

# Инсталиране и конфигуриране на HTTP под Linux

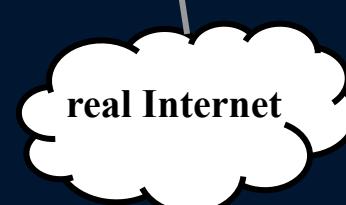
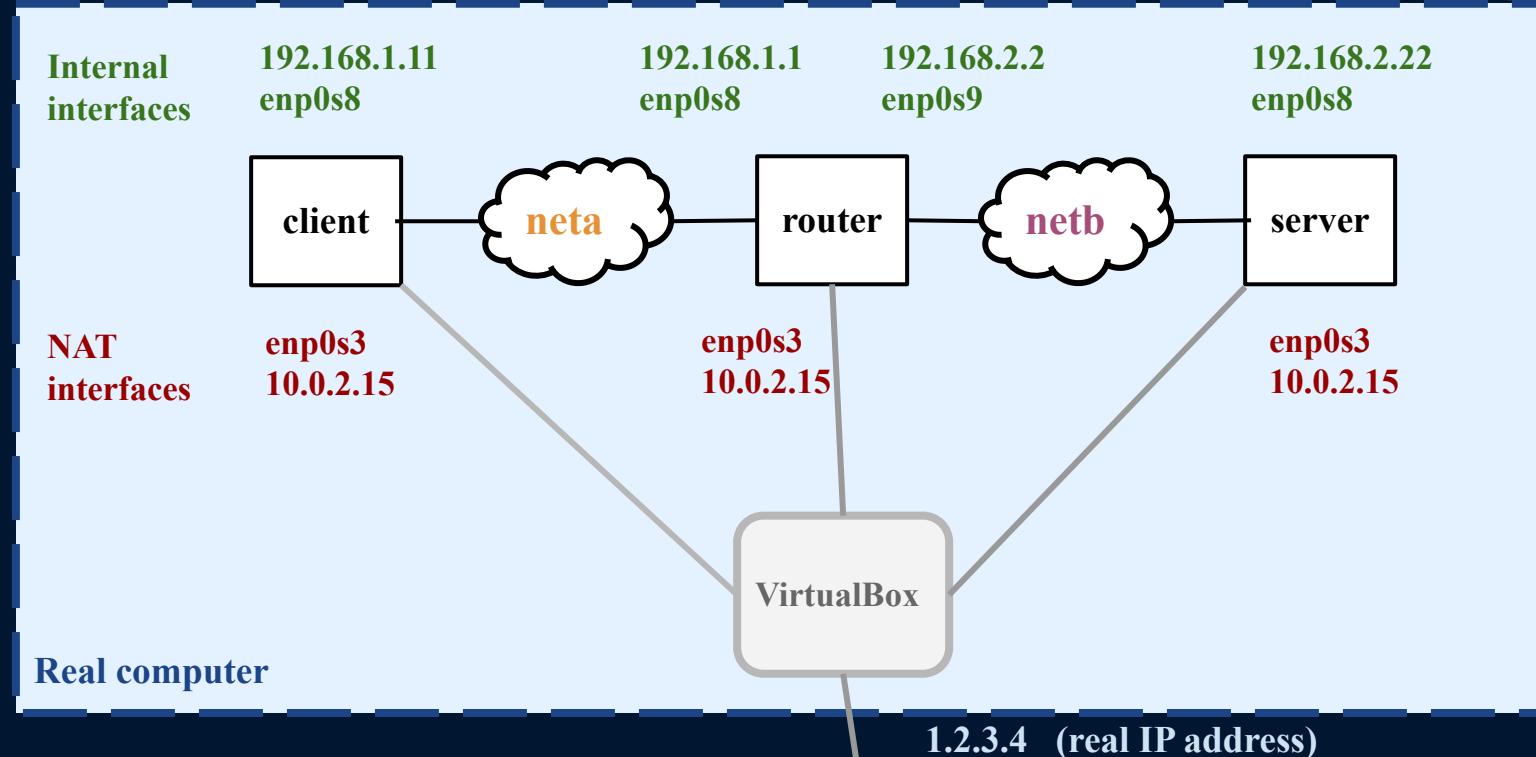
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## Съдържание:

