Vilniaus Gedimino technikos universitetas

Elektronikos fakultetas

Kompiuterijos ir ryšių technologijų katedra

Debesų kompiuterija

Modulis ELKRM17304

Automatizavimas Ansible pagalba

Laboratorinio darbo nr. 4 ataskaita

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Laboratorinis darbas nr. 4

Automatizavimas `Ansible` pagalba

Darbo tikslas

- Išbandyti `Ansible` įrankį.

Darbo eiga

Infrastruktūros paruošimas

Šiuo metu KDV naudoju *Windows 10*. Darbui atlikti pasirinkau terminalo emuliatorių *MinTTY* ir CLI įrankių sistemą *MSYS2*.
Pastaroji Windows OS emuliuoja *nix aplinką. [1]

Prisijungimas prie savo serverio nr. 1

Kol laukiau SSH paslaugos pasiekiamumo, tikrinau nurodytą TCP prievadą. Prisiminiau ir išmėginau kelis būdus:

```
$ ssh 158.129.200.236 45522
ssh: connect to host 158.129.200.236 port 22: Connection timed out
$
```

```
$ telnet 158.129.200.236 45522
Trying 158.129.200.236...
^C
$
```

```
$ ssh ssh://stud@158.129.200.236:45522
^C
$
```

Išskyrus tikrinimą `netcat` įrankiu, kurį savo klientinėje OS spėjau *tik įsidiegti*:

```
$ pacman -S openbsd-netcat
resolving dependencies...
looking for conflicting packages...
Packages (1) openbsd-netcat-1.217_2-1
Total Download Size:   0.03 MiB
Total Installed Size:  0.12 MiB

:: Proceed with installation? [Y/n]
:: Retrieving packages...
 openbsd-netcat-1.217_2-1-x86_64                                    35.4 KiB  37.8 KiB/s
00:01 [#############################################################] 100%
(1/1) checking keys in keyring
[#############################################################] 100%
(1/1) checking package integrity
[#############################################################] 100%
(1/1) loading package files
[#############################################################] 100%
(1/1) checking for file conflicts
[#############################################################] 100%
(1/1) checking available disk space
[#############################################################] 100%
:: Processing package changes...
(1/1) installing openbsd-netcat
[#############################################################] 100%
$
```

Tuomet laboratorinė SSH paslauga tapo jau pasiekiama..:

```
$ telnet 158.129.200.236 45522
Trying 158.129.200.236...
Connected to 158.129.200.236.
Escape character is '^]'.
SSH-2.0-OpenSSH_8.2p1 Ubuntu-4ubuntu0.3
^]

Connection closed by foreign host.
$
```

... ir pagaliau prisijungiau prie serverio nr.1:

```
$ ssh ssh://stud@158.129.200.236:45522
stud@158.129.200.236's password:
Welcome to Ubuntu 20.04.3 LTS (GNU/Linux 5.4.0-90-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

  System information as of Tue 07 Dec 2021 04:31:42 PM UTC

  System load:  0.0                Processes:                229
  Usage of /:   41.0% of 19.56GB   Users logged in:          0
  Memory usage: 9%                 IPv4 address for docker0: 172.17.0.1
  Swap usage:   0%                 IPv4 address for ens160:  10.128.67.8

 * Super-optimized for small spaces - read how we shrank the memory
   footprint of MicroK8s to make it the smallest full K8s around.

   https://ubuntu.com/blog/microk8s-memory-optimisation

41 updates can be applied immediately.
To see these additional updates run: apt list --upgradable


The list of available updates is more than a week old.
To check for new updates run: sudo apt update

Last login: Tue Oct 19 19:27:21 2021 from 81.29.22.28
stud@cc-lab:~$
```

Gauto OS atnaujinimas:

```
stud@cc-lab:~$ id
uid=1001(stud) gid=1001(stud) groups=1001(stud),27(sudo)

stud@cc-lab:~$ sudo apt update
[sudo] password for stud:
Hit:1 http://lt.archive.ubuntu.com/ubuntu focal InRelease
Hit:2 http://lt.archive.ubuntu.com/ubuntu focal-updates InRelease
Hit:3 http://lt.archive.ubuntu.com/ubuntu focal-backports InRelease
Hit:4 http://lt.archive.ubuntu.com/ubuntu focal-security InRelease
Reading package lists... Done
Building dependency tree
Reading state information... Done
43 packages can be upgraded. Run 'apt list --upgradable' to see them.
stud@cc-lab:~$
```

Ansible įdiegimas:

```
stud@cc-lab:~$ sudo apt install ansible
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  ieee-data python3-argcomplete python3-crypto python3-dnspython python3-jmespath python3-kerberos
python3-libcloud python3-lockfile python3-netaddr python3-ntlm-auth
  python3-requests-kerberos python3-requests-ntlm python3-selinux python3-winrm python3-xmltodict
Suggested packages:
  cowsay sshpass python-lockfile-doc ipython3 python-netaddr-docs
The following NEW packages will be installed:
  ansible ieee-data python3-argcomplete python3-crypto python3-dnspython python3-jmespath python3-
kerberos python3-libcloud python3-lockfile python3-netaddr
  python3-ntlm-auth python3-requests-kerberos python3-requests-ntlm python3-selinux python3-winrm
python3-xmltodict
0 upgraded, 16 newly installed, 0 to remove and 43 not upgraded.
Need to get 9,644 kB of archives.
After this operation, 90.2 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://lt.archive.ubuntu.com/ubuntu focal/main amd64 python3-crypto amd64 2.6.1-13ubuntu2 [237
kB]
Get:2 http://lt.archive.ubuntu.com/ubuntu focal/main amd64 python3-dnspython all 1.16.0-1build1 [89.1
kB]
Get:3 http://lt.archive.ubuntu.com/ubuntu focal/main amd64 ieee-data all 20180805.1 [1,589 kB]
Get:4 http://lt.archive.ubuntu.com/ubuntu focal-updates/main amd64 python3-netaddr all 0.7.19-3ubuntu1
[236 kB]
Get:5 http://lt.archive.ubuntu.com/ubuntu focal/universe amd64 ansible all 2.9.6+dfsg-1 [5,794 kB]
Get:6 http://lt.archive.ubuntu.com/ubuntu focal/universe amd64 python3-argcomplete all 1.8.1-
1.3ubuntu1 [27.2 kB]
Get:7 http://lt.archive.ubuntu.com/ubuntu focal-updates/main amd64 python3-jmespath all 0.9.4-2ubuntu1
[21.5 kB]
Get:8 http://lt.archive.ubuntu.com/ubuntu focal/universe amd64 python3-kerberos amd64 1.1.14-3.1build1
[22.6 kB]
Get:9 http://lt.archive.ubuntu.com/ubuntu focal/main amd64 python3-lockfile all 1:0.12.2-2ubuntu2
[14.6 kB]
Get:10 http://lt.archive.ubuntu.com/ubuntu focal/universe amd64 python3-libcloud all 2.8.0-1 [1,403
kB]
Get:11 http://lt.archive.ubuntu.com/ubuntu focal/universe amd64 python3-ntlm-auth all 1.1.0-1 [19.6
kB]
Get:12 http://lt.archive.ubuntu.com/ubuntu focal/universe amd64 python3-requests-kerberos all 0.12.0-2
[11.9 kB]
Get:13 http://lt.archive.ubuntu.com/ubuntu focal/universe amd64 python3-requests-ntlm all 1.1.0-1
[6,004 B]
Get:14 http://lt.archive.ubuntu.com/ubuntu focal/universe amd64 python3-selinux amd64 3.0-1build2 [139
kB]
Get:15 http://lt.archive.ubuntu.com/ubuntu focal/universe amd64 python3-xmltodict all 0.12.0-1 [12.6
kB]
Get:16 http://lt.archive.ubuntu.com/ubuntu focal/universe amd64 python3-winrm all 0.3.0-2 [21.7 kB]
Fetched 9,644 kB in 1s (10.9 MB/s)
Selecting previously unselected package python3-crypto.
(Reading database ... 107888 files and directories currently installed.)
Preparing to unpack .../00-python3-crypto_2.6.1-13ubuntu2_amd64.deb ...
Unpacking python3-crypto (2.6.1-13ubuntu2) ...
Selecting previously unselected package python3-dnspython.
```

```
Preparing to unpack .../01-python3-dnspython_1.16.0-1build1_all.deb ...
Unpacking python3-dnspython (1.16.0-1build1) ...
Selecting previously unselected package ieee-data.
Preparing to unpack .../02-ieee-data_20180805.1_all.deb ...
Unpacking ieee-data (20180805.1) ...

Progress: [  8%]
[###########.....................................................................................
.............................................]

Selecting previously unselected package python3-netaddr.
Preparing to unpack .../03-python3-netaddr_0.7.19-3ubuntu1_all.deb ...
Unpacking python3-netaddr (0.7.19-3ubuntu1) ...
Selecting previously unselected package ansible.
Preparing to unpack .../04-ansible_2.9.6+dfsg-1_all.deb ...
Unpacking ansible (2.9.6+dfsg-1) ...
Selecting previously unselected package python3-argcomplete.
Preparing to unpack .../05-python3-argcomplete_1.8.1-1.3ubuntu1_all.deb ...
Unpacking python3-argcomplete (1.8.1-1.3ubuntu1) ...
Selecting previously unselected package python3-jmespath.
Preparing to unpack .../06-python3-jmespath_0.9.4-2ubuntu1_all.deb ...
Unpacking python3-jmespath (0.9.4-2ubuntu1) ...
Selecting previously unselected package python3-kerberos.
Preparing to unpack .../07-python3-kerberos_1.1.14-3.1build1_amd64.deb ...
Unpacking python3-kerberos (1.1.14-3.1build1) ...
Selecting previously unselected package python3-lockfile.
Preparing to unpack .../08-python3-lockfile_1%3a0.12.2-2ubuntu2_all.deb ...
Unpacking python3-lockfile (1:0.12.2-2ubuntu2) ...
Selecting previously unselected package python3-libcloud.
Preparing to unpack .../09-python3-libcloud_2.8.0-1_all.deb ...
Unpacking python3-libcloud (2.8.0-1) ...
Selecting previously unselected package python3-ntlm-auth.
Preparing to unpack .../10-python3-ntlm-auth_1.1.0-1_all.deb ...
Unpacking python3-ntlm-auth (1.1.0-1) ...
Selecting previously unselected package python3-requests-kerberos.
Preparing to unpack .../11-python3-requests-kerberos_0.12.0-2_all.deb ...
Unpacking python3-requests-kerberos (0.12.0-2) ...
Selecting previously unselected package python3-requests-ntlm.
Preparing to unpack .../12-python3-requests-ntlm_1.1.0-1_all.deb ...
Unpacking python3-requests-ntlm (1.1.0-1) ...
Selecting previously unselected package python3-selinux.
Preparing to unpack .../13-python3-selinux_3.0-1build2_amd64.deb ...
Unpacking python3-selinux (3.0-1build2) ...
Selecting previously unselected package python3-xmltodict.
Preparing to unpack .../14-python3-xmltodict_0.12.0-1_all.deb ...
Unpacking python3-xmltodict (0.12.0-1) ...
Selecting previously unselected package python3-winrm.
Preparing to unpack .../15-python3-winrm_0.3.0-2_all.deb ...
Unpacking python3-winrm (0.3.0-2) ...
Setting up python3-lockfile (1:0.12.2-2ubuntu2) ...
Setting up python3-ntlm-auth (1.1.0-1) ...
Setting up python3-kerberos (1.1.14-3.1build1) ...
Setting up python3-xmltodict (0.12.0-1) ...
Setting up python3-jmespath (0.9.4-2ubuntu1) ...
Setting up python3-requests-kerberos (0.12.0-2) ...
Setting up ieee-data (20180805.1) ...
Setting up python3-dnspython (1.16.0-1build1) ...
Setting up python3-selinux (3.0-1build2) ...
Setting up python3-crypto (2.6.1-13ubuntu2) ...
Setting up python3-argcomplete (1.8.1-1.3ubuntu1) ...
Setting up python3-requests-ntlm (1.1.0-1) ...
Setting up python3-libcloud (2.8.0-1) ...
Setting up python3-netaddr (0.7.19-3ubuntu1) ...
Setting up python3-winrm (0.3.0-2) ...
Setting up ansible (2.9.6+dfsg-1) ...
Processing triggers for man-db (2.9.1-1) ...
stud@cc-lab:~$
```

