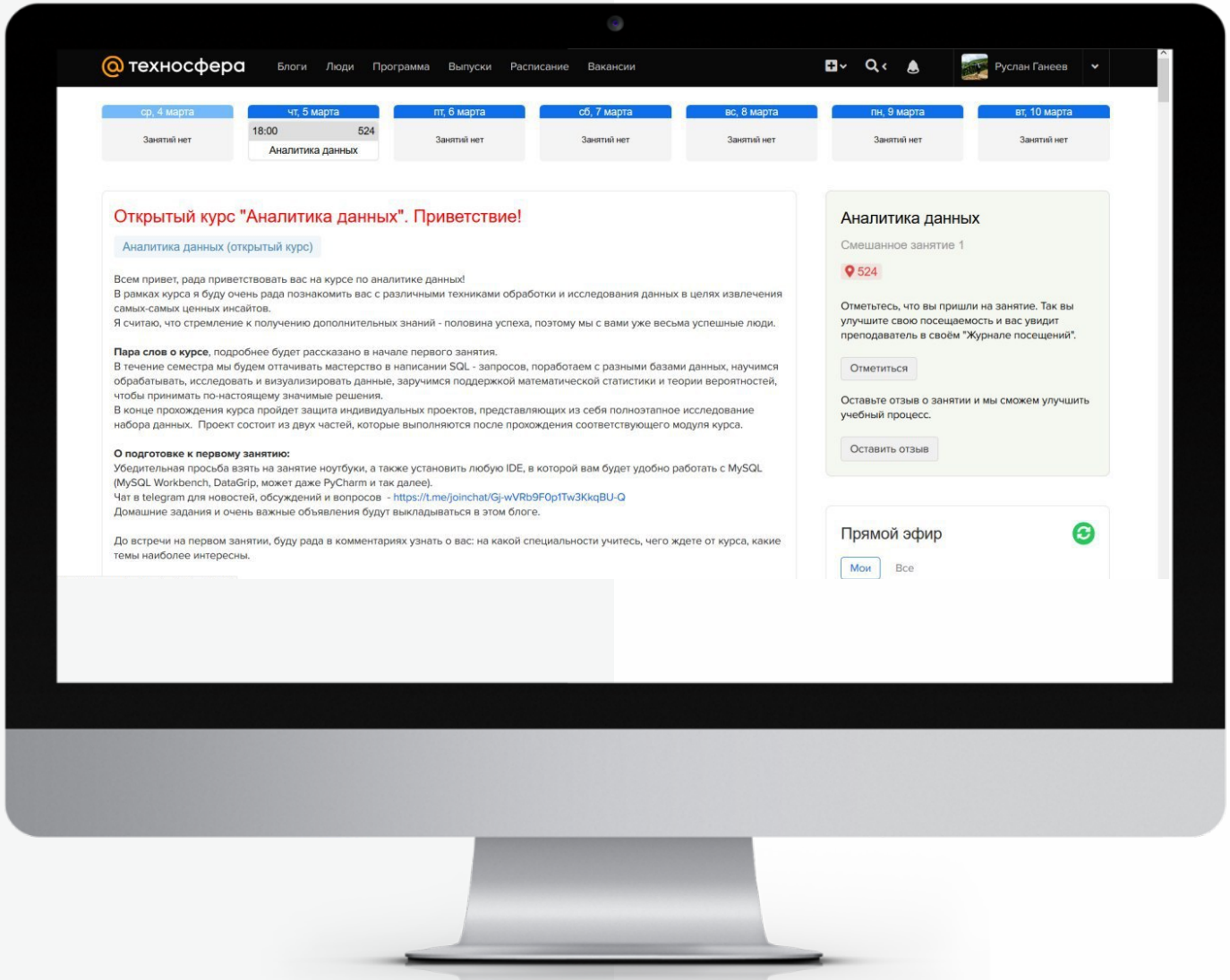
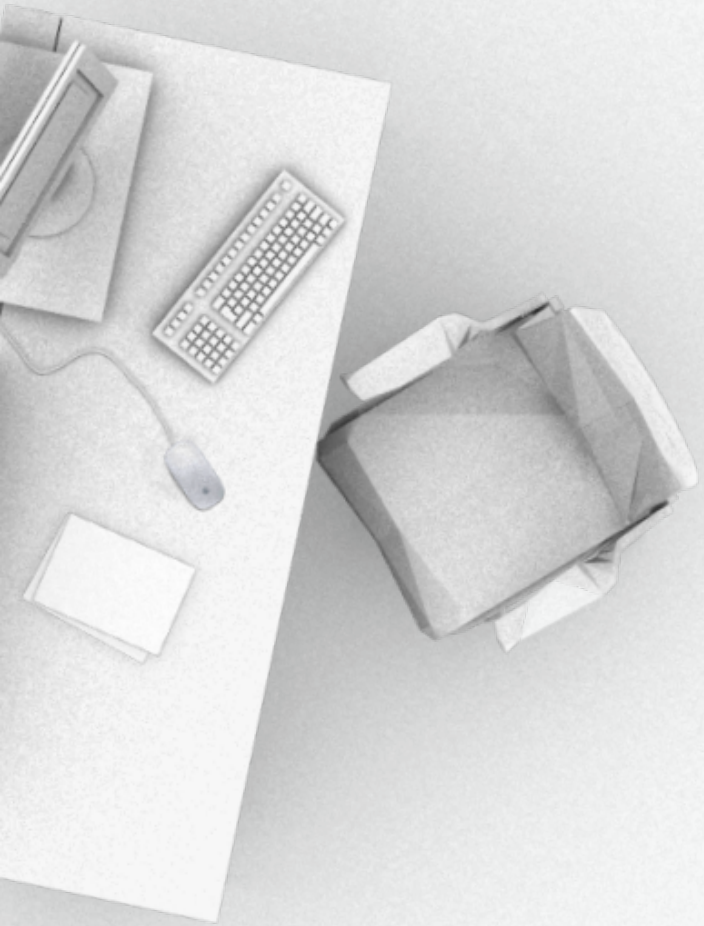
Сетевое взаимодействие

1. Модели OSI & TCP/IP
2. Сетевые протоколы – ARP, ICMP, TELNET
3. IPv4 и IPv6
4. Tcpdump и Wireshark
5. Mocks and Stubs
6. Варианты реализаций HTTP сервера