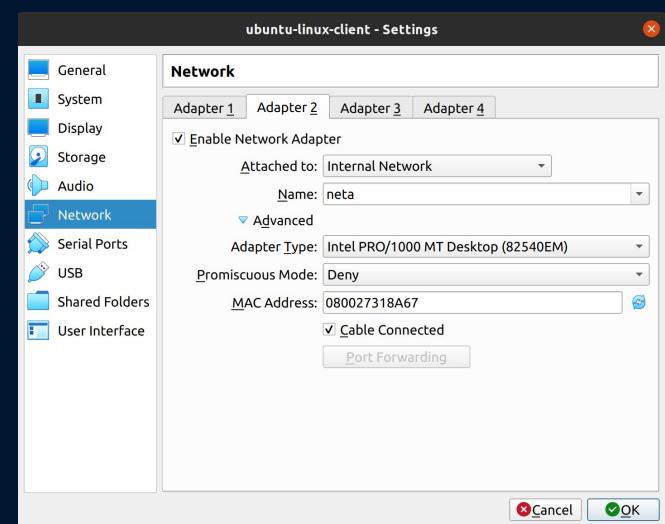
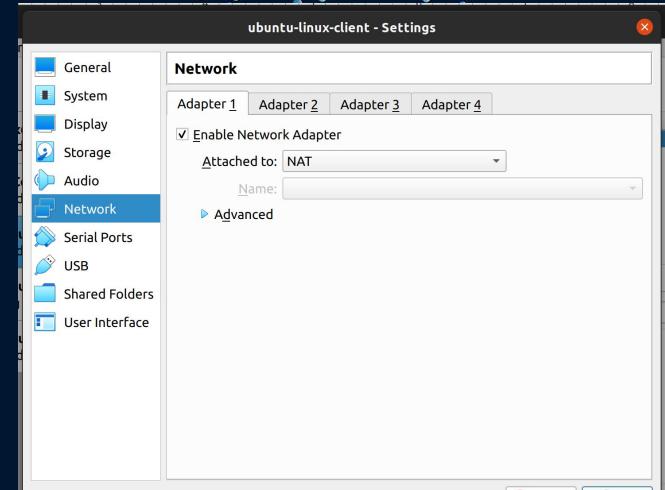
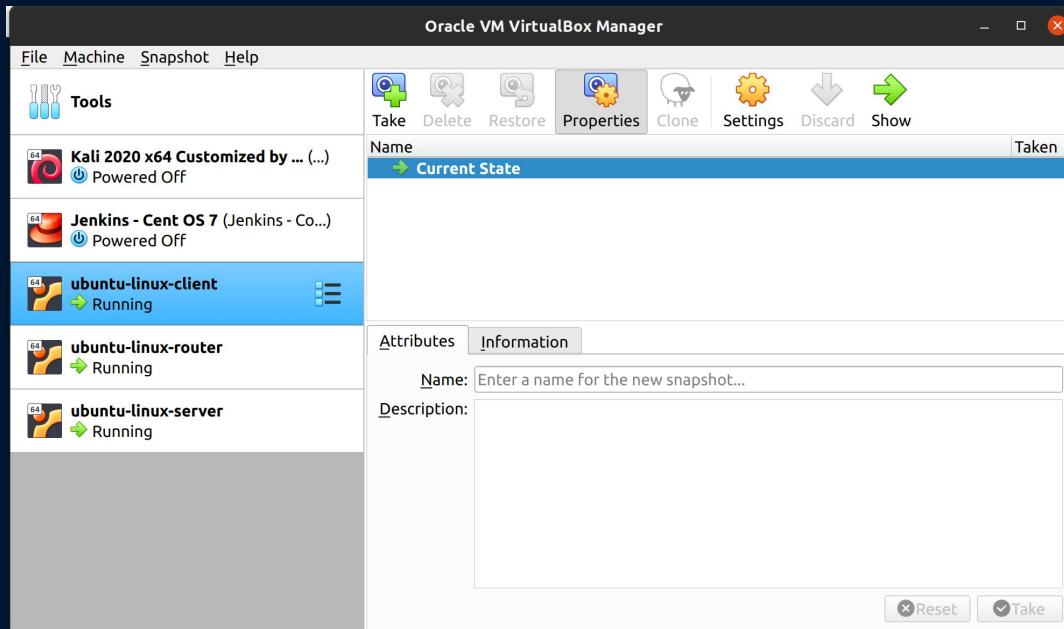
1. Създаване на 3 VM-ки: client, router, server
2. Инсталране на Apache **HTTP** Web Server
3. Настройване на DNS мапинг
4. Конфигурация на HTTP Web Server-а
5. Конфигуриране на HTTPS
6. Настройване на directory-ите
7. Създаване на key pairs
8. Конфигуриране на Apache да използва HTTPS
  