Tikrinu *Ansible* versiją:

```
stud@cc-lab:~$ ansible --version
ansible 2.9.6
  config file = /etc/ansible/ansible.cfg
  configured module search path = ['/home/stud/.ansible/plugins/modules',
'/usr/share/ansible/plugins/modules']
  ansible python module location = /usr/lib/python3/dist-packages/ansible
  executable location = /usr/bin/ansible
  python version = 3.8.10 (default, Sep 28 2021, 16:10:42) [GCC 9.3.0]
stud@cc-lab:~$
```

- ⇒ *Ansible* įdiegtas.

Ryšio tarp serverių tikrinimas ir pradinis aprašymas

Patikrinu kai kuriuos serverio nr. 1 IP nustatymus:

```
stud@cc-lab:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
2: ens160: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP group default qlen 1000
    link/ether 00:50:56:9a:28:de brd ff:ff:ff:ff:ff:ff
    inet 10.128.67.8/24 brd 10.128.67.255 scope global ens160
       valid_lft forever preferred_lft forever
    inet6 fe80::250:56ff:fe9a:28de/64 scope link
       valid_lft forever preferred_lft forever
3: docker0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc noqueue state DOWN group default
    link/ether 02:42:5b:81:0f:4a brd ff:ff:ff:ff:ff:ff
    inet 172.17.0.1/16 brd 172.17.255.255 scope global docker0
       valid_lft forever preferred_lft forever

stud@cc-lab:~$ ip r
default via 10.128.67.254 dev ens160 proto dhcp src 10.128.67.8 metric 100
10.128.67.0/24 dev ens160 proto kernel scope link src 10.128.67.8
10.128.67.254 dev ens160 proto dhcp scope link src 10.128.67.8 metric 100
172.17.0.0/16 dev docker0 proto kernel scope link src 172.17.0.1 linkdown
stud@cc-lab:~$
```

Ieškau „kaimynų“ (serverio nr. 2) su sniferiu:

```
stud@cc-lab:~$ sudo tcpdump -tni ens160 not tcp port 22
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on ens160, link-type EN10MB (Ethernet), capture size 262144 bytes

ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
LLDP, length 338: sw-rlab-301-top
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
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ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
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ARP, Request who-has 10.128.67.13 tell 10.128.67.5, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.13 tell 10.128.67.5, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.13 tell 10.128.67.5, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.13 tell 10.128.67.5, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.13 tell 10.128.67.5, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.13 tell 10.128.67.5, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.12 tell 10.128.67.5, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
LLDP, length 338: sw-rlab-301-top
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
ARP, Request who-has 10.128.67.14 tell 10.128.67.6, length 46
^C
52 packets captured
52 packets received by filter
0 packets dropped by kernel
stud@cc-lab:~$
```

- ⇒ „Kaimynai“ tyli.

Diegiu tinklo skenerį:

```
stud@cc-lab:~$ sudo apt install nmap
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libblas3 liblinear4 liblua5.3-0 lua-lpeg nmap-common
Suggested packages:
  liblinear-tools liblinear-dev ncat ndiff zenmap
The following NEW packages will be installed:
  libblas3 liblinear4 liblua5.3-0 lua-lpeg nmap nmap-common
0 upgraded, 6 newly installed, 0 to remove and 43 not upgraded.
Need to get 5,669 kB of archives.
After this operation, 26.8 MB of additional disk space will be used.
Do you want to continue? [Y/n]
Get:1 http://lt.archive.ubuntu.com/ubuntu focal/main amd64 libblas3 amd64 3.9.0-1build1 [142 kB]
Get:2 http://lt.archive.ubuntu.com/ubuntu focal/universe amd64 liblinear4 amd64 2.3.0+dfsg-3build1
[41.7 kB]
Get:3 http://lt.archive.ubuntu.com/ubuntu focal/main amd64 liblua5.3-0 amd64 5.3.3-1.1ubuntu2 [116 kB]
Get:4 http://lt.archive.ubuntu.com/ubuntu focal/universe amd64 lua-lpeg amd64 1.0.2-1 [31.4 kB]
Get:5 http://lt.archive.ubuntu.com/ubuntu focal/universe amd64 nmap-common all 7.80+dfsg1-2build1
[3,676 kB]
Get:6 http://lt.archive.ubuntu.com/ubuntu focal/universe amd64 nmap amd64 7.80+dfsg1-2build1 [1,662
kB]
Fetched 5,669 kB in 3s (1,860 kB/s)
Selecting previously unselected package libblas3:amd64.
(Reading database ... 117331 files and directories currently installed.)
Preparing to unpack .../0-libblas3_3.9.0-1build1_amd64.deb ...
Unpacking libblas3:amd64 (3.9.0-1build1) ...
Selecting previously unselected package liblinear4:amd64.
Preparing to unpack .../1-liblinear4_2.3.0+dfsg-3build1_amd64.deb ...
Unpacking liblinear4:amd64 (2.3.0+dfsg-3build1) ...
Selecting previously unselected package liblua5.3-0:amd64.
Preparing to unpack .../2-liblua5.3-0_5.3.3-1.1ubuntu2_amd64.deb ...
Unpacking liblua5.3-0:amd64 (5.3.3-1.1ubuntu2) ...
Selecting previously unselected package lua-lpeg:amd64.
Preparing to unpack .../3-lua-lpeg_1.0.2-1_amd64.deb ...
Unpacking lua-lpeg:amd64 (1.0.2-1) ...
Selecting previously unselected package nmap-common.
Preparing to unpack .../4-nmap-common_7.80+dfsg1-2build1_all.deb ...
Unpacking nmap-common (7.80+dfsg1-2build1) ...
Selecting previously unselected package nmap.
Preparing to unpack .../5-nmap_7.80+dfsg1-2build1_amd64.deb ...
Unpacking nmap (7.80+dfsg1-2build1) ...
Setting up lua-lpeg:amd64 (1.0.2-1) ...
Setting up libblas3:amd64 (3.9.0-1build1) ...
update-alternatives: using /usr/lib/x86_64-linux-gnu/blas/libblas.so.3 to provide /usr/lib/x86_64-
linux-gnu/libblas.so.3 (libblas.so.3-x86_64-linux-gnu) in auto mode
Setting up nmap-common (7.80+dfsg1-2build1) ...
Setting up liblua5.3-0:amd64 (5.3.3-1.1ubuntu2) ...
Setting up liblinear4:amd64 (2.3.0+dfsg-3build1) ...
Setting up nmap (7.80+dfsg1-2build1) ...

Progress: [ 88%]
[#########################################################################################################
################################.................]

Processing triggers for man-db (2.9.1-1) ...
Processing triggers for libc-bin (2.31-0ubuntu9.2) ...
stud@cc-lab:~$
```