Не забудьте отметиться на портале



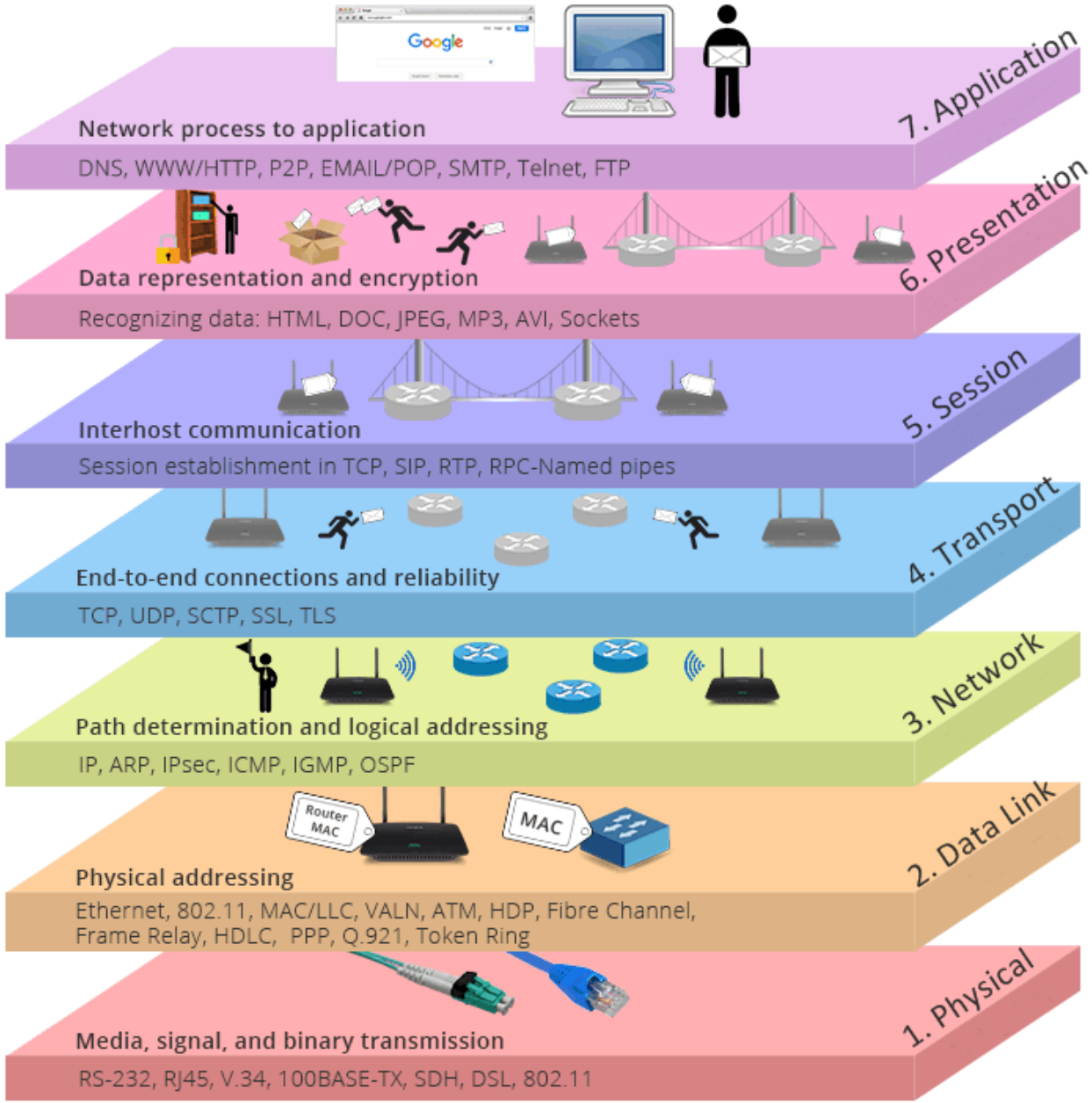
Модели OSI & TCP/IP

OSI model

Open Systems Interconnection

взаимодействие открытых систем

Инкапсуляция и декапсуляция – процесс трансформации данных между принимающей и передающей сторонами



Уровень приложений

(HTTP, SMTP, DNS, TELNET, SSH FTP)

Транспортный уровень

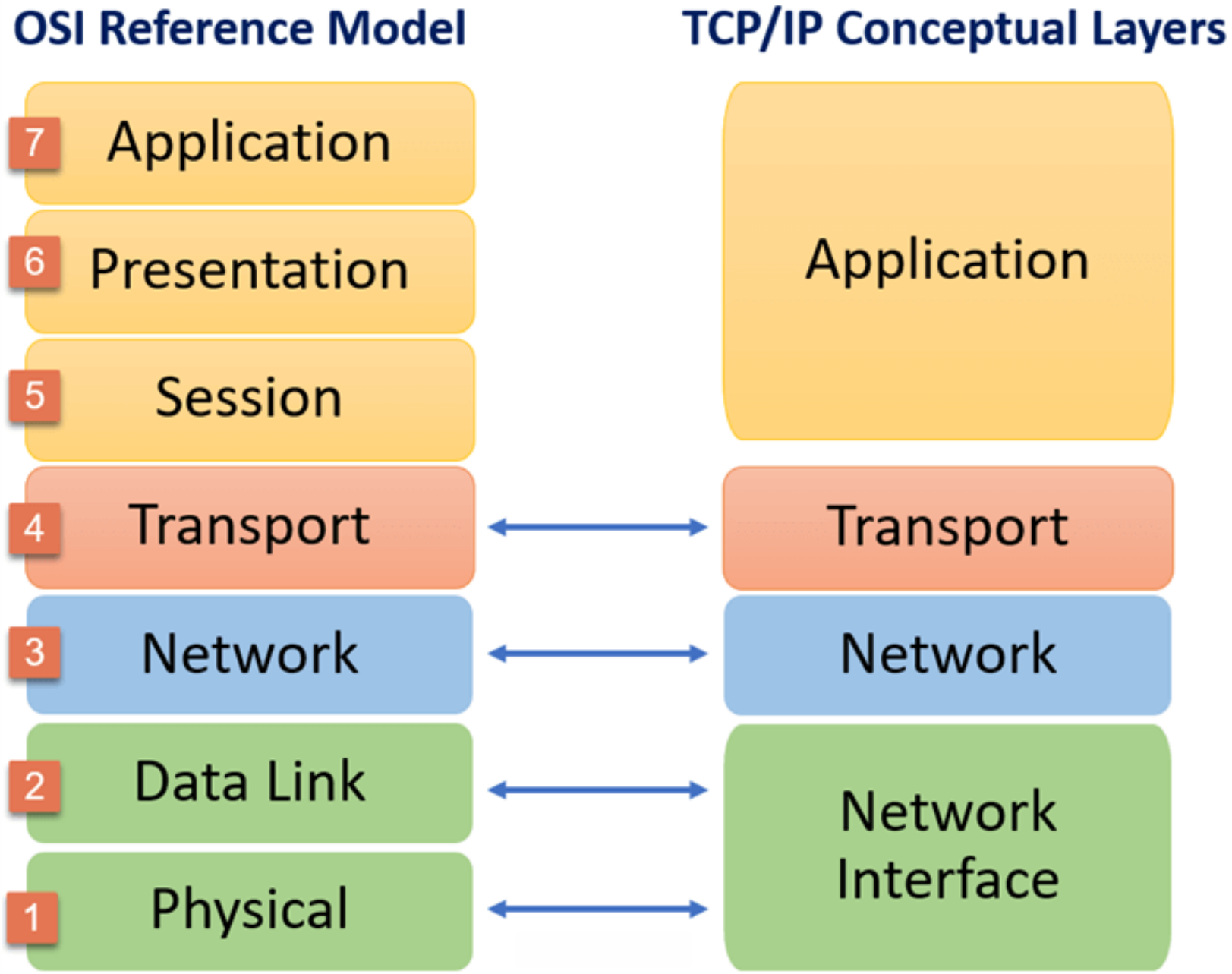
(TCP, UDP)