9. Тестване

01

# Създаване на 3 VM-ки: client, router, server



# Примерен сътъп и конфигуриране на мрежовите адаптери на client-a.



Всяка VM-ка има следните спецификации:

- Memory size: 1024 MB
- Hard disk size: 10 GB
- OS: Ubuntu-18.04 (64-bit)

## 01

## Network Interface-и за client, router and server

```
ubuntu-linux-server [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
server@server:~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
        inet6 fe80::a00:27ff:fe8c:63c prefixlen 64 scopeid 0x20<link>
            ether 08:00:27:c6:e8:3c txqueuelen 1000 (Ethernet)
            RX packets 203 bytes 241452 (241.4 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 85 bytes 8282 (8.2 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

enp0s8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.2.22 netmask 255.255.255.0 broadcast 192.168.2.255
        inet6 fe80::a00:27ff:fe15:98ba prefixlen 64 scopeid 0x20<link>
            ether 08:00:27:21:fe:15 txqueuelen 1000 (Ethernet)
            RX packets 0 bytes 0 (0.0 B)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 12 bytes 936 (936.0 B)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

```
ubuntu-linux-client [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
client@client:~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
        inet6 fe80::a00:27ff:fe8f:b148 prefixlen 64 scopeid 0x20<link>
            ether 08:00:27:8f:b1:48 txqueuelen 1000 (Ethernet)
            RX packets 14967 bytes 21915571 (21.9 MB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 2703 bytes 240999 (240.9 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

enp0s8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.1.11 netmask 255.255.255.0 broadcast 192.168.1.255
        inet6 fe80::a00:27ff:fe31:8a67 prefixlen 64 scopeid 0x20<link>
            ether 08:00:27:31:8a:67 txqueuelen 1000 (Ethernet)
            RX packets 0 bytes 0 (0.0 B)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 139 bytes 13479 (13.4 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

```
lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
        inet6 ::1 prefixlen 128 scopeid 0x10<host>
            loop txqueuelen 1000 (Local Loopback)
            RX packets 222 bytes 18250 (18.2 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 222 bytes 18250 (18.2 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

```
ubuntu-linux-router [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
        inet6 fe80::a00:27ff:fec7:ebd2 prefixlen 64 scopeid 0x20<link>
            ether 08:00:27:c7:eb:d2 txqueuelen 1000 (Ethernet)
            RX packets 11389 bytes 16851129 (16.8 MB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 1533 bytes 104315 (104.3 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

enp0s8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.169.1.1 netmask 255.255.255.0 broadcast 192.168.1.255
        inet6 fe80::a00:27ff:fe9c:c55a prefixlen 64 scopeid 0x20<link>
            ether 08:00:27:9c:c5:5a txqueuelen 1000 (Ethernet)
            RX packets 373 bytes 121086 (121.0 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 33 bytes 2406 (2.4 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

enp0s9: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.169.2.2 netmask 255.255.255.0 broadcast 192.168.2.255
        inet6 fe80::a00:27ff:fe97:7336 prefixlen 64 scopeid 0x20<link>
            ether 08:00:27:97:73:36 txqueuelen 1000 (Ethernet)
            RX packets 0 bytes 0 (0.0 B)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 33 bytes 2406 (2.4 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
        inet6 ::1 prefixlen 128 scopeid 0x10<host>
            loop txqueuelen 1000 (Local Loopback)
            RX packets 116 bytes 9682 (9.6 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 116 bytes 9682 (9.6 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

router@router:~\$

## 01

## Ping и SSH връзка от client към server посредством router

ubuntu-linux-client [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Activities Terminal