Ir ieškau jų skenuodamas duotą vidinį potinklį:

```
stud@cc-lab:~$ ip a | awk '/inet/'
    inet 127.0.0.1/8 scope host lo
    inet 10.128.67.8/24 brd 10.128.67.255 scope global ens160
    inet6 fe80::250:56ff:fe9a:28de/64 scope link
    inet 172.17.0.1/16 brd 172.17.255.255 scope global docker0

stud@cc-lab:~$ sudo nmap -sP 10.128.67.8/24
Starting Nmap 7.80 ( https://nmap.org ) at 2021-12-07 16:44 UTC
Nmap scan report for 10.128.67.3
Host is up (0.00025s latency).
MAC Address: 00:50:56:9A:2F:79 (VMware)
Nmap scan report for 10.128.67.4
Host is up (0.00017s latency).
MAC Address: 00:50:56:9A:D3:7C (VMware)
Nmap scan report for 10.128.67.5
Host is up (0.00016s latency).
MAC Address: 00:50:56:9A:FD:C6 (VMware)
Nmap scan report for 10.128.67.6
Host is up (0.00016s latency).
MAC Address: 00:50:56:9A:04:4E (VMware)
Nmap scan report for 10.128.67.9
Host is up (0.00023s latency).
MAC Address: 00:50:56:9A:B7:C7 (VMware)
Nmap scan report for 10.128.67.10
Host is up (0.00017s latency).
MAC Address: 00:50:56:9A:2A:F0 (VMware)
Nmap scan report for 10.128.67.11
Host is up (0.00016s latency).
MAC Address: 00:50:56:9A:BD:36 (VMware)
Nmap scan report for 10.128.67.12
Host is up (0.00011s latency).
MAC Address: 00:50:56:9A:5A:91 (VMware)
Nmap scan report for cc-lab (10.128.67.8)
Host is up.
Nmap done: 256 IP addresses (9 hosts up) scanned in 1.82 seconds
stud@cc-lab:~$
```

- ⇒ Radau aštuonis kaimynus, turbūt grupiokų serverius nr. 1.
- ⇒ Kol neaišku, kuris IP kam priklauso, treniruosiuosi su savo serveriu `10.128.67.8` kaip pagrindiniu taikiniu.

Tikrinu `/etc/hosts` failo formatą ir turinį:

```
stud@cc-lab:~$ tail /etc/hosts
127.0.0.1 localhost
127.0.1.1 cc-lab

# The following lines are desirable for IPv6 capable hosts
::1     ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters
stud@cc-lab:~$
```

Aprašau jame savo serverį nr. 1, tik vardu `serveris2` :

```
stud@cc-lab:~$ echo '10.128.67.8    serveris2' >> /etc/hosts
-bash: /etc/hosts: Permission denied

stud@cc-lab:~$ echo '10.128.67.8    serveris2' | sudo tee -a /etc/hosts
10.128.67.8    serveris2

stud@cc-lab:~$ tail /etc/hosts
127.0.0.1 localhost
127.0.1.1 cc-lab

# The following lines are desirable for IPv6 capable hosts
::1     ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters
10.128.67.8    serveris2
stud@cc-lab:~$
```

Patikrinu vardo išsprendimą:

```
stud@cc-lab:~$ ping serveris2
PING serveris2 (10.128.67.8) 56(84) bytes of data.
64 bytes from serveris2 (10.128.67.8): icmp_seq=1 ttl=64 time=0.084 ms
64 bytes from serveris2 (10.128.67.8): icmp_seq=2 ttl=64 time=0.053 ms
^C
--- serveris2 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1016ms
rtt min/avg/max/mdev = 0.053/0.068/0.084/0.015 ms
stud@cc-lab:~$
```

- ⇒ Laikinas vardas veikia.

SSH ryšio ir rakto paruošimas

Darbo su SSH raktais prisiminimui pasinaudoju straipsneliu: [2]
Sukuriu `stud` paskyrai naują SSH raktą:

```
stud@cc-lab:~$ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/home/stud/.ssh/id_rsa):
Created directory '/home/stud/.ssh'.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/stud/.ssh/id_rsa
Your public key has been saved in /home/stud/.ssh/id_rsa.pub
The key fingerprint is:
SHA256:eRmPaDqOuSZ8j+MXGe9DMROb9ewfCVJqK/OIjWWDH4g stud@cc-lab
The key's randomart image is:
+---[RSA 3072]----+
|                 |
|        . . .    |
|         =.=     |
|      . *o+=+    |
|     . *S=++.. . |
|    E =oX.. . o  |
| .    o@ B   . . |
|  o +=+.* .   .  |
|   =*=o  .       |
+----[SHA256]-----+
stud@cc-lab:~$
```

- ⇒ Dėl patogumo ir nereikalaujamo padidinto saugumo, *Passphrase* neįjungiau (nurodžiau tuščią).
- ⇒ Kadangi pradžiai išmėginsiu raktą savo paties serveryje, viešas jo raktas išsisaugos jame pačiame kaip atskiras SSH mazgų įrašas.

- ⇒ Kadangi šiame įraše telpa ne vien IP adresas, bet ir serverio vardas, dėl tvarkos reiktų jungtis vardu (tuomet išspręstasis IP adresas išsisaugo kartu).
- ⇒ O tam, kad šio įrašo apie SSH mazgą vėliau netektų keisti / taisyti, reiktų prisijungimui naudoti jau galutinį mazgo vardą, nebe testinį `serveris2`.

Pašalinu pradinį, testinį mazgo vardą (dvi eilutes) iš sisteminės lentelės ir įrašau adekvatų vardą:

```
stud@cc-lab:~$ sudo vim /etc/hosts
  ...

stud@cc-lab:~$ echo -e '# 2021-12-07 saukrs: pradedu laborą nr. 4,\n10.128.67.8    serveris1' | sudo
tee -a /etc/hosts
# 2021-12-07 saukrs: pradedu laborą nr. 4,
10.128.67.8    serveris1
stud@cc-lab:~$
```

Įsitikinu, kad failą sukonfigūravau teisingai:

```
stud@cc-lab:~$ tail /etc/hosts
127.0.1.1 cc-lab

# The following lines are desirable for IPv6 capable hosts
::1     ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters
# 2021-12-07 saukrs: pradedu laborą nr. 4,
10.128.67.8    serveris1
stud@cc-lab:~$
```

Tikrinu vardą `serveris1`, išsisprendžia:

```
stud@cc-lab:~$ ping serveris1
PING serveris1 (10.128.67.8) 56(84) bytes of data.
64 bytes from serveris1 (10.128.67.8): icmp_seq=1 ttl=64 time=0.060 ms
64 bytes from serveris1 (10.128.67.8): icmp_seq=2 ttl=64 time=0.055 ms
^C
--- serveris1 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1002ms
rtt min/avg/max/mdev = 0.055/0.057/0.060/0.002 ms
stud@cc-lab:~$
```

Jungiuosi prie savo serverio su slaptažodžiu, patvirtinu rakto eliptinį pėdsaką ir iškart atsijungiu su `^D` kombinacija:

```
stud@cc-lab:~$ ssh serveris1
The authenticity of host 'serveris1 (10.128.67.8)' can't be established.
ECDSA key fingerprint is SHA256:53taBSfMAMqEJLYWDEYZqm5IOYHYeEiBNK6eUve1agE.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'serveris1,10.128.67.8' (ECDSA) to the list of known hosts.
stud@serveris1's password:

stud@cc-lab:~$ ^D
stud@cc-lab:~$
```

- ⇒ Prieš viešojo SSH rakto kopijavimą į serverį verta patikslinti, ar serverio ECDSA (eliptinis) rakto pėdsakas yra autentiškas.

  Visiškai nesuprantu, kaip tinkamai tai padaryti + atpažinti galimą „pasiklausymą“ / MITM ataką. [3]

  Todėl tiesiog įvedžiau `yes`.
- ⇒ `serveris1` jau pilnai paruoštas jungimuisi per SSH (su slaptažodžiu).

Serverio nr. 1 savęs pasiekimas (testinis) naudojantis SSH raktu

Kopijuoju SSH raktą į savo paties (tą patį) serverį:

```
stud@cc-lab:~$ ssh-copy-id serveris1
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/home/stud/.ssh/id_rsa.pub"
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are
already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to
install the new keys
stud@serveris1's password:

Number of key(s) added: 1

Now try logging into the machine, with:   "ssh 'serveris1'"
and check to make sure that only the key(s) you wanted were added.

stud@cc-lab:~$
```

Ir tikrinu SSH prisijungimą tuo raktu:

```
stud@cc-lab:~$ ssh serveris1
Welcome to Ubuntu 20.04.3 LTS (GNU/Linux 5.4.0-90-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

  System information as of Tue 07 Dec 2021 04:54:55 PM UTC

  System load:  0.02               Processes:                233
  Usage of /:   42.0% of 19.56GB   Users logged in:          1
  Memory usage: 11%                IPv4 address for docker0: 172.17.0.1
  Swap usage:   0%                 IPv4 address for ens160:  10.128.67.8

 * Super-optimized for small spaces - read how we shrank the memory
   footprint of MicroK8s to make it the smallest full K8s around.

   https://ubuntu.com/blog/microk8s-memory-optimisation

41 updates can be applied immediately.
To see these additional updates run: apt list --upgradable


Last login: Tue Dec  7 16:31:43 2021 from 86.38.73.194

stud@cc-lab:~$ w
 16:54:58 up 57 min,  2 users,  load average: 0.10, 0.04, 0.01
USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
stud     pts/0    86.38.73.194     16:31    1.00s  0.25s  0.02s ssh serveris1
stud     pts/1    10.128.67.8      16:54    2.00s  0.05s  0.00s w

stud@cc-lab:~$ logout
Connection to serveris1 closed.
stud@cc-lab:~$
```

- ⇒ Testinis SSH prisijungimas raktu į `serveris1` jau irgi veikia.

