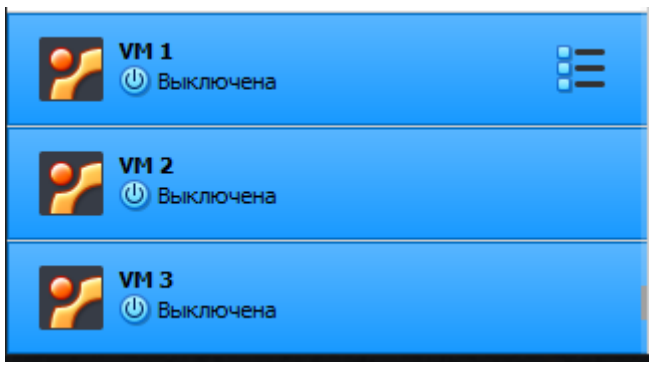
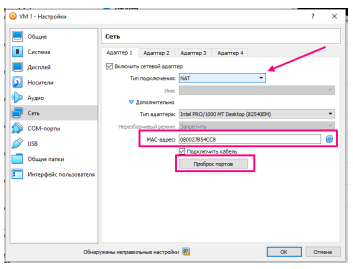
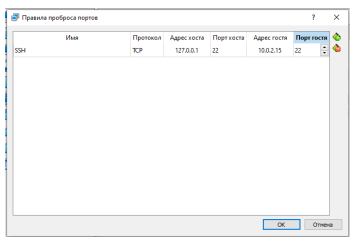
Configuring DHCP, DNS servers and dynamic routing using OSPF protocol

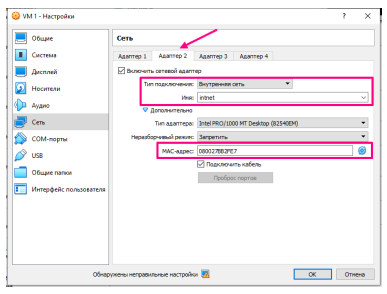
- Create 3 clean Ubuntu virtual machines.



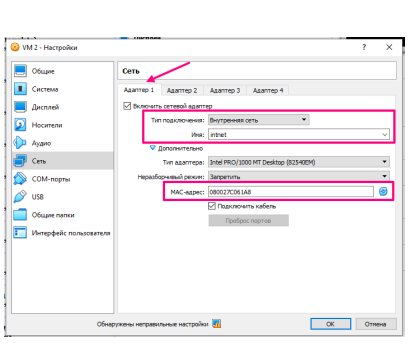
- On the "VM1" let's change network settings on:
  - First adapter - NAT.
  - Change a MAC-address on the NAT adapter.
  - In the Port Forwarding page add SSH connection.
  - Second adapter - Internal.
  - Change a MAC-address on the Internal adapter.

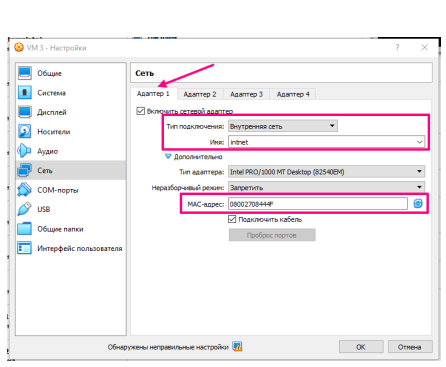




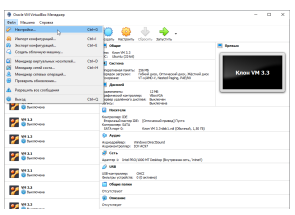


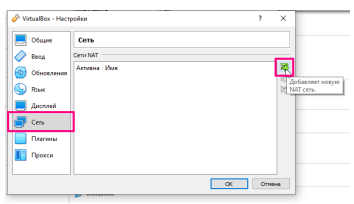
- On the "VM2" and "VM3" let's change network setting on the same way:
  - First adapter - NAT.
  - Change a MAC-address on the NAT adapter.

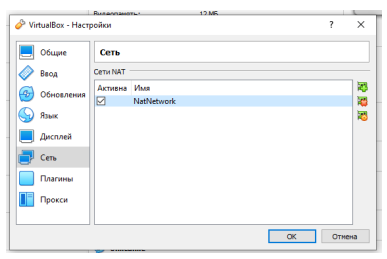




- For DHCP we have to change some Virtual Box settings. Go to "file" » "settings" » "network" » "add new NAT network" » "OK".