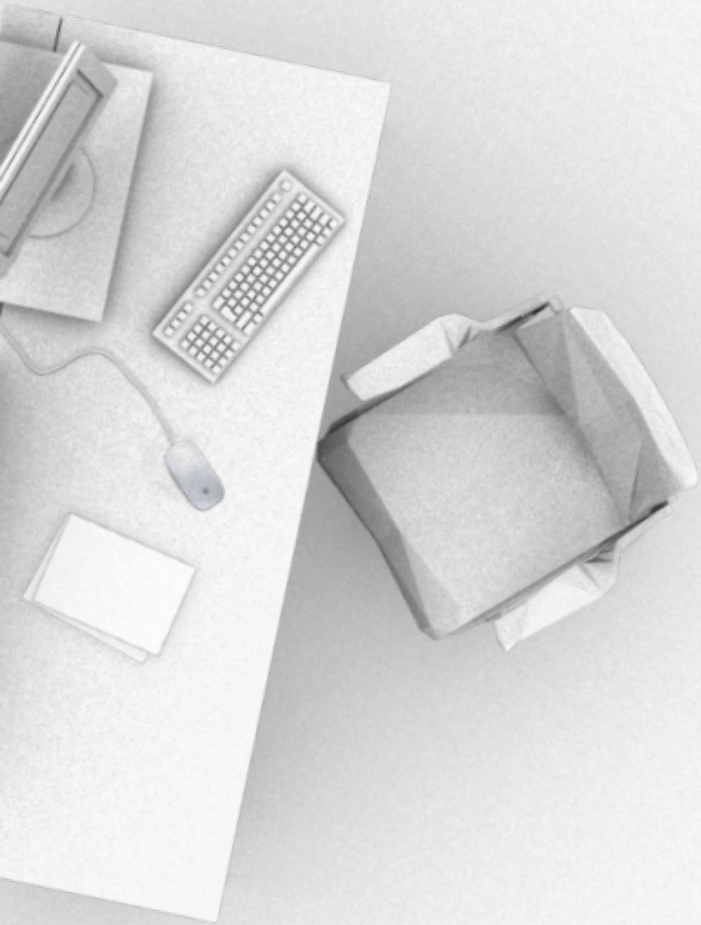
Уровень сети или сетевой

(IPv4, IPv6, Ipsec, OSPF)

Уровень доступа к сети

(Ethernet, IEEE 802.11, PPP)



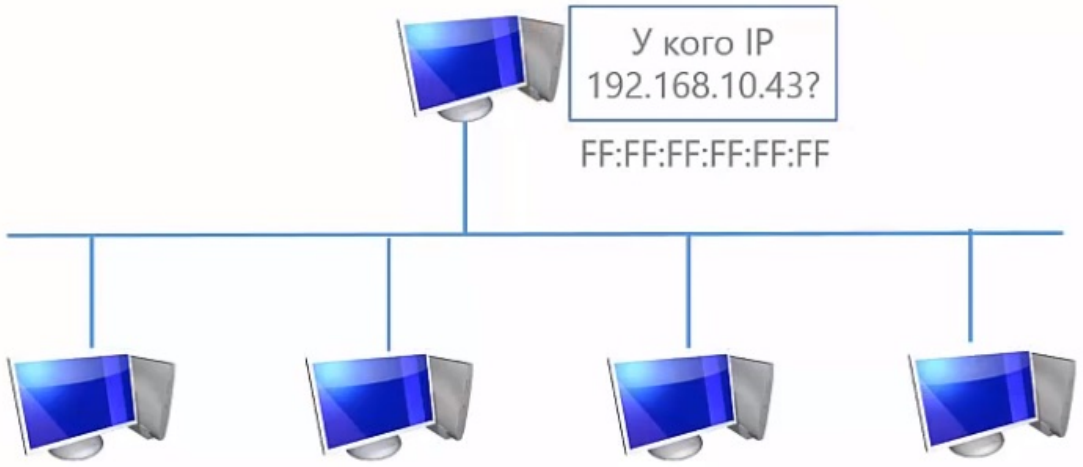


ARP | ICMP | TELNET

ARP

ARP - Address Resolution Protocol или протокол разрешения адресов

Отвечает за преобразование IP адресов в MAC адреса.




```
~ arp -a
(192.168.1.1) at c:80:63:c3:6a:a5 on en0 ifscope [ethernet]
(192.168.1.101) at 4a:f1:59:cf:6b:e5 on en0 ifscope [ethernet]
(192.168.1.157) at 1e:fb:f6:d4:2a:1 on en0 ifscope [ethernet]
(192.168.1.255) at ff:ff:ff:ff:ff:ff on en0 ifscope [ethernet]
(224.0.0.251) at 1:0:5e:0:0:fb on en0 ifscope permanent [ethernet]
(230.230.230.230) at 1:0:5e:66:e6:e6 on en0 ifscope permanent [ethernet]
(239.255.255.250) at 1:0:5e:7f:ff:fa on en0 ifscope permanent [ethernet]
```

ICMP

ICMP - Internet Control Message Protocol

```
~ ❯ ping mail.ru
PING mail.ru (217.69.139.200): 56 data bytes
64 bytes from 217.69.139.200: icmp_seq=0 ttl=61 time=54.848 ms
64 bytes from 217.69.139.200: icmp_seq=1 ttl=61 time=53.689 ms
64 bytes from 217.69.139.200: icmp_seq=2 ttl=61 time=60.668 ms
```