Inventory failo paruošimas

Testinė konfigūracija

Bandau `/etc/hosts` formatu įtraukti `serveris1` aprašymą ir į numatytąjį inventorinį failą `/etc/ansible/hosts`:
(pažvelgus į pastarojo turinį pasirodė, jog formatas toks pats)

```
stud@cc-lab:~$ echo -e '# 2021-12-07 saukrs: pradedu laborą nr. 4,\n[servers]\n10.128.67.8
serveris2' | sudo tee -a /etc/ansible/hosts
# 2021-12-07 saukrs: pradedu laborą nr. 4,
[servers]
10.128.67.8    serveris2
stud@cc-lab:~$
```

- ⇒ Čia apibrėžiau serverių grupę `servers`.

Tikrinu inventoriaus failą:

```
stud@cc-lab:~$ ansible-inventory --list -y
[WARNING]:  * Failed to parse /etc/ansible/hosts with yaml plugin: Syntax Error while loading YAML.
did not find expected <document start>  The error appears to be in
'/etc/ansible/hosts': line 47, column 1, but may be elsewhere in the file depending on the exact
syntax problem.  The offending line appears to be:  [servers] 10.128.67.8
serveris2 ^ here
[WARNING]:  * Failed to parse /etc/ansible/hosts with ini plugin: /etc/ansible/hosts:47: Expected
key=value host variable assignment, got: serveris2
[WARNING]: Unable to parse /etc/ansible/hosts as an inventory source
[WARNING]: No inventory was parsed, only implicit localhost is available
all:
  children:
    ungrouped: {}
stud@cc-lab:~$
```

- ⇒ Bloga inventorinio failo struktūra.
- ⇒ Nors vietoj `serveris1` klaidingai įrašiau `serveris2`, kol kas situacijos tai nekeitė.

Šalinu tris savo įterptas eilutes (taisydamas failo turinį redaktoriuje):

```
stud@cc-lab:~$ sudo vim /etc/ansible/hosts
  ...
stud@cc-lab:~$
```

Kol rasiu klaidą, inventoriuje aprašau mazgą nenaudodamas vardo išvis — tik IP adresą:

```
stud@cc-lab:~$ echo -e '# 2021-12-07 saukrs: pradedu laborą nr. 4,\n[servers]\n10.128.67.8' | sudo tee
-a /etc/ansible/hosts
# 2021-12-07 saukrs: pradedu laborą nr. 4,
[servers]
10.128.67.8
```

Dabar *Ansible* inventorius pradėjo veikti:

```
stud@cc-lab:~$ ansible-inventory --list -y
all:
  children:
    servers:
      hosts:
        10.128.67.8: {}
    ungrouped: {}
stud@cc-lab:~$
```

Pirmas *Inventory* failo testas

Tikrinu *Ansible* gebėjimą jungtis prie testinio inventorinio (t. y. savo paties) serverio:

```
stud@cc-lab:~$ ansible all -m ping -u stud
10.128.67.8 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3"
    },
    "changed": false,
    "ping": "pong"
}
stud@cc-lab:~$
```

- ⇒ *Ansible* mazgas jau prisijungia prie paties savęs (kol kas tik IP adresu).

Inventory failo tikslinimas

LD aprašyme pagaliau atkreipiau dėmesį, kad *Ansible* `hosts` failas naudoja *kiek kitokį* formatą aprašyti mazgui.

- ⇒ Šis formatas yra lankstesnis — skirtingose situacijose turi galimybę „šakotis“: [4]

Failas	**Pirmas stulpelis**	**Antras stulpelis**
`/etc/hosts`	**<IP adresas>**	vardas
`/etc/ansible/hosts` IP adresams	**<IP adresas>**	—
`/etc/ansible/hosts` registruotuotiems vardams	vardas	—
`/etc/ansible/hosts` neregistruotiems vardams	vardas	`ansible_host=`**<IP adresas>**

- ⇒ Jis turi ir kitų galimybių (pvz. nurodyti netipinį mazgo TCP prievadą SSH prisijungimui).

Taigi, ištrinu savo pradinę `/etc/ansible/hosts` konfigūraciją:

```
stud@cc-lab:~$ sudo vim /etc/ansible/hosts
  ...
stud@cc-lab:~$
```

Papildau ją kitu formatu:

```
stud@cc-lab:~$ echo -e '# 2021-12-07 saukrs: pradedu laborą nr. 4,\n[servers]\nserver1
ansible_host=10.128.67.8' | sudo tee -a /etc/ansible/hosts
# 2021-12-07 saukrs: pradedu laborą nr. 4,
[servers]
server1 ansible_host=10.128.67.8
stud@cc-lab:~$
```

Patikrinu šį formatą — tinkamas:

```
stud@cc-lab:~$ ansible-inventory --list -y
all:
  children:
    servers:
      hosts:
        server1:
          ansible_host: 10.128.67.8
    ungrouped: {}
stud@cc-lab:~$
```

Patikrinu inventorinio failo veikimą — veikia:

```
stud@cc-lab:~$ ansible all -m ping -u stud
server1 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3"
    },
    "changed": false,
    "ping": "pong"
}
stud@cc-lab:~$
```

Nustoju naudoti CLI raktą `-u stud`, nes dabar virtualioje laboratorijoje magistrantai dirba vien su šia paskyra, kitų vardų nenaudojame:

```
stud@cc-lab:~$ ansible all -m ping
server1 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3"
    },
    "changed": false,
    "ping": "pong"
}
stud@cc-lab:~$
```

- ⇒ susipažinta su `/etc/ansible/hosts` formatu, sukurta testinė konfigūracija.

Aprašau serverį nr. 2

LD aprašo susirandu mano serveriui nr. 2 priskirtą IP adresą: `10.128.67.20`.

Pirmiausia aprašau jį `/etc/hosts` faile:

```
stud@cc-lab:~$ echo '10.128.67.20   serveris2' | sudo tee -a /etc/hosts
10.128.67.20   serveris2

stud@cc-lab:~$ tail /etc/hosts

# The following lines are desirable for IPv6 capable hosts
::1     ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters
# 2021-12-07 saukrs: pradedu laborą nr. 4,
10.128.67.8    serveris1
10.128.67.20   serveris2
stud@cc-lab:~$
```

Paskui ir *Ansible* inventoriuje:

```
stud@cc-lab:~$ echo 'serveris2 ansible_host=10.128.67.20' | sudo tee -a /etc/ansible/hosts
serveris2 ansible_host=10.128.67.20

stud@cc-lab:~$ tail /etc/ansible/hosts

# Here's another example of host ranges, this time there are no
# leading 0s:

#db-[99:101]-node.example.com

# 2021-12-07 saukrs: pradedu laborą nr. 4,
[servers]
server1 ansible_host=10.128.67.8
serveris2 ansible_host=10.128.67.20
stud@cc-lab:~$
```

- ⇒ Pastebiu netiksliai užrašytą serverio nr. 1 vardą.

Konfigūracijos klaidų taisymas

Pataisau serverio nr. 1 aprašymą redaktoriumi, rankiniu būdu:

```
stud@cc-lab:~$ sudo vim /etc/ansible/hosts
  ...
# 2021-12-07 saukrs: pradedu laborą nr. 4,
[servers]
serveris1 ansible_host=10.128.67.8
serveris2 ansible_host=10.128.67.20

47,8          All
stud@cc-lab:~$
```

Įsitikinu, kad *Inventory* papildžiau teisingai:

```
stud@cc-lab:~$ ansible-inventory --list -y
all:
  children:
    servers:
      hosts:
        serveris1:
          ansible_host: 10.128.67.8
        serveris2:
          ansible_host: 10.128.67.20
    ungrouped: {}
stud@cc-lab:~$
```

- ⇒ Jei `/etc/ansible/hosts` faile naudotume tik vardus (be IP adresų), tokias klaidas varduose (tą patį vardą, keliose vietose aprašomą skirtingai) būtų pavykę pastebėti iškart.
- ⇒ Paruoštas ir patikrintas inventoriaus failas, jame aprašytas serveris nr. 2.

Ansible prisijungimų tikrinimas

Ansible valdymo mazge startuoju komandą:

```
stud@cc-lab:~$ ansible all -m ping
The authenticity of host '10.128.67.20 (10.128.67.20)' can't be established.
ECDSA key fingerprint is SHA256:53taBSfMAMqEJLYWDEYZqm5IOYHYeEiBNK6eUve1agE.
Are you sure you want to continue connecting (yes/no/[fingerprint])? serveris1 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3"
    },
    "changed": false,
    "ping": "pong"
}
yes^C
serveris2 | UNREACHABLE! => {
    "changed": false,
    "msg": "Failed to connect to the host via ssh: Warning: Permanently added '10.128.67.20' (ECDSA)
to the list of known hosts.\r\nstud@10.128.67.20: Permission denied (pub
lickey,password).",
    "unreachable": true
}
stud@cc-lab:~$
```

- ⇒ Vis dar neparuošiau SSH prisijungimo iš `serveris1` į `serveris2`.

Tolimesnis SSH prisijungimų tvarkymas

Kopijuoju serverio nr. 1 raktą į serverį nr. 2:

```
stud@cc-lab:~$ ssh-copy-id serveris2
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/home/stud/.ssh/id_rsa.pub"
The authenticity of host 'serveris2 (10.128.67.20)' can't be established.
ECDSA key fingerprint is SHA256:53taBSfMAMqEJLYWDEYZqm5IOYHYeEiBNK6eUve1agE.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are
already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to
install the new keys
stud@serveris2's password:

Number of key(s) added: 1

Now try logging into the machine, with:   "ssh 'serveris2'"
and check to make sure that only the key(s) you wanted were added.

stud@cc-lab:~$
```

Antras prisijungimų tikrinimas

```
stud@cc-lab:~$ ansible all -m ping
serveris1 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3"
    },
    "changed": false,
    "ping": "pong"
}
serveris2 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3"
    },
    "changed": false,
    "ping": "pong"
}
stud@cc-lab:~$
```

- ⇒ Galų gale abu serveriai atsiliepia tinkamai. Rezultatas panašus į pateiktąjį LD apraše. *Ansible* valdymo mazgas palaiko ryšį su dviem serveriais (vienu testiniu ir vienu produkciniu).