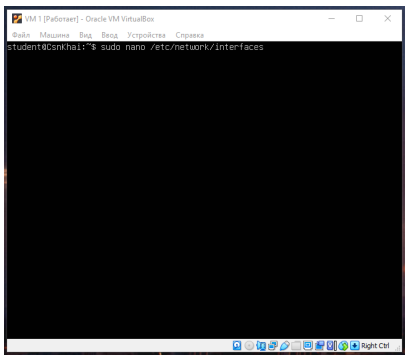


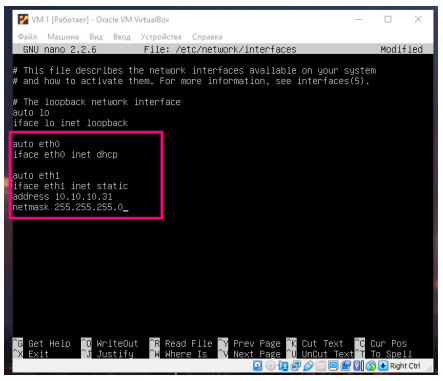


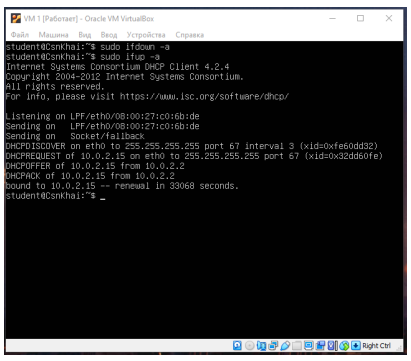


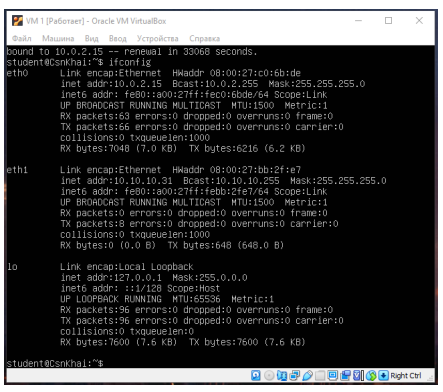
Tune the "VM1":

- Change network interfaces settings for the "VM1":
  - Change the file "*sudo nano /etc/network/interfaces*".
  - Reboot all networks "*sudo ifdown -a*" and then "*sudo ifup -a*".
  - Check the network state using "*ifconfig*".

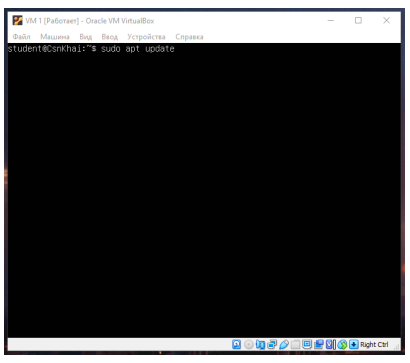


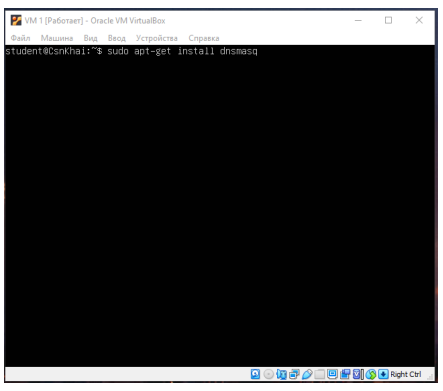




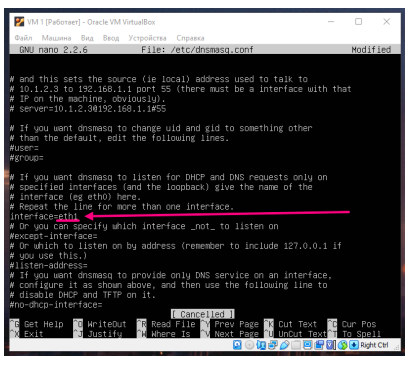


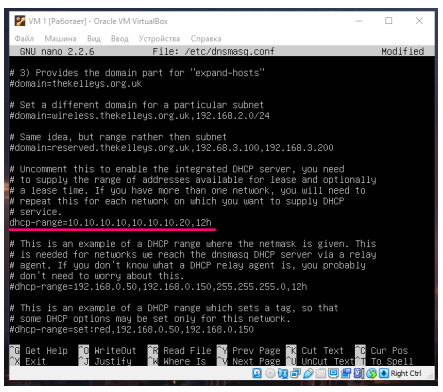
- Install DNSMASQ on the "VM1":
  - Update a list of repository "*sudo apt update*".
  - Install dnsmasq with command "*sudo apt-get install dnsmasq*".

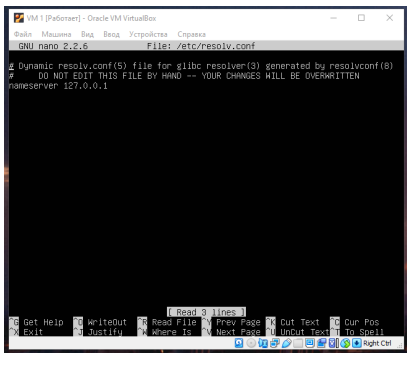


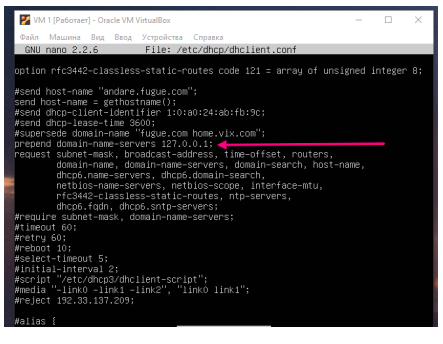


- Tune DNSMASQ on the "VM1":
  - Uncomment the line "interface = eth1" in the file "*sudo nano /etc/dnsmasq.conf*".
  - Uncomment the line and put the rage "dhcp-range=..." in the file "*sudo nano /etc/dnsmasq.conf*".
  - Setting the file "*sudo nano /etc/resolv.conf*".
  - Uncomment the line "prepend domain-name-servers 127.0.0.1;" in the file "*sudo nano /etc/dhcp/dhclient.conf*".