TTL - Time To Live, число хопов (hop – ”прыжок”) в течение которого пакет может находиться в сети

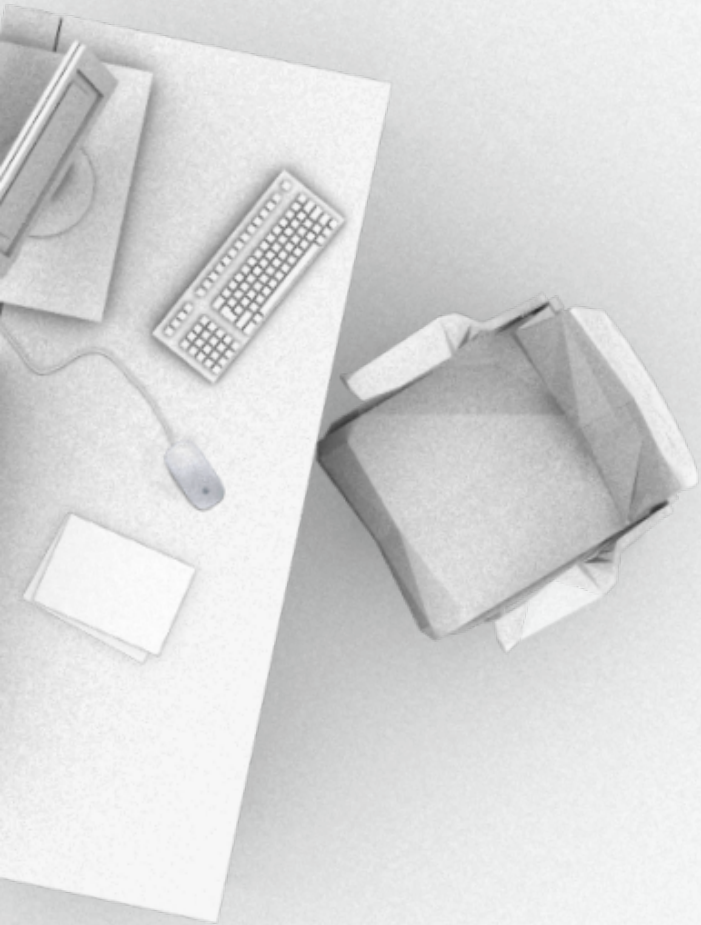
```
✘ ~ ❯ traceroute mail.ru
traceroute: Warning: mail.ru has multiple addresses; using 94.100.180.200
traceroute to mail.ru (94.100.180.200), 64 hops max, 52 byte packets
 1  192.168.1.1 (192.168.1.1)  3.385 ms  2.489 ms  2.302 ms
 2  172.16.151.1 (172.16.151.1)  3.402 ms  2.499 ms  2.109 ms
 3  c65-acc10.obninsk.maxnet.ru (195.112.96.222)  2.556 ms  2.770 ms  2.093 ms
 4  * * *
 5  172.17.99.5 (172.17.99.5)  10.185 ms  5.501 ms  4.583 ms
 6  * * *
 7  * * *
```

TELNET

Telnet - сетевой протокол для реализации текстового терминального интерфейса по сети

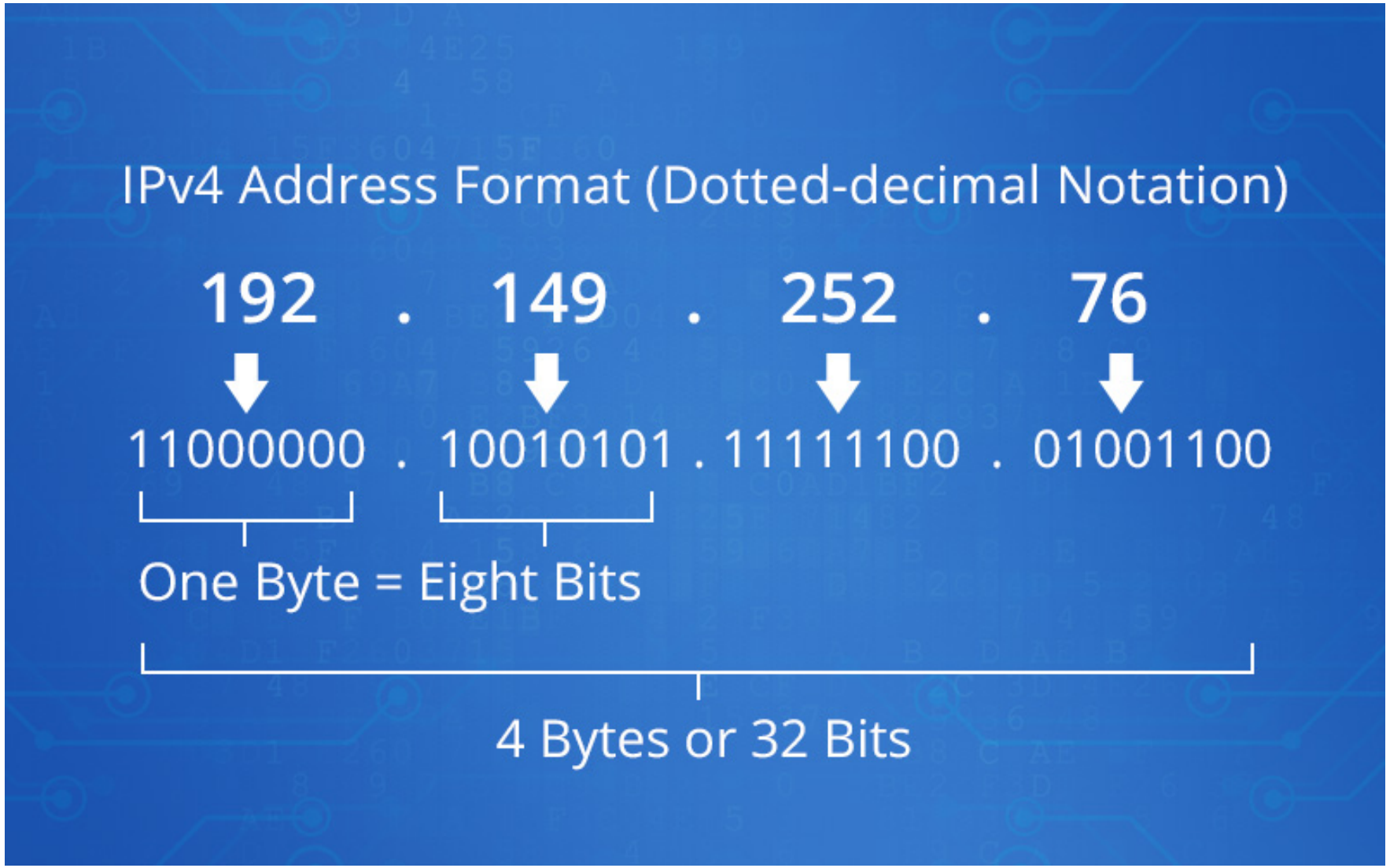
NVT - Network Virtual Terminal

```
✘ ~ telnet www.mail.ru 80
Trying 217.69.139.70...
Connected to www.mail.ru.
Escape character is '^]'.
GET /index.html
<html>
<head><title>301 Moved Permanently</title></head>
<body bgcolor="white">
<center><h1>301 Moved Permanently</h1></center>
<hr><center>nginx/1.6.2</center>
</body>
</html>
Connection closed by foreign host.
```