BT 16:22

client@client:~

```
client@client:~$ ping 192.168.2.22
PING 192.168.2.22 (192.168.2.22) 56(84) bytes of data.
64 bytes from 192.168.2.22: icmp_seq=1 ttl=63 time=1.56 ms
64 bytes from 192.168.2.22: icmp_seq=2 ttl=63 time=2.28 ms
64 bytes from 192.168.2.22: icmp_seq=3 ttl=63 time=2.23 ms
64 bytes from 192.168.2.22: icmp_seq=4 ttl=63 time=1.58 ms
^C
--- 192.168.2.22 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3005ms
rtt min/avg/max/mdev = 1.565/1.917/2.283/0.344 ms
client@client:~$ route -n
Kernel IP routing table
Destination     Gateway         Genmask        Flags Metric Ref    Use Iface
0.0.0.0         10.0.2.2      0.0.0.0       UG    0      0        0 enp0s3
10.0.2.0        0.0.0.0       255.255.255.0 U     0      0        0 enp0s3
169.254.0.0     0.0.0.0       255.255.0.0   U     1000   0        0 enp0s8
192.168.0.0     192.168.1.1  255.255.0.0   UG    0      0        0 enp0s8
192.168.1.0     0.0.0.0       255.255.255.0 U     0      0        0 enp0s8
client@client:~$
```

Show Applications

ubuntu-linux-client [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Activities Terminal

BT 16:11

server@server:~

```
client@client:~$ ssh server@192.168.2.22
Welcome to Ubuntu 18.04 LTS (GNU/Linux 4.15.0-20-generic x86_64)

 * Documentation:  https://help.ubuntu.com
   Management:     https://landscape.canonical.com
   Files:          https://ubuntu.com/adantage

 System information as of Tue Jan 10 16:10:33 EET 2023

 System load:  0.0          Processes:           93
 Usage of /:   24.1% of 8.80GB  Users logged in:  1
 Memory usage: 15%
 Swap usage:  0%
 IP address for enp0s3: 10.0.2.15
 IP address for enp0s8: 192.168.2.22

 * Strictly confined Kubernetes makes edge and IoT secure. Learn how MicroK8s
 just raised the bar for easy, resilient and secure K8s cluster deployment.

 https://ubuntu.com/engage/secure-kubernetes-at-the-edge

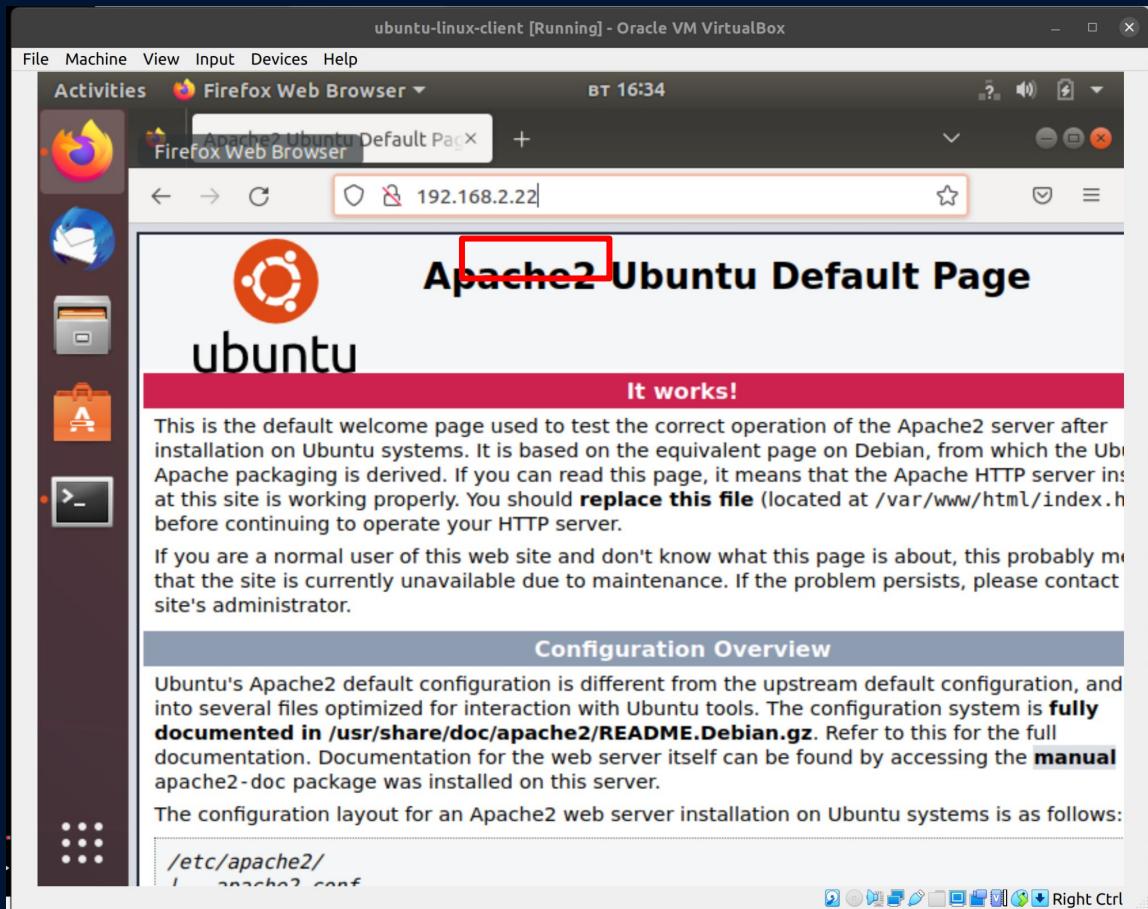
 * Canonical Livepatch is available for installation.
 - Reduce system reboots and improve kernel security. Activate at:
 https://ubuntu.com/livepatch

 30 updates can be applied immediately.
 19 of these updates are standard security updates.
 To see these additional updates run: apt list --upgradable

 New release '20.04.5 LTS' available.
```