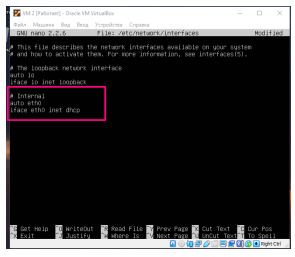
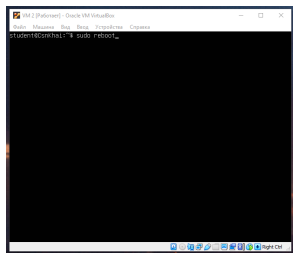
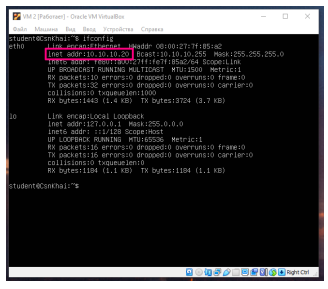




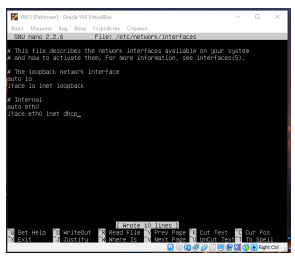
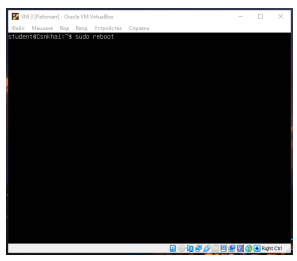
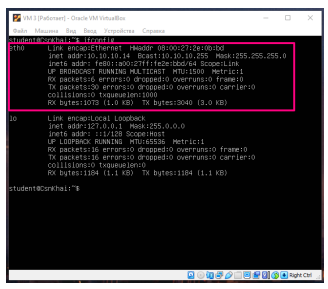


Tune the "VM2" and "VM3":

- Tune the "VM2":
  - On the "VM2" change the file "*sudo nano /etc/network/interfaces*".
  - Reboot the "VM2" with "*sudo reboot*".
  - Check the network with "*ifconfig*". We see that the ip-address is given by DHCP.
  - If we don't have an ip-address on the machine, we can try to do "*sudo ifdown -a*" and then "*sudo ifup -a*". If it doesn't help - reboot machine as many times as we need to get the ip-address. Because of VirtualBox we can sometimes don't get an ip-address even if we done everything correct.

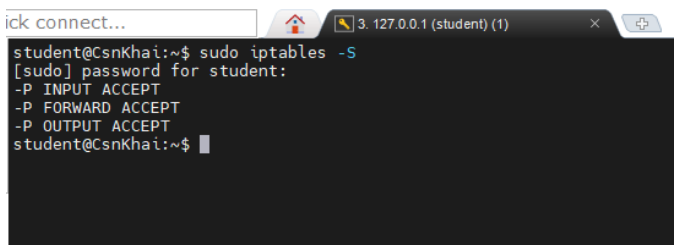




- Tune the "VM3" by the same way:
  - On the "VM3" change the file "*sudo nano /etc/network/interfaces*".
  - Reboot the "VM3" with "*sudo reboot*".
  - Check the network with "*ifconfig*". We see that the ip-address is given by DHCP.

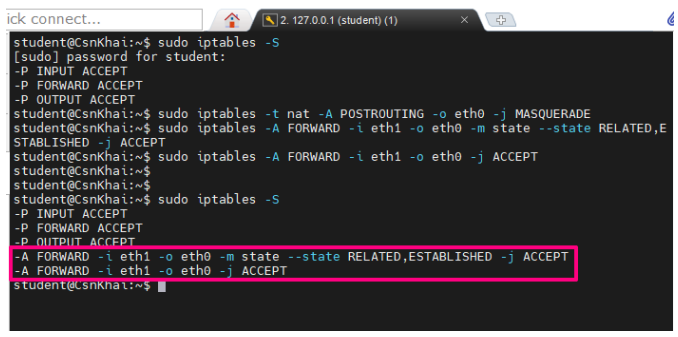




Tune iptables on the "VM1":

- Check on "VM1" "*sudo iptables -S*".



- Do the next commands on the "VM1":
  - "*sudo iptables -t nat -A POSTROUTING -o eth0 -j MASQUERADE*".
  - "*sudo iptables -A FORWARD -i eth1 -o eth0 -m state --state RELATED,ESTABLISHED -j ACCEPT*".
  - "*sudo iptables -A FORWARD -i eth1 -o eth0 -j ACCEPT*".
  - "*sudo iptables -S*".



- We have finished. Congratulations!