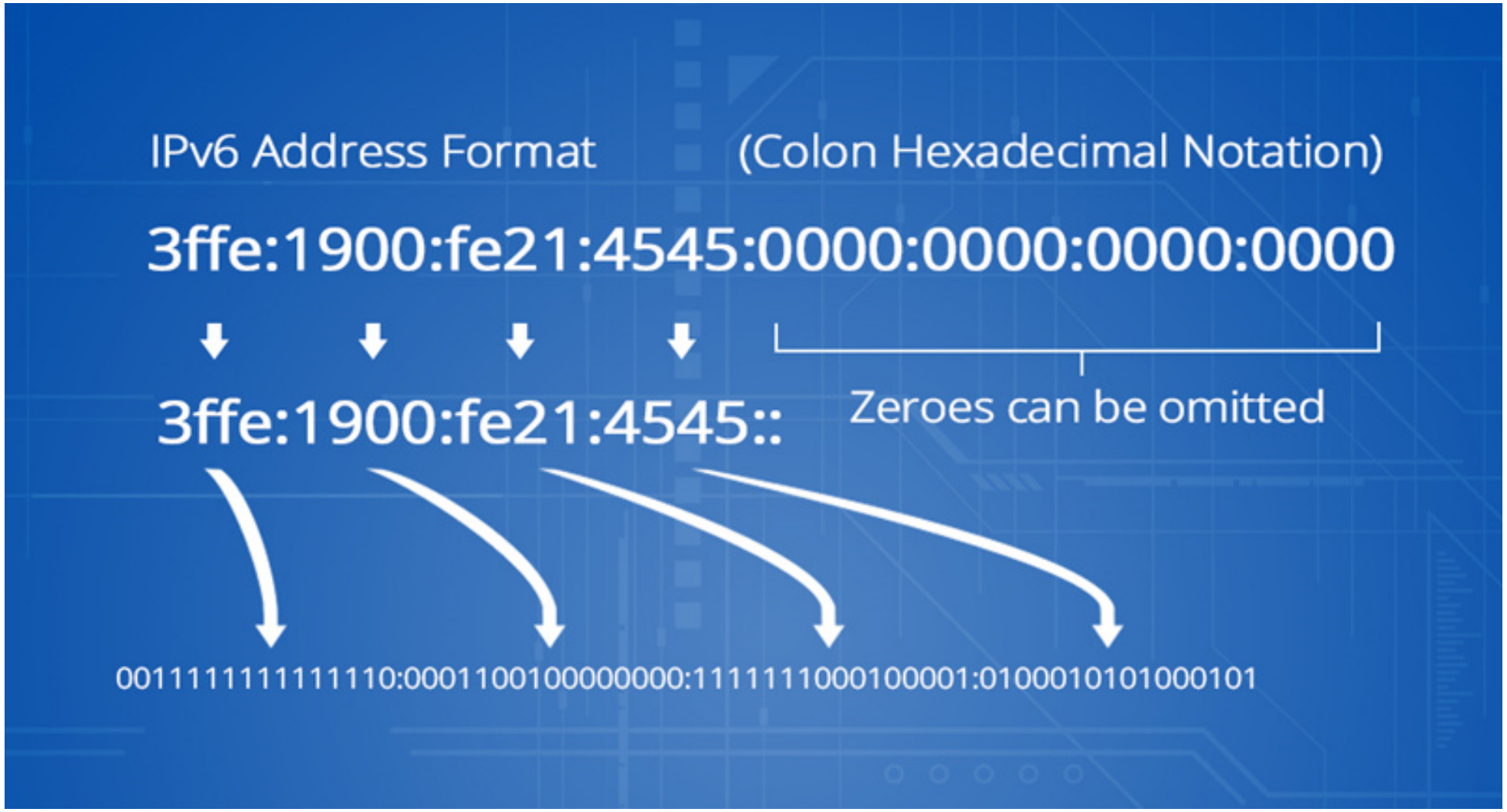


IPv4 и IPv6

IPv4


IPv4 Address Format (Dotted-decimal Notation)
192 . 149 . 252 . 76
11000000 . 10010101 . 11111100 . 01001100
One Byte = Eight Bits
4 Bytes or 32 Bits

IPv6


IPv6 Address Format
(Colon Hexadecimal Notation)
3ffe:1900:fe21:4545:0000:0000:0000:0000
3ffe:1900:fe21:4545::
Zeroes can be omitted
0011111111111110:0001100100000000:1111111000100001:0100010101000101