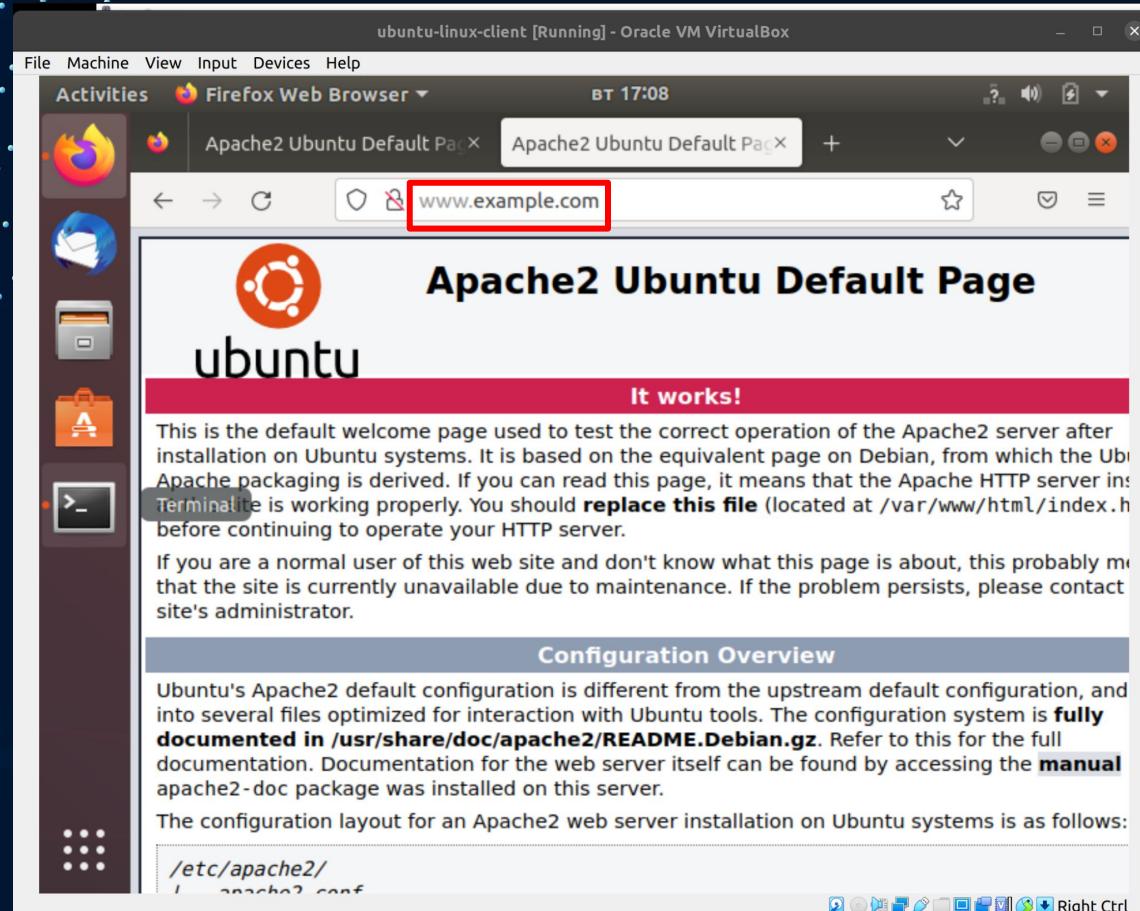
## 02

# Инсталиране на Apache HTTP Web Server



# 03

## Настройване на DNS мапинг



# 04 Конфигурация на HTTP Web Server-a

Когато се логнем на server-a, можем да намерим следните конфигурационни файлове:

- **/var/www/html** → съдържа web контента за самата web страница (напр. Index.html файла)
- **/etc/apache2/apache2.conf** → съдържа глобалната конфигурация на web server-a
- **/etc/apache2/sites-available/000-default.conf** → съдържа основната конфигурация на web server-a, например променливи като ServerAdmin (email адреса на администратора), DocumentRoot (показва къде се намира root directory-ята на server-a), ErrorLog and CustomLog (показват къде се намират логовете)
- **/etc/apache2/sites-available/default-ssl.conf** → съдържа конфигурация за сътъпване на HTTPs
- **/etc/apache2/mods-available/** → съдържа допълнителни фичъри/модули на Apache, например cache\_disk.load, proxy.conf и др.
- **/var/logs/apache2/** → съдържа Apache логове
  - **access.log** → съдържа записи, кой, кога е достъпвал website-a (request/response информация)
  - **error.log** → съдържа информация за грешките и error-ите

# 05 Конфигуриране на HTTPS

Настройване на Apache да поддържа HTTPS, така че уеб браузърите да могат да се свързват с него по защищен начин чрез HTTPS.

```