Nuotolinis komandų vykdymas

LD užduoties *Ad-hoc* komandos

```
stud@cc-lab:~$ ansible all -a "df -h"
serveris1 | CHANGED | rc=0 >>
Filesystem                         Size  Used Avail Use% Mounted on
udev                               1.5G     0  1.5G   0% /dev
tmpfs                              300M  1.2M  299M   1% /run
/dev/mapper/ubuntu--vg-ubuntu--lv   20G  8.3G   11G  45% /
tmpfs                              1.5G  124K  1.5G   1% /dev/shm
tmpfs                              5.0M     0  5.0M   0% /run/lock
tmpfs                              1.5G     0  1.5G   0% /sys/fs/cgroup
/dev/loop0                          56M   56M     0 100% /snap/core18/2246
/dev/loop1                          56M   56M     0 100% /snap/core18/2253
/dev/loop3                          62M   62M     0 100% /snap/core20/1270
/dev/loop2                          62M   62M     0 100% /snap/core20/1242
/dev/loop4                          68M   68M     0 100% /snap/lxd/21835
/dev/loop5                          68M   68M     0 100% /snap/lxd/21803
/dev/loop7                          33M   33M     0 100% /snap/snapd/13640
/dev/loop6                         117M  117M     0 100% /snap/docker/1125
/dev/loop8                          43M   43M     0 100% /snap/snapd/14066
/dev/sda2                          976M  203M  707M  23% /boot
tmpfs                              300M     0  300M   0% /run/user/1001
serveris2 | CHANGED | rc=0 >>
Filesystem                         Size  Used Avail Use% Mounted on
udev                               1.5G     0  1.5G   0% /dev
tmpfs                              300M  1.2M  299M   1% /run
/dev/mapper/ubuntu--vg-ubuntu--lv   20G  7.7G   11G  42% /
tmpfs                              1.5G     0  1.5G   0% /dev/shm
tmpfs                              5.0M     0  5.0M   0% /run/lock
tmpfs                              1.5G     0  1.5G   0% /sys/fs/cgroup
/dev/loop1                          56M   56M     0 100% /snap/core18/2246
/dev/loop2                          62M   62M     0 100% /snap/core20/1169
/dev/loop0                          56M   56M     0 100% /snap/core18/2128
/dev/loop3                          68M   68M     0 100% /snap/lxd/21803
/dev/loop4                          68M   68M     0 100% /snap/lxd/21835
/dev/loop5                         117M  117M     0 100% /snap/docker/1125
/dev/loop6                          43M   43M     0 100% /snap/snapd/13831
/dev/loop7                          33M   33M     0 100% /snap/snapd/13640
/dev/sda2                          976M  203M  707M  23% /boot
tmpfs                              300M     0  300M   0% /run/user/1001
stud@cc-lab:~$
```

- ⇒ Gaunu serverių primontuotų failinių sistemų (FS) būsenas.

```
stud@cc-lab:~$ ansible all -a uptime
serveris1 | CHANGED | rc=0 >>
 17:08:48 up  1:10,  2 users,  load average: 0.07, 0.02, 0.00
serveris2 | CHANGED | rc=0 >>
 17:08:48 up 51 min,  1 user,  load average: 0.00, 0.00, 0.00
stud@cc-lab:~$
```

- ⇒ Gaunu serverių veikimo trukmes ir sistemines apkrovas (*System load*).
- ⇒ *Ansible* abi LD komandas įvykdė abiejuose serveriuose sėkmingai.

Kitos (paprastos) *Ad-hoc* komandas

```
stud@cc-lab:~$ ansible all -a "ip r"
serveris2 | CHANGED | rc=0 >>
default via 10.128.67.254 dev ens160 proto dhcp src 10.128.67.20 metric 100
10.128.67.0/24 dev ens160 proto kernel scope link src 10.128.67.20
10.128.67.254 dev ens160 proto dhcp scope link src 10.128.67.20 metric 100
172.17.0.0/16 dev docker0 proto kernel scope link src 172.17.0.1 linkdown
serveris1 | CHANGED | rc=0 >>
default via 10.128.67.254 dev ens160 proto dhcp src 10.128.67.8 metric 100
10.128.67.0/24 dev ens160 proto kernel scope link src 10.128.67.8
10.128.67.254 dev ens160 proto dhcp scope link src 10.128.67.8 metric 100
172.17.0.0/16 dev docker0 proto kernel scope link src 172.17.0.1 linkdown
stud@cc-lab:~$
```

- ⇒ Gavau maršrutų lenteles.

```
stud@cc-lab:~$ ansible all -a w
serveris2 | CHANGED | rc=0 >>
 17:19:21 up  1:01,  1 user,  load average: 0.00, 0.00, 0.00
USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
stud     pts/0    10.128.67.8      17:19    1.00s  0.19s  0.00s w
serveris1 | CHANGED | rc=0 >>
 17:19:21 up  1:21,  2 users,  load average: 0.00, 0.00, 0.00
USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
stud     pts/0    86.38.73.194     16:31    5.00s  1.64s  0.00s ssh -C -o ControlMaster=auto -o
ControlPersist=60s -o KbdInteractiveAuthentication=no -o PreferredAuthenticat
ions=gssapi-with-mic,gssapi-keyex,hostbased,publickey -o PasswordAuthentication=no -o
ConnectTimeout=10 -o ControlPath=/home/stud/.ansible/cp/62369c22bf -tt 10.128.67.8 /bin
/sh -c '/usr/bin/python3 /home/stud/.ansible/tmp/ansible-tmp-1638897559.5734017-
231528218158292/AnsiballZ_command.py && sleep 0'
stud     pts/3    10.128.67.8      17:19    1.00s  0.21s  0.01s w
stud@cc-lab:~$
```

- ⇒ Gavau prisijungusių vartotojų skaičių ir aktyvias vykdomas programas.
- ⇒ Čia atsitiktinai pastebiu, kad *Ansible* jungimuisi į serverius naudoja komandą `ssh` su gana ilga komandine eilute:

```
ssh \
  -C \
  -o ControlMaster=auto \
  -o ControlPersist=60s \
  -o KbdInteractiveAuthentication=no \
  -o PreferredAuthentications=gssapi-with-mic,gssapi-keyex,hostbased,publickey \
  -o PasswordAuthentication=no \
  -o ConnectTimeout=10 \
  -o ControlPath=/home/stud/.ansible/cp/62369c22bf \
  -tt \
  10.128.67.8 /bin/sh \
  -c '/usr/bin/python3 \
        /home/stud/.ansible/tmp/ansible-tmp-1638897559.5734017-231528218158292/AnsiballZ_command.py
\
      && sleep 0'
```

- ⇒ ... ir nuotoliniame serveryje startuoja tokį *Python* skriptą:

```
/usr/bin/python3 /home/stud/.ansible/tmp/ansible-tmp-1638897559.5734017-
231528218158292/AnsiballZ_command.py
```

- ⇒ Panašu, kad skriptą `AnsiballZ_command.py` *Ansible* į nuotolinį serverį sau nusikopijuoja prieš pat vykdymą.

Leidžiu paskutinę paprastą komandą:

```
stud@cc-lab:~$ ansible all -a "lsb_release -d"
serveris1 | CHANGED | rc=0 >>
Description:    Ubuntu 20.04.3 LTS
serveris2 | CHANGED | rc=0 >>
Description:    Ubuntu 20.04.3 LTS
stud@cc-lab:~$
```

- ⇒ Visos paprastos (pavienės) *Ad-hoc* komandos veikia.

Kompozitinės *Ad-hoc* komandos

Mėginu komandą `lscpu | awk '/^CPU/'` nustatyti mašinos CPU branduolių skaičiui:

```
stud@cc-lab:~$ ansible all -a "lscpu | awk '/^CPU/'"
serveris2 | FAILED | rc=1 >>
lscpu: bad usage
Try 'lscpu --help' for more information.non-zero return code
serveris1 | FAILED | rc=1 >>
lscpu: bad usage
Try 'lscpu --help' for more information.non-zero return code
stud@cc-lab:~$
```

- ⇒ Neveikia, ir neaišku, kokią komandinę eilutę `lscpu` gavo, kad „pyksta“.

Mėginu visą komandą įvykdyti *Bash* pagalba:

```
stud@cc-lab:~$ ansible all -a bash -c "lscpu | awk '/^CPU/'"
serveris1 | FAILED | rc=-1 >>
the connection plugin 'lscpu | awk '/^CPU/'' was not found
serveris2 | FAILED | rc=-1 >>
the connection plugin 'lscpu | awk '/^CPU/'' was not found
stud@cc-lab:~$
```

- ⇒ Blogai: šitaip raktą `-c` *Ansible* pasiima sau ir pasimeta.

Visą komandinę eilutę kartu su `bash` apgaubiu išorinėmis dvigubomis kabutėmis (kaip vientisą, vieną argumentą), o vidines dvigubąsias „eskeipinu“:

```
stud@cc-lab:~$ ansible all -a "bash -c \"lscpu | awk '/^CPU.s/'\""
serveris1 | CHANGED | rc=0 >>
CPU(s):                          2
serveris2 | CHANGED | rc=0 >>
CPU(s):                          2
stud@cc-lab:~$
```

- ⇒ Pagaliau veikia. Beje, `awk` komandą šiek tiek papildžiau, kad grąžintų tik vieną eilutę per mazgą.