Примеры записей IPv4 и IPv6 адресов

IPv4

172.16.4.3 10101100.00010000.00000100.00000011

255.255.255.0 11111111.11111111.11111111.00000000

Broadcast: 172.16.4.255

HostMin: 172.16.4.1

HostMax: 172.16.4.254

Hosts/Net: 254

Loopback

IPv4: 127.0.0.1, 127.0.14.1

IPv6: ::1

IPv6

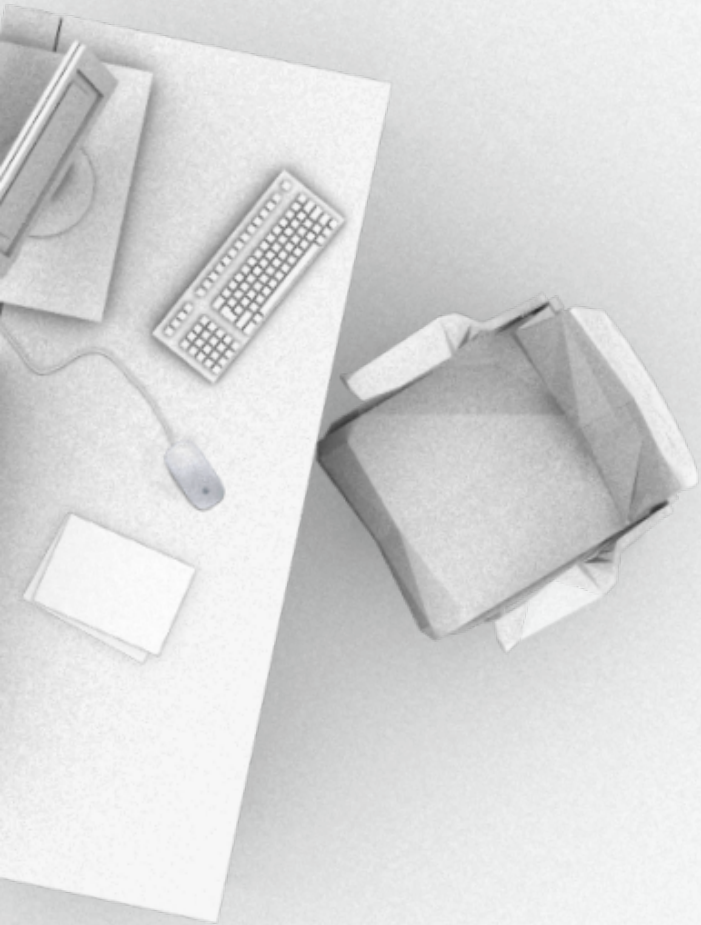
2001:0000:3238:DFE1:0063:0000:0000:FEFB 10.1.14.87

2001: 0: 3238: DFE1: 63 :: FEFB

IPv4 CIDR (Classless Inter-Domain Routing)

192.168.34.11/30

6.13.25.174/19



Tcpdump и Wireshark

Tcpdump

```
~ ifconfig | grep "192." -C 4
        status: inactive
en0: flags=8863<UP,BROADCAST,SMART,RUNNING,SIMPLEX,MULTICAST> mtu 1500
        options=400<CHANNEL_IO>
        ether 3c:22:fb:0c:ae:fc
        inet 192.168.1.144 netmask 0xffffff00 broadcast 192.168.1.255
        media: autoselect
        status: active
en1: flags=8963<UP,BROADCAST,SMART,RUNNING,PROMISC,SIMPLEX,MULTICAST> mtu 1500
        options=460<TSO4,TSO6,CHANNEL_IO>
```

```
~ sudo tcpdump -i en0 dst port 443 -v
tcpdump: listening on en0, link-type EN10MB (Ethernet), capture size 262144 bytes
15:58:47.974792 IP (tos 0x0, ttl 64, id 0, offset 0, flags [DF], proto TCP (6), length 52)
    192.168.1.144.52733 > 168.62.58.130.https: Flags [.], cksum 0x9d14 (correct), ack 3527497017, win 2042, options [nop,nop,TS val
15:58:48.171918 IP (tos 0x0, ttl 64, id 0, offset 0, flags [DF], proto TCP (6), length 40)
    192.168.1.144.52731 > r.mail.ru.https: Flags [R.], cksum 0xa053 (correct), seq 611858757, ack 271381627, win 2047, length 0
15:58:48.172048 IP (tos 0x0, ttl 64, id 0, offset 0, flags [DF], proto TCP (6), length 64)
    192.168.1.144.52735 > r.mail.ru.https: Flags [S], cksum 0x1968 (correct), seq 2950077916, win 65535, options [mss 1460,nop,wscal
15:58:48.179283 IP (tos 0x0, ttl 64, id 0, offset 0, flags [DF], proto TCP (6), length 52)
    192.168.1.144.52735 > r.mail.ru.https: Flags [.], cksum 0x0828 (correct), ack 1609777364, win 2053, options [nop,nop,TS val 1056
15:58:48.179439 IP (tos 0x0, ttl 64, id 0, offset 0, flags [DF], proto TCP (6), length 569)
    192.168.1.144.52735 > r.mail.ru.https: Flags [P.], cksum 0x6442 (correct), seq 0:517, ack 1, win 2053, options [nop,nop,TS val 1
15:58:48.182391 IP (tos 0x0, ttl 64, id 18818, offset 0, flags [none], proto TCP (6), length 40)
```

```
✗ ~ sudo tcpdump -i en0 dst port 443 -v
tcpdump: listening on en0, link-type EN10MB (Ethernet), capture size 262144 bytes
16:01:01.809779 IP (tos 0x0, ttl 64, id 0, offset 0, flags [DF], proto TCP (6), length 413)
    192.168.1.144.50325 > 149.154.167.50.https: Flags [P.], cksum 0xbeaa (correct), seq 2589
16:01:01.867631 IP (tos 0x0, ttl 64, id 0, offset 0, flags [DF], proto TCP (6), length 52)
    192.168.1.144.50325 > 149.154.167.50.https: Flags [.], cksum 0xf9c7 (correct), ack 5, wi
16:01:01.876749 IP (tos 0x0, ttl 64, id 0, offset 0, flags [DF], proto TCP (6), length 52)
```

Wireshark

```
~ tcpdump --list-interfaces
1.en0 [Up, Running]
2.p2p0 [Up, Running]
3.awdl0 [Up, Running]
4.llw0 [Up, Running]
5.utun0 [Up, Running]
6.utun1 [Up, Running]
7.utun2 [Up, Running]
8.lo0 [Up, Running, Loopback]
9.bridge0 [Up, Running]
10.en1 [Up, Running]
11.en2 [Up, Running]
12.en3 [Up, Running]
13.en4 [Up, Running]
14.gif0 [none]
15.stf0 [none]
16.ap1 [none]
```