server@server:~$ openssl genpkey -algorithm RSA -pkeyopt rsa_keygen_bits:2048 -pkeyopt rsa_keygen_pu  
bexp:65537 -out cakey.pem
```

```
.....+++++  
.....+++++
```

```
server@server:~$ ls -l cakey.pem
```

```
-rw----- 1 server server 1704 Jan 11 09:48 cakey.pem
```

```
server@server:~$ openssl req -new -x509 -key cakey.pem -out cacert.pem -days 1095
```

```
Can't load /home/server/.rnd into RNG
```

```
139641506447808:error:2406F079:random number generator:RAND_load_file:Cannot open file:../crypto/ran  
d/randfile.c:88:Filename=/home/server/.rnd
```

```
You are about to be asked to enter information that will be incorporated  
into your certificate request.
```

```
What you are about to enter is what is called a Distinguished Name or a DN.
```

```
There are quite a few fields but you can leave some blank
```

```
For some fields there will be a default value,
```

```
If you enter '.', the field will be left blank.
```

```
-----  
Country Name (2 letter code) [AU]:BG
```

```
State or Province Name (full name) [Some-State]:Sofia
```

```
Locality Name (eg, city) []:Sofia
```

```
Organization Name (eg, company) [Internet Widgits Pty Ltd]:TU
```

```
Organizational Unit Name (eg, section) []:
```

```
Common Name (e.g. server FQDN or YOUR name) []:www.tu-sofia.bg
```

```
Email Address []:tu-mail@tu-sofia.bg
```

```
server@server:~$
```