Pamėginu išsitraukti ir CPU taktinį dažnį:

```
stud@cc-lab:~$ ansible all -a "bash -c \"lscpu | awk '/^CPU.s|Hz/'\""
serveris1 | CHANGED | rc=0 >>
CPU(s):                          2
Model name:                      Intel(R) Xeon(R) CPU           E5645  @ 2.40GHz
CPU MHz:                         2400.085
serveris2 | CHANGED | rc=0 >>
CPU(s):                          2
Model name:                      Intel(R) Xeon(R) CPU           E5620  @ 2.40GHz
CPU MHz:                         2400.085
stud@cc-lab:~$
```

- ⇒ *Ansible* geba vykdyti ir *Bash*-kompozitines *Ad-hoc* komandas.
- ⇒ Pamiršau patikrinti *Ansible* hostų grupavimą, t.y. nurodyti serverių grupę `servers` vietoje `all`. Esu įsitikinęs, kad ji veiktų taip pat puikiai.

(Bonus) *Ansible* grojaraščių vykdymas

Pradedu kurti atskirą grojaraštį (*Playbook*):

```
stud@cc-lab:~$ ls -Al
total 52
drwxrwxr-x 4 stud stud 4096 Dec  7 16:57 .ansible
-rw------- 1 stud stud 1005 Dec  7 16:54 .bash_history
-rw-r--r-- 1 stud stud  220 Oct 19 14:14 .bash_logout
-rw-r--r-- 1 stud stud 3771 Oct 19 14:14 .bashrc
drwxrwxr-x 3 stud stud 4096 Oct 19 16:23 build
drwx------ 2 stud stud 4096 Oct 19 14:21 .cache
-rw------- 1 stud stud   39 Dec  7 16:41 .lesshst
drwxrwxr-x 3 stud stud 4096 Oct 19 16:08 .local
-rw-r--r-- 1 stud stud  807 Oct 19 14:14 .profile
drwxr-xr-x 3 stud stud 4096 Oct 19 15:40 snap
drwx------ 2 stud stud 4096 Dec  7 17:07 .ssh
-rw-r--r-- 1 stud stud    0 Oct 19 14:15 .sudo_as_admin_successful
drwxrwxr-x 2 stud stud 4096 Oct 19 15:40 test
-rw------- 1 stud stud 1162 Dec  7 16:38 .viminfo

stud@cc-lab:~$ mkdir src

stud@cc-lab:~$ cd src

stud@cc-lab:~/src$ vim saukrs-1.yml
  ...
```

Kopijuoju pavyzdį iš *Red Hat* Blog-įrašo: [5]

```
# 2021-12-07 saukrs: kopijuoju iš https://www.redhat.com/en/blog/ansible-101-ansible-beginners
#
- name: saukrs Playbook nr.1
  hosts: serveris2
  tasks:
    - name: diegiame nginx
        yum:
          name: nginx
          state: present
```

Bandau grojaraštį:

```
[1]+  Stopped                 vim saukrs-1.yml

stud@cc-lab:~/src$ ansible-playbook saukrs-1.yml
ERROR! Syntax Error while loading YAML.
  mapping values are not allowed in this context

The error appears to be in '/home/stud/src/saukrs-1.yml': line 7, column 12, but may
be elsewhere in the file depending on the exact syntax problem.

The offending line appears to be:

    - name: diegiame nginx
        yum:
           ^ here
stud@cc-lab:~/src$
```

- ⇒ Klaida. Bet ne faktas, kad septintoje eilutėje.

Įterpiu YAML pradžios žymę `---` :

```
stud@cc-lab:~/src$ fg
```

```
---
# 2021-12-07 saukrs: kopijuoju iš https://www.redhat.com/en/blog/ansible-101-ansible-beginners
- name: saukrs Playbook nr.1
  hosts: serveris2
  tasks:
    - name: diegiame nginx
        yum:
          name: nginx
          state: present
```

- ⇒ Klaida išlieka tokia pati.

Įsikopijuoja kitą pavyzdį: [6]

```
stud@cc-lab:~/src$ vim saukrs-2.yml
```

```
---
- hosts: all
  become: yes
  tasks:
  - name: Install packages
    apt:
      name:
      - ntpdate
      - nmap
      state: latest
      cache_valid_time: 3600
```

Bandau antrą grojaraštį:

```
[1]+  Stopped                 vim saukrs-2.yml
stud@cc-lab:~/src$ ansible-playbook saukrs-2.yml

PLAY [all]
*************************************************************************************************************
***********************************************************

TASK [Gathering Facts]
*************************************************************************************************************
*********************************************
fatal: [serveris1]: FAILED! => {"msg": "Missing sudo password"}
fatal: [serveris2]: FAILED! => {"msg": "Missing sudo password"}

PLAY RECAP
*************************************************************************************************************
*********************************************************
serveris1                  : ok=0    changed=0    unreachable=0    failed=1    skipped=0    rescued=0
ignored=0
serveris2                  : ok=0    changed=0    unreachable=0    failed=1    skipped=0    rescued=0
ignored=0

stud@cc-lab:~/src$
```

- ⇒ Grojaraštis nr. 2 sintaksės klaidų nebeturi, tačiau praneša, kad trūksta `sudo` slaptažodžio.
- ⇒ Grąžina `ok=0` ir `failed=1`.

Suguglinu patarimą naudoti papildomą raktą `--ask-become-pass`: [7]

```
stud@cc-lab:~/src$ ansible-playbook saukrs-2.yml --ask-become-pass
BECOME password:

PLAY [all]
*********************************************************************************************************
*************************************************************

TASK [Gathering Facts]
*********************************************************************************************************
*********************************************
ok: [serveris1]
ok: [serveris2]

TASK [Install packages]
*********************************************************************************************************
*********************************************
changed: [serveris1]
changed: [serveris2]

PLAY RECAP
*********************************************************************************************************
*********************************************************
serveris1                  : ok=2    changed=1    unreachable=0    failed=0    skipped=0    rescued=0
ignored=0
serveris2                  : ok=2    changed=1    unreachable=0    failed=0    skipped=0    rescued=0
ignored=0

stud@cc-lab:~/src$
```

- ⇒ *Ansible* paprašė slaptažodžio — spėjau, kad `stud` paskyros, ir pataikiau, regis.
- ⇒ Žingsnis `[Install packages]` užtruko ilgiausiai:
  - `serveris1` apie 10 s.
  - `serveris2` apie 20 s.
- ⇒ Grojaraštis grąžina `ok=2` ir `failed=0`.
- ⇒ Panašu, kad jis įdiegė / atnaujino abu nurodytus paketus: `ntpdate` ir `nmap`. Paketų būsenos tiesiogiai nepatikrinau.