filters

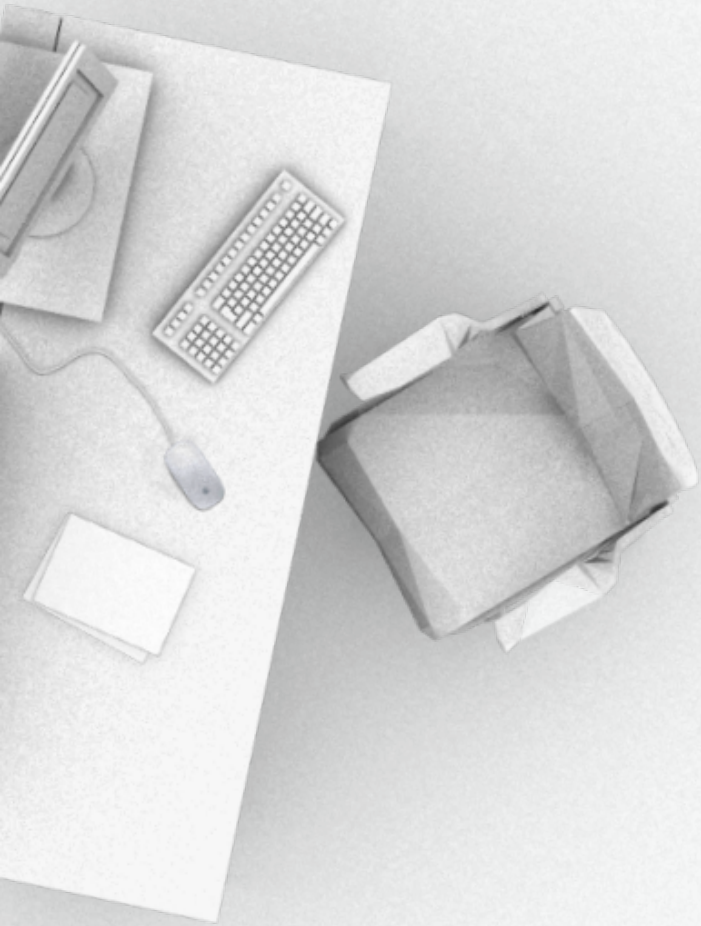
http.host contains "technoatom”