# 06

## Настройване на directory-ите

- На server-а създаваме следните directory-ий:

```
server@server:~$ cd ~/  
server@server:~$ mkdir demoCA  
server@server:~$ mkdir demoCA/certs  
server@server:~$ mkdir demoCA/crl  
server@server:~$ mkdir demoCA/newcerts  
server@server:~$ mkdir demoCA/private  
server@server:~$ touch demoCA/index.txt  
server@server:~$ echo 02 > demoCA/serial  
server@server:~$ mv cacert.pem demoCA/  
server@server:~$ mv cakey.pem demoCA/private/
```

- Промяна на параметри в '/usr/lib/ssl/openssl.cnf':

```
server@server:~$ sudo vi /usr/lib/ssl/openssl.cnf
```

- 'stateOrProvinceName' и 'organizationName' трябва да станат 'optional'

# 07

## Създаване на key pairs

- Създаване на key pair за server-а:

```
server@server:~$ openssl genpkey -algorithm RSA -pkeyopt rsa_keygen_bits:2048  
-pkeyopt rsa_keygen_pubexp:65537 -out privkey-www.example.com.pem
```

- Генериране на необходимите сертификати:

```
server@server:~$ openssl req -new -key privkey-www.example.com.pem -out  
certreq-www.example.com.csr
```

```
server@server:~$ ls -l
```

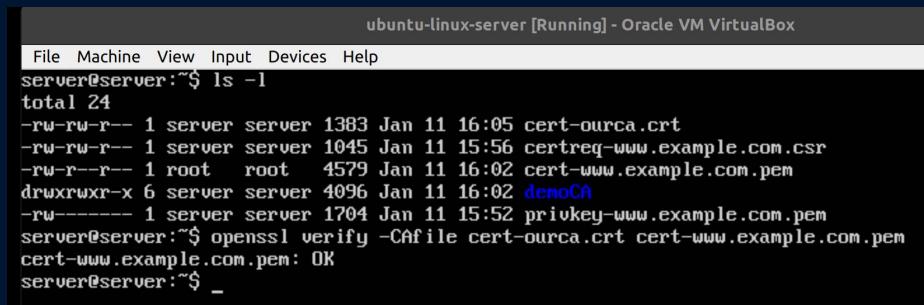
```
server@server:~$ openssl ca -in certreq-www.example.com.csr -out  
cert-www.example.com.pem
```

```
server@server:~$ ls -l
```

```
server@server:~$ cp demoCA/cacert.pem cert-ourca.crt
```

```
server@server:~$ ls -l
```

- **cert-www.example.com.pem →**  
сертификат на уеб сайта
- **cert-ourca.crt →**  
сертификат на сертификат authority-то



```
ubuntu-linux-server [Running] - Oracle VM VirtualBox  
File Machine View Input Devices Help  
server@server:~$ ls -l  
total 24  
-rw-rw-r-- 1 server server 1383 Jan 11 16:05 cert-ourca.crt  
-rw-rw-r-- 1 server server 1045 Jan 11 15:56 certreq-www.example.com.csr  
-rw-r--r-- 1 root   root   4579 Jan 11 16:02 cert-www.example.com.pem  
drwxrwxr-x 6 server server 4096 Jan 11 16:02 demoCA  
-rw----- 1 server server 1704 Jan 11 15:52 privkey-www.example.com.pem  
server@server:~$ openssl verify -CAfile cert-ourca.crt cert-www.example.com.pem  
cert-www.example.com.pem: OK  
server@server:~$ _
```

# 08

## Конфигуриране на Apache да използва HTTPS

```
server@server:~$ sudo cp cert-www.example.com.pem /etc/ssl/certs/  
server@server:~$ sudo cp cert-ourca.crt /etc/ssl/certs/  
server@server:~$ sudo cp privkey-www.example.com.pem /etc/ssl/private/  
server@server:~$ ls -l /etc/ssl
```