Nutariau pasitikrinti, ką tiksliai vykdo *Ansible* ir kuri komanda paprašo `sudo` slaptažodžio. Dėstytojas pasiūlė naudoti `-v` ar net `-vvv`, mėginu:

```
stud@cc-lab:~/src$ ansible-playbook saukrs-2.yml -vvv
ansible-playbook 2.9.6
  config file = /etc/ansible/ansible.cfg
  configured module search path = ['/home/stud/.ansible/plugins/modules',
'/usr/share/ansible/plugins/modules']
  ansible python module location = /usr/lib/python3/dist-packages/ansible
  executable location = /usr/bin/ansible-playbook
  python version = 3.8.10 (default, Sep 28 2021, 16:10:42) [GCC 9.3.0]
Using /etc/ansible/ansible.cfg as config file
host_list declined parsing /etc/ansible/hosts as it did not pass its verify_file() method
script declined parsing /etc/ansible/hosts as it did not pass its verify_file() method
auto declined parsing /etc/ansible/hosts as it did not pass its verify_file() method
Parsed /etc/ansible/hosts inventory source with ini plugin

PLAYBOOK: saukrs-2.yml
*********************************************************************************************************
*********************************************
1 plays in saukrs-2.yml

PLAY [all]
*********************************************************************************************************
*************************************************************

TASK [Gathering Facts]
*********************************************************************************************************
*********************************************
```

```
task path: /home/stud/src/saukrs-2.yml:2
<10.128.67.8> ESTABLISH SSH CONNECTION FOR USER: None
<10.128.67.8> SSH: EXEC ssh -C -o ControlMaster=auto -o ControlPersist=60s -o
KbdInteractiveAuthentication=no -o PreferredAuthentications=gssapi-with-mic,gssapi-
keyex,hostbased,publickey -o PasswordAuthentication=no -o ConnectTimeout=10 -o
ControlPath=/home/stud/.ansible/cp/62369c22bf 10.128.67.8 '/bin/sh -c '"'"'echo ~ && sleep 0'"'"''
<10.128.67.20> ESTABLISH SSH CONNECTION FOR USER: None
<10.128.67.20> SSH: EXEC ssh -C -o ControlMaster=auto -o ControlPersist=60s -o
KbdInteractiveAuthentication=no -o PreferredAuthentications=gssapi-with-mic,gssapi-
keyex,hostbased,publickey -o PasswordAuthentication=no -o ConnectTimeout=10 -o
ControlPath=/home/stud/.ansible/cp/b650e54a14 10.128.67.20 '/bin/sh -c '"'"'echo ~ && sleep 0'"'"''
<10.128.67.8> (0, b'/home/stud\n', b'')
<10.128.67.8> ESTABLISH SSH CONNECTION FOR USER: None
<10.128.67.8> SSH: EXEC ssh -C -o ControlMaster=auto -o ControlPersist=60s -o
KbdInteractiveAuthentication=no -o PreferredAuthentications=gssapi-with-mic,gssapi-
keyex,hostbased,publickey -o PasswordAuthentication=no -o ConnectTimeout=10 -o
ControlPath=/home/stud/.ansible/cp/62369c22bf 10.128.67.8 '/bin/sh -c '"'"'( umask 77 && mkdir -p "`
echo /home/stud/.ansible/tmp/ansible-tmp-1638899019.7293622-253348797528778 `" && echo ansible-tmp-
1638899019.7293622-253348797528778="` echo /home/stud/.ansible/tmp/ansible-tmp-1638899019.7293622-
253348797528778 `" ) && sleep 0'"'"''
<10.128.67.8> (0, b'ansible-tmp-1638899019.7293622-253348797528778=/home/stud/.ansible/tmp/ansible-
tmp-1638899019.7293622-253348797528778\n', b'')
<10.128.67.20> (0, b'/home/stud\n', b'')
<10.128.67.20> ESTABLISH SSH CONNECTION FOR USER: None
<10.128.67.20> SSH: EXEC ssh -C -o ControlMaster=auto -o ControlPersist=60s -o
KbdInteractiveAuthentication=no -o PreferredAuthentications=gssapi-with-mic,gssapi-
keyex,hostbased,publickey -o PasswordAuthentication=no -o ConnectTimeout=10 -o
ControlPath=/home/stud/.ansible/cp/b650e54a14 10.128.67.20 '/bin/sh -c '"'"'( umask 77 && mkdir -p "`
echo /home/stud/.ansible/tmp/ansible-tmp-1638899019.7481883-242494816437750 `" && echo ansible-tmp-
1638899019.7481883-242494816437750="` echo /home/stud/.ansible/tmp/ansible-tmp-1638899019.7481883-
242494816437750 `" ) && sleep 0'"'"''
<10.128.67.20> (0, b'ansible-tmp-1638899019.7481883-242494816437750=/home/stud/.ansible/tmp/ansible-
tmp-1638899019.7481883-242494816437750\n', b'')
<serveris2> Attempting python interpreter discovery
<10.128.67.20> ESTABLISH SSH CONNECTION FOR USER: None
<serveris1> Attempting python interpreter discovery
<10.128.67.8> ESTABLISH SSH CONNECTION FOR USER: None
<10.128.67.20> SSH: EXEC ssh -C -o ControlMaster=auto -o ControlPersist=60s -o
KbdInteractiveAuthentication=no -o PreferredAuthentications=gssapi-with-mic,gssapi-
keyex,hostbased,publickey -o PasswordAuthentication=no -o ConnectTimeout=10 -o
ControlPath=/home/stud/.ansible/cp/b650e54a14 10.128.67.20 '/bin/sh -c '"'"'echo PLATFORM; uname; echo
FOUND; command -v '"'"'"'"'"'"'"'"'/usr/bin/python'"'"'"'"'"'"'"'"'; command -v
'"'"'"'"'"'"'"'"'python3.7'"'"'"'"'"'"'"'"'; command -v '"'"'"'"'"'"'"'"'python3.6'"'"'"'"'"'"'"'"';
command -v '"'"'"'"'"'"'"'"'python3.5'"'"'"'"'"'"'"'"'; command -v
'"'"'"'"'"'"'"'"'python2.7'"'"'"'"'"'"'"'"'; command -v '"'"'"'"'"'"'"'"'python2.6'"'"'"'"'"'"'"'"';
command -v '"'"'"'"'"'"'"'"'/usr/libexec/platform-python'"'"'"'"'"'"'"'"'; command -v
'"'"'"'"'"'"'"'"'/usr/bin/python3'"'"'"'"'"'"'"'"'; command -v
'"'"'"'"'"'"'"'"'python'"'"'"'"'"'"'"'"'; echo ENDFOUND && sleep 0'"'"''
<10.128.67.8> SSH: EXEC ssh -C -o ControlMaster=auto -o ControlPersist=60s -o
KbdInteractiveAuthentication=no -o PreferredAuthentications=gssapi-with-mic,gssapi-
keyex,hostbased,publickey -o PasswordAuthentication=no -o ConnectTimeout=10 -o
ControlPath=/home/stud/.ansible/cp/62369c22bf 10.128.67.8 '/bin/sh -c '"'"'echo PLATFORM; uname; echo
FOUND; command -v '"'"'"'"'"'"'"'"'/usr/bin/python'"'"'"'"'"'"'"'"'; command -v
'"'"'"'"'"'"'"'"'python3.7'"'"'"'"'"'"'"'"'; command -v '"'"'"'"'"'"'"'"'python3.6'"'"'"'"'"'"'"'"';
command -v '"'"'"'"'"'"'"'"'python3.5'"'"'"'"'"'"'"'"'; command -v
'"'"'"'"'"'"'"'"'python2.7'"'"'"'"'"'"'"'"'; command -v '"'"'"'"'"'"'"'"'python2.6'"'"'"'"'"'"'"'"';
command -v '"'"'"'"'"'"'"'"'/usr/libexec/platform-python'"'"'"'"'"'"'"'"'; command -v
'"'"'"'"'"'"'"'"'/usr/bin/python3'"'"'"'"'"'"'"'"'; command -v
'"'"'"'"'"'"'"'"'python'"'"'"'"'"'"'"'"'; echo ENDFOUND && sleep 0'"'"''
<10.128.67.20> (0, b'PLATFORM\nLinux\nFOUND\n/usr/bin/python3\nENDFOUND\n', b'')
<10.128.67.20> ESTABLISH SSH CONNECTION FOR USER: None
<10.128.67.20> SSH: EXEC ssh -C -o ControlMaster=auto -o ControlPersist=60s -o
KbdInteractiveAuthentication=no -o PreferredAuthentications=gssapi-with-mic,gssapi-
keyex,hostbased,publickey -o PasswordAuthentication=no -o ConnectTimeout=10 -o
ControlPath=/home/stud/.ansible/cp/b650e54a14 10.128.67.20 '/bin/sh -c '"'"'/usr/bin/python3 && sleep
0'"'"''
<10.128.67.8> (0, b'PLATFORM\nLinux\nFOUND\n/usr/bin/python3\nENDFOUND\n', b'')
<10.128.67.8> ESTABLISH SSH CONNECTION FOR USER: None
<10.128.67.8> SSH: EXEC ssh -C -o ControlMaster=auto -o ControlPersist=60s -o
KbdInteractiveAuthentication=no -o PreferredAuthentications=gssapi-with-mic,gssapi-
keyex,hostbased,publickey -o PasswordAuthentication=no -o ConnectTimeout=10 -o
ControlPath=/home/stud/.ansible/cp/62369c22bf 10.128.67.8 '/bin/sh -c '"'"'/usr/bin/python3 && sleep
0'"'"''
<10.128.67.20> (0, b'{"platform_dist_result": [], "osrelease_content":
"NAME=\\"Ubuntu\\"\\nVERSION=\\"20.04.3 LTS (Focal
```

```
Fossa)\\"\\nID=ubuntu\\nID_LIKE=debian\\nPRETTY_NAME=\\"Ubuntu 20.04.3
LTS\\"\\nVERSION_ID=\\"20.04\\"\\nHOME_URL=\\"https://www.ubuntu.com/\\"\\nSUPPORT_URL=\\"https://help
.ubuntu.com/\\"\\nBUG_REPORT_URL=\\"https://bugs.launchpad.net/ubuntu/\\"\\nPRIVACY_POLICY_URL=\\"http
s://www.ubuntu.com/legal/terms-and-policies/privacy-
policy\\"\\nVERSION_CODENAME=focal\\nUBUNTU_CODENAME=focal\\n"}\n', b'')
Using module file /usr/lib/python3/dist-packages/ansible/modules/system/setup.py
<10.128.67.20> PUT /home/stud/.ansible/tmp/ansible-local-8956eid90gyx/tmpmvv1n7vm TO
/home/stud/.ansible/tmp/ansible-tmp-1638899019.7481883-242494816437750/AnsiballZ_setup.py
<10.128.67.20> SSH: EXEC sftp -b - -C -o ControlMaster=auto -o ControlPersist=60s -o
KbdInteractiveAuthentication=no -o PreferredAuthentications=gssapi-with-mic,gssapi-
keyex,hostbased,publickey -o PasswordAuthentication=no -o ConnectTimeout=10 -o
ControlPath=/home/stud/.ansible/cp/b650e54a14 '[10.128.67.20]'
<10.128.67.8> (0, b'{"platform_dist_result": [], "osrelease_content":
"NAME=\\"Ubuntu\\"\\nVERSION=\\"20.04.3 LTS (Focal
Fossa)\\"\\nID=ubuntu\\nID_LIKE=debian\\nPRETTY_NAME=\\"Ubuntu 20.04.3
LTS\\"\\nVERSION_ID=\\"20.04\\"\\nHOME_URL=\\"https://www.ubuntu.com/\\"\\nSUPPORT_URL=\\"https://help
.ubuntu.com/\\"\\nBUG_REPORT_URL=\\"https://bugs.launchpad.net/ubuntu/\\"\\nPRIVACY_POLICY_URL=\\"http
s://www.ubuntu.com/legal/terms-and-policies/privacy-
policy\\"\\nVERSION_CODENAME=focal\\nUBUNTU_CODENAME=focal\\n"}\n', b'')
Using module file /usr/lib/python3/dist-packages/ansible/modules/system/setup.py
<10.128.67.8> PUT /home/stud/.ansible/tmp/ansible-local-8956eid90gyx/tmp7h_h8icd TO
/home/stud/.ansible/tmp/ansible-tmp-1638899019.7293622-253348797528778/AnsiballZ_setup.py
<10.128.67.8> SSH: EXEC sftp -b - -C -o ControlMaster=auto -o ControlPersist=60s -o
KbdInteractiveAuthentication=no -o PreferredAuthentications=gssapi-with-mic,gssapi-
keyex,hostbased,publickey -o PasswordAuthentication=no -o ConnectTimeout=10 -o
ControlPath=/home/stud/.ansible/cp/62369c22bf '[10.128.67.8]'
<10.128.67.20> (0, b'sftp> put /home/stud/.ansible/tmp/ansible-local-8956eid90gyx/tmpmvv1n7vm
/home/stud/.ansible/tmp/ansible-tmp-1638899019.7481883-242494816437750/AnsiballZ_setup.py\n', b'')
<10.128.67.20> ESTABLISH SSH CONNECTION FOR USER: None
<10.128.67.20> SSH: EXEC ssh -C -o ControlMaster=auto -o ControlPersist=60s -o
KbdInteractiveAuthentication=no -o PreferredAuthentications=gssapi-with-mic,gssapi-
keyex,hostbased,publickey -o PasswordAuthentication=no -o ConnectTimeout=10 -o
ControlPath=/home/stud/.ansible/cp/b650e54a14 10.128.67.20 '/bin/sh -c '"'"'chmod u+x
/home/stud/.ansible/tmp/ansible-tmp-1638899019.7481883-242494816437750/
/home/stud/.ansible/tmp/ansible-tmp-1638899019.7481883-242494816437750/AnsiballZ_setup.py && sleep
0'"'"''
<10.128.67.8> (0, b'sftp> put /home/stud/.ansible/tmp/ansible-local-8956eid90gyx/tmp7h_h8icd
/home/stud/.ansible/tmp/ansible-tmp-1638899019.7293622-253348797528778/AnsiballZ_setup.py\n', b'')
<10.128.67.8> ESTABLISH SSH CONNECTION FOR USER: None
<10.128.67.20> (0, b'', b'')
<10.128.67.20> ESTABLISH SSH CONNECTION FOR USER: None
<10.128.67.20> SSH: EXEC ssh -C -o ControlMaster=auto -o ControlPersist=60s -o
KbdInteractiveAuthentication=no -o PreferredAuthentications=gssapi-with-mic,gssapi-
keyex,hostbased,publickey -o PasswordAuthentication=no -o ConnectTimeout=10 -o
ControlPath=/home/stud/.ansible/cp/b650e54a14 -tt 10.128.67.20 '/bin/sh -c '"'"'sudo -H -S -n  -u root
/bin/sh -c '"'"'"'"'"'"'"'"'"'"'"'"'echo BECOME-SUCCESS-uawkzdzxtwbuqhzyjbiocuqvsbhmallm ; /usr/bin/python3
/home/stud/.ansible/tmp/ansible-tmp-1638899019.7481883-
242494816437750/AnsiballZ_setup.py'"'"'"'"'"'"'"'"'"'"'"'"' && sleep 0'"'"''
<10.128.67.8> SSH: EXEC ssh -C -o ControlMaster=auto -o ControlPersist=60s -o
KbdInteractiveAuthentication=no -o PreferredAuthentications=gssapi-with-mic,gssapi-
keyex,hostbased,publickey -o PasswordAuthentication=no -o ConnectTimeout=10 -o
ControlPath=/home/stud/.ansible/cp/62369c22bf 10.128.67.8 '/bin/sh -c '"'"'chmod u+x
/home/stud/.ansible/tmp/ansible-tmp-1638899019.7293622-253348797528778/
/home/stud/.ansible/tmp/ansible-tmp-1638899019.7293622-253348797528778/AnsiballZ_setup.py && sleep
0'"'"''
<10.128.67.8> (0, b'', b'')
<10.128.67.8> ESTABLISH SSH CONNECTION FOR USER: None
<10.128.67.8> SSH: EXEC ssh -C -o ControlMaster=auto -o ControlPersist=60s -o
KbdInteractiveAuthentication=no -o PreferredAuthentications=gssapi-with-mic,gssapi-
keyex,hostbased,publickey -o PasswordAuthentication=no -o ConnectTimeout=10 -o
ControlPath=/home/stud/.ansible/cp/62369c22bf -tt 10.128.67.8 '/bin/sh -c '"'"'sudo -H -S -n  -u root
/bin/sh -c '"'"'"'"'"'"'"'"'"'"'"'"'echo BECOME-SUCCESS-xucyadvmmhrwwkflwsxapwvnhklmvrvo ; /usr/bin/python3
/home/stud/.ansible/tmp/ansible-tmp-1638899019.7293622-
253348797528778/AnsiballZ_setup.py'"'"'"'"'"'"'"'"'"'"'"'"' && sleep 0'"'"''
Escalation requires password
<10.128.67.20> ESTABLISH SSH CONNECTION FOR USER: None
<10.128.67.20> SSH: EXEC ssh -C -o ControlMaster=auto -o ControlPersist=60s -o
KbdInteractiveAuthentication=no -o PreferredAuthentications=gssapi-with-mic,gssapi-
keyex,hostbased,publickey -o PasswordAuthentication=no -o ConnectTimeout=10 -o
ControlPath=/home/stud/.ansible/cp/b650e54a14 10.128.67.20 '/bin/sh -c '"'"'rm -f -r
/home/stud/.ansible/tmp/ansible-tmp-1638899019.7481883-242494816437750/ > /dev/null 2>&1 && sleep
0'"'"''
<10.128.67.20> (0, b'', b'')
Escalation requires password
fatal: [serveris2]: FAILED! => {
```

```
    "msg": "Missing sudo password"
}
<10.128.67.8> ESTABLISH SSH CONNECTION FOR USER: None
<10.128.67.8> SSH: EXEC ssh -C -o ControlMaster=auto -o ControlPersist=60s -o
KbdInteractiveAuthentication=no -o PreferredAuthentications=gssapi-with-mic,gssapi-
keyex,hostbased,publickey -o PasswordAuthentication=no -o ConnectTimeout=10 -o
ControlPath=/home/stud/.ansible/cp/62369c22bf 10.128.67.8 '/bin/sh -c '"'"'rm -f -r
/home/stud/.ansible/tmp/ansible-tmp-1638899019.7293622-253348797528778/ > /dev/null 2>&1 && sleep
0'"'"''
<10.128.67.8> (0, b'', b'')
fatal: [serveris1]: FAILED! => {
    "msg": "Missing sudo password"
}

PLAY RECAP
*********************************************************************************************************
**********************************************************
serveris1                  : ok=0    changed=0    unreachable=0    failed=1    skipped=0    rescued=0
ignored=0
serveris2                  : ok=0    changed=0    unreachable=0    failed=1    skipped=0    rescued=0
ignored=0

stud@cc-lab:~/src$
```