tcp.port == 443

dns

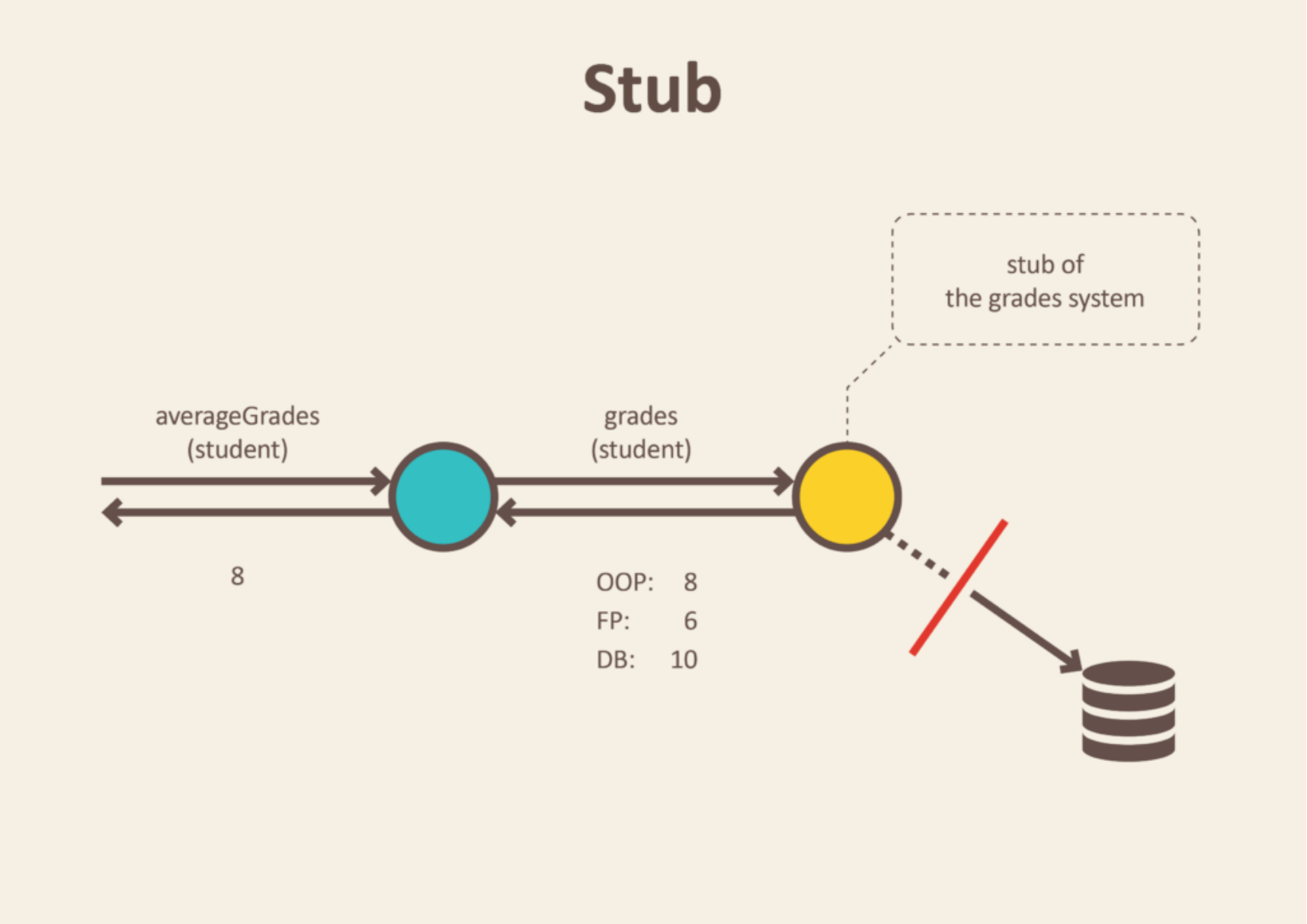
http2

arp

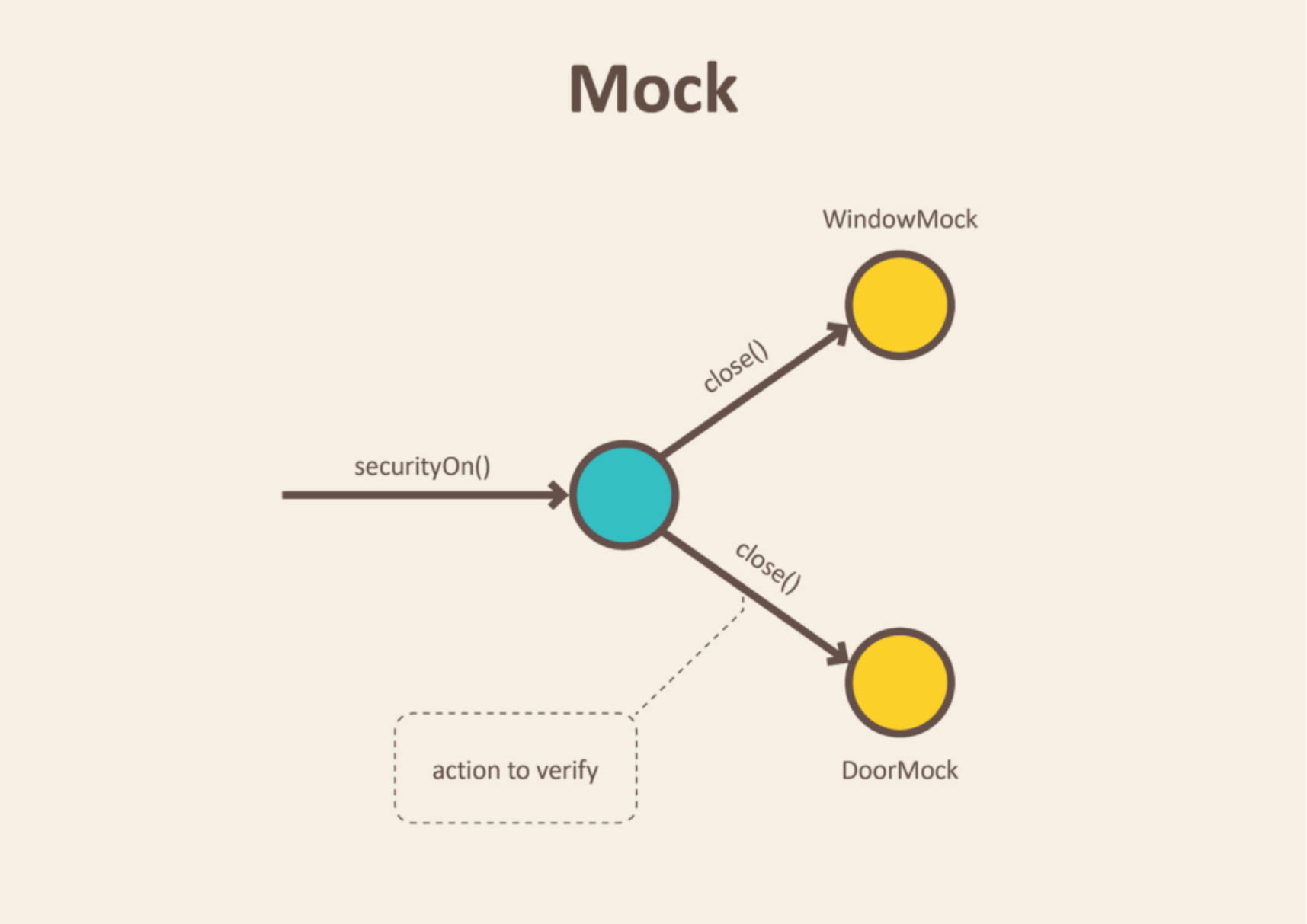


Mocks and Stubs

Stub


Stub
stub of
the grades system
averageGrades
(student)
grades
(student)
8
OOP: 8
FP: 6
DB: 10

Mock

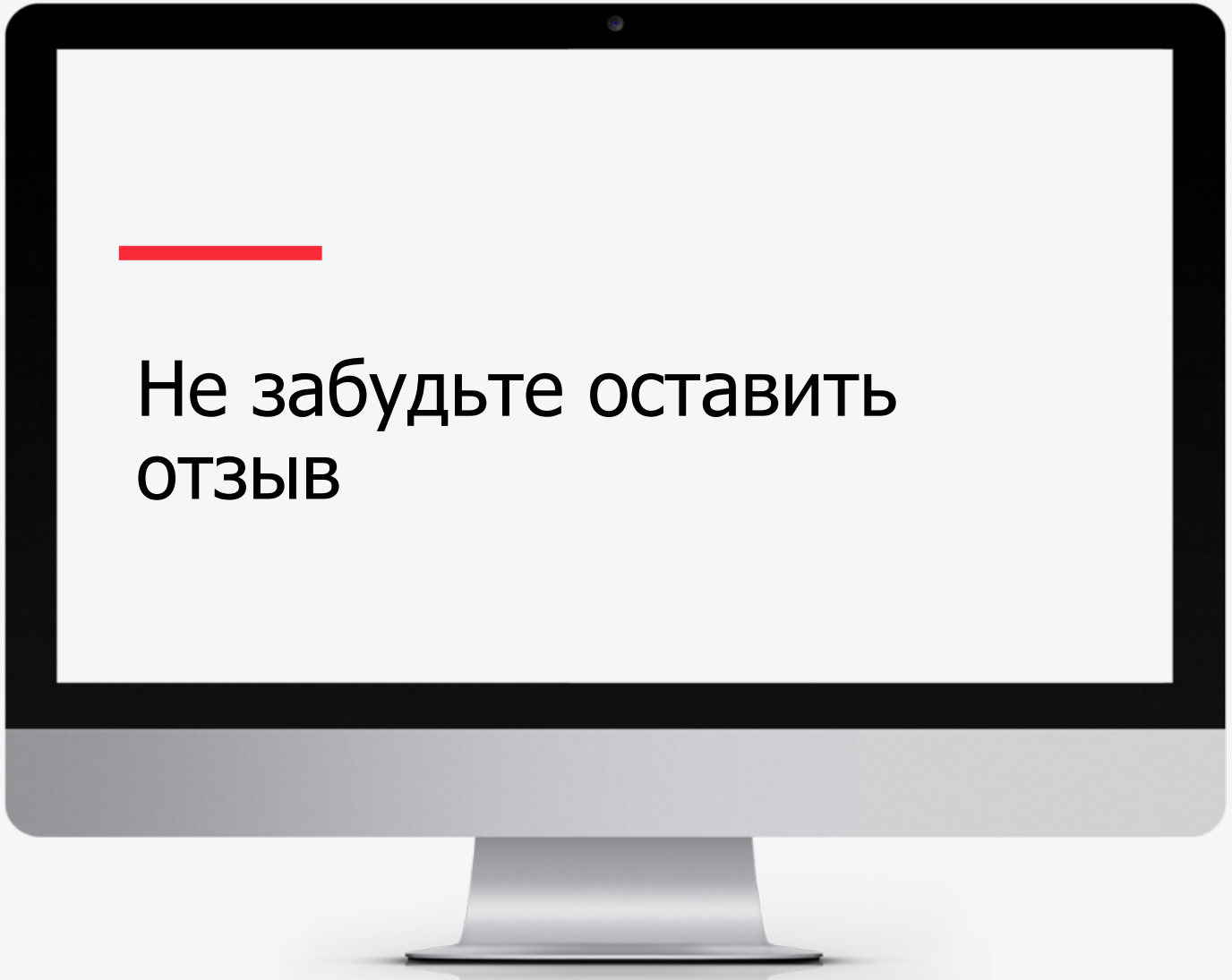

Mock
WindowMock
close()
securityOn()
close()
action to verify
DoorMock

Варианты реализаций HTTP сервера

BaseHTTPServer

Socket

Python объекты


Не забудьте оставить
отзыв

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ЗА ВНИМАНИЕ