- Конфигуриране на Apache да използва HTTPS:

```
server@server:~$ cd /etc/apache2/sites-available  
server@server:~$ sudo vi default-ssl.conf
```

- Добавяне на: ServerName www.example.com:443
- Закоментиране на: SSLCertificateFile и SSLCertificateKeyFile
- Добавяне на следващите редове:

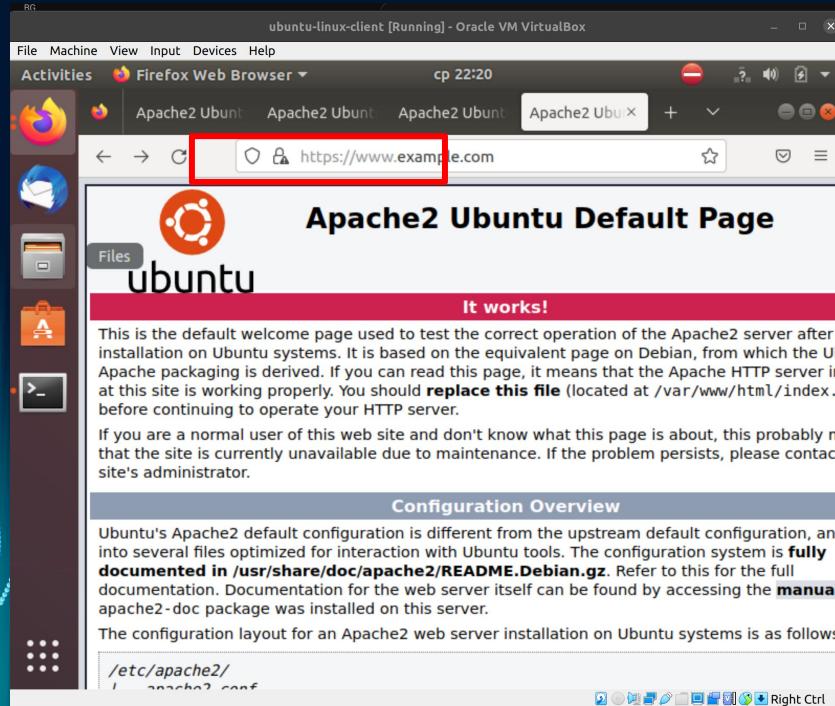
```
SSLCertificateFile      /etc/ssl/certs/cert-www.example.com.pem  
SSLCertificateKeyFile   /etc/ssl/private/privkey-www.example.com.pem  
SSLCACertificateFile    /etc/ssl/certs/cert-ourca.crt
```

- Активиране на Apache SSL модулите:

```
server@server:~$ sudo a2enmod ssl  
server@server:~$ sudo a2ensite default-ssl  
server@server:~$ sudo systemctl reload apache2
```

# 09 BAHTECT

```
client@client:~$ scp server@192.168.2.22:/home/server/cert-ourca.crt .
client@client:~$ sudo mkdir /usr/share/ca-certificates/extra
client@client:~$ sudo cp cert-ourca.crt /usr/share/ca-certificates/extra/
client@client:~$ sudo dpkg-reconfigure ca-certificates
```



Right Ctrl

# Всички ресурси за това демо:

## — SERVER —

- **Инструкции:** <https://github.com/desi109/configuring-http-server-under-linux/blob/master/server/server-cmds>
- **Конфигурации:** <https://github.com/desi109/configuring-http-server-under-linux/tree/master/server/etc>

## — CLIENT —

- **Инструкции:** <https://github.com/desi109/configuring-http-server-under-linux/blob/master/client/client-cmds>
- **Конфигурации:** <https://github.com/desi109/configuring-http-server-under-linux/tree/master/client/etc>

## — ROUTER —

- **Инструкции:** <https://github.com/desi109/configuring-http-server-under-linux/blob/master/router/router-cmds>
- **Конфигурации:** <https://github.com/desi109/configuring-http-server-under-linux/tree/master/router/etc>

# Благодаря за вниманието!

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Ако имате въпроси, може да ги зададете сега



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## Ресурси:

- Troy McMillan, Cisco Networking Essentials, 2nd Edition, 2015