- ⇒ Duomenų gavau išties daug.
- ⇒ Į serverį SFTP įrankiu kopijuojamas ir per SSH vykdomas failas `AnsiballZ_setup.py`, kurį jau identifikavau anksčiau.
- ⇒ Iš to vis tiek neaišku, ką tiksliai tas *Python* skriptas veikia ir ar viduje panaudoja `sudo`.
- ⇒ Tik ataskaitos kūrimo metu pastebėjau, kad `sudo` naudojama *Ansible* viduje taip:

```
sudo \
    -H \
    -S \
    -n \
    -u root \
    /bin/sh \
           -c ' \
               echo BECOME-SUCCESS-xucyadvmmhrwwkflwsxapwvnhklmvrvo ; \
               /usr/bin/python3 \
                   /home/stud/.ansible/tmp/ansible-tmp-1638899019.7293622-
253348797528778/AnsiballZ_setup.py \
           '
&& sleep 0
```

- ⇒ Dabar akivaizdu, kad *Ansible* pagal nutylėjimą tikrai bando persijungt į `root` vartotoją: `-u root`.

Gavau dėstytojo patarimą greta `become:` instrukcijos panaudoti `become_user:` ir nurodyti jai reikšmę `stud`.

Papildau antrąjį, veikiantį grojaraštį komentaru su jo kilmės nuoroda bei šia instrukcija:

```
stud@cc-lab:~/src$ fg



---
# 2021-12-07 saukrs: paėmiau iš https://techexpert.tips/ansible/ansible-playbook-examples-ubuntu-
linux/ ,
  ...
  become: yes
  become_user: stud
  ...
```

Ir jį patikrinu:

```
[1]+  Stopped                 vim saukrs-2.yml
stud@cc-lab:~/src$ ansible-playbook saukrs-2.yml

PLAY [all]
*************************************************************************************************************
************************************************************

TASK [Gathering Facts]
*************************************************************************************************************
*********************************************
ok: [serveris1]
ok: [serveris2]

TASK [Install packages]
*************************************************************************************************************
*********************************************
ok: [serveris2]
ok: [serveris1]

PLAY RECAP
*************************************************************************************************************
************************************************************
serveris1                  : ok=2    changed=0    unreachable=0    failed=0    skipped=0    rescued=0
ignored=0
serveris2                  : ok=2    changed=0    unreachable=0    failed=0    skipped=0    rescued=0
ignored=0

stud@cc-lab:~/src$
```

- ⇒ `BECOME password:` nebeprašomas, iš vienos pusės džiugu.
- ⇒ Iš kitos pusės *Ansible* dabar nebedarė jokių pakeitimų.
  Jei paketai serveriuose dar būtų neįdiegti ar neatnaujinti, `sudo` slaptažodžio turbūt vis tiek prireiktų.
- ⇒ Kaip elgtųsi *Ansible* pastaruoju atveju (ar paprašytų slaptažodžio ne iškart, vėliau, ar tiesiog sustotų ir pateiktų klaidą), lieka man neaišku ir neištestuota.

Laboratorinio darbo pabaiga

- Susipažinta su *Ansible* sistema iš naudotojo pusės.
- Sukurtas inventoriaus failas.
- Patikrintas nuotolinis komandų vykdymas.
- Patikrintas grojaraščio vykdymas
- Susipažinta truputį ir su *Ansible* vidiniu mechanizmu (angl. *Under the hood*).

  Toks pažinimo būdas klasikinėje elektronikos inžinieriaus mąstysenoje (angl. *From the bottom up*, nuo įrangos iki abstraktesnių lygmenų) yra tiesiausias link užtikrinto sistemos supratimo (bent jau mano atveju).
- Laboratorinis darbas man suteikė praktiškai naudingų įgūdžių (užtikrintumą).

Nuorodos

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