

# Лабораторная работа №1

Подготовка лабораторного стенда

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## Вводная часть

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Целью данной работы является приобретение практических навыков установки Rocky Linux на виртуальную машину с помощью инструмента Vagrant.

1. Сформируйте box-файл с дистрибутивом Rocky Linux для VirtualBox.
2. Запустите виртуальные машины сервера и клиента и убедитесь в их работоспособности.
3. Внесите изменения в настройки загрузки образов виртуальных машин server и client, добавив пользователя с правами администратора и изменив названия хостов.
4. Скопируйте необходимые для работы с Vagrant файлы и box-файлы виртуальных машин на внешний носитель. Используя эти файлы, вы можете попробовать развернуть виртуальные машины на другом компьютере.

## Выполнение лабораторной работы

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```
mkdir -p /var/tmp/user_name/packer
```

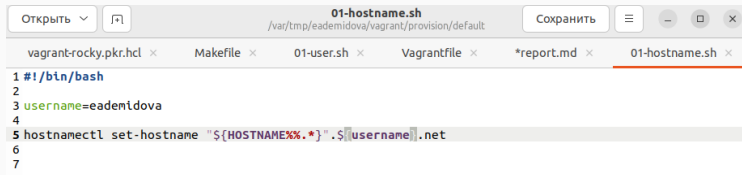
```
mkdir -p /var/tmp/user_name/vagran
```

Файлы: vagrant-rocky.pkr.hc, ks.cfg, Vagrantfile, Makefile.

В каталогах default, server и client разместим скриптзаглушку 01-dummy.sh

```
#!/bin/bash  
echo "Provisioning script $0"
```

В каталоге default разместим заранее подготовленный скрипт 01-user.sh по изменению названия виртуальной машины:



```
01-hostname.sh
/var/tmp/eademidova/vagrant/provision/default
Сохранить
vagrant-rocky.pkr.hcl x Makefile x 01-user.sh x Vagrantfile x *report.md x 01-hostname.sh x
1 #!/bin/bash
2
3 username=eademidova
4
5 hostnamectl set-hostname "${HOSTNAME%.*}.${username}.net"
6
7
```

Рис. 1: Скрипт 01-user.sh



# Конфигурационные файлы

В каталоге default разместим заранее подготовленный скрипт 01-hostname.sh по изменению названия виртуальной машины:

```
1 #!/bin/bash
2
3 echo "Provisioning script $0"
4
5 username=eademidova
6 userpassword=123456
7
8 encpassword=`openssl passwd -1 ${userpassword}`
9
10 id -u $username
11 if [[ $? ]]
12 then
13     adduser -G wheel -p ${encpassword} ${username}
14     homedir=`getent passwd ${username} | cut -d: -f6`
15     echo "export PS1='[\u@\H \W]\\$ ' " >> ${homedir}/.bashrc
16 fi
17
```

Рис. 2: Скрипт 01-hostname.sh

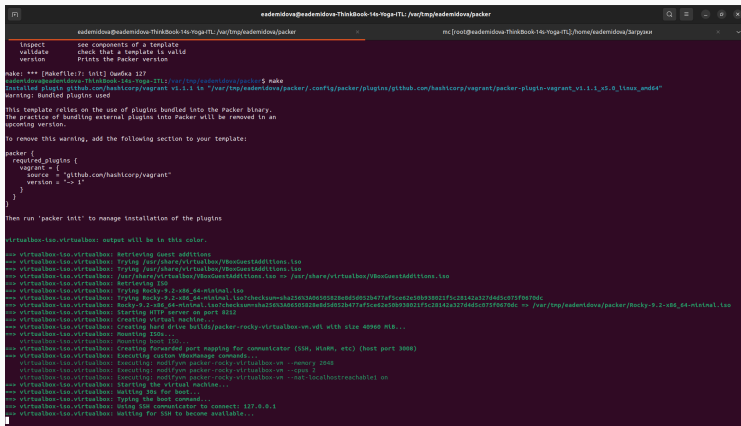
Перейдем в каталог с проектом:

```
cd /var/tmp/user_name/packer
```

В терминале наберем

```
make help
```

# Развёртывание лабораторного стенда на ОС Linux



```
eademidova@eademidova-ThinkBook-14s-Yoga-ITL: /var/tmp/eademidova/packer$
eademidova@eademidova-ThinkBook-14s-Yoga-ITL: /var/tmp/eademidova/packer$
eademidova@eademidova-ThinkBook-14s-Yoga-ITL: /var/tmp/eademidova/packer$ make
make: *** [Makefile:7: lint] Ошибка 127
eademidova@eademidova-ThinkBook-14s-Yoga-ITL: /var/tmp/eademidova/packer$ make
Installed plugin github.com/hashicorp/vagrant v1.1.1 in "/var/tmp/eademidova/packer/.config/packer/plugins/github.com/hashicorp/vagrant/packer-plugin-vagrant_v1.1.1_x86_64_linux_amd64"
Warning: Bundled plugins used

This template relies on the use of plugins bundled into the Packer binary.
The practice of bundling external plugins into Packer will be removed in an
upcoming version.

To remove this warning, add the following section to your template:

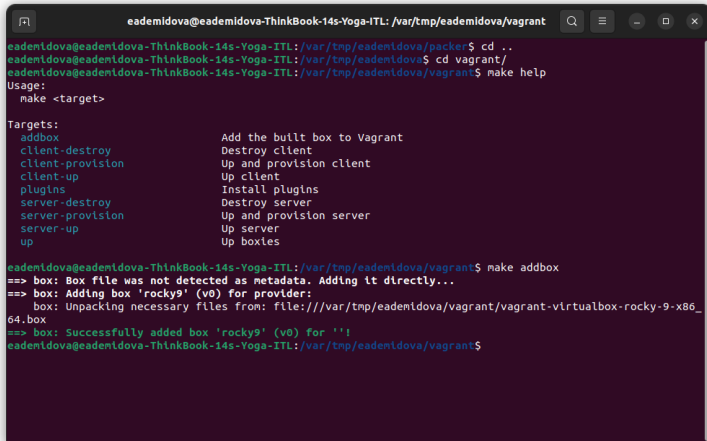
packer {
  required_plugins {
    vagrant = {
      source = "github.com/hashicorp/vagrant"
      version = "~> 1"
    }
  }
}

Then run 'packer init' to manage installation of the plugins

virtualbox-iso.virtualbox: output will be in this color.
== virtualbox-iso.virtualbox: Retrieving Guest additions
== virtualbox-iso.virtualbox: Trying /usr/share/virtualbox/VBoxGuestAdditions.iso
== virtualbox-iso.virtualbox: Trying /usr/share/virtualbox/VBoxGuestAdditions.iso
== virtualbox-iso.virtualbox: /usr/share/virtualbox/VBoxGuestAdditions.iso => /usr/share/virtualbox/VBoxGuestAdditions.iso
== virtualbox-iso.virtualbox: Retrieving ISO
== virtualbox-iso.virtualbox: Trying Rocky-9.2-x86_64-minimal.iso
== virtualbox-iso.virtualbox: Trying Rocky-9.2-x86_64-minimal.iso?checksum=sha256:3a6e50582e6d5051b477f5e62c50b38021f5c28142a327d4d5c075f6676d4
== virtualbox-iso.virtualbox: Rocky-9.2-x86_64-minimal.iso?checksum=sha256:3a6e50582e6d5051b477f5e62c50b38021f5c28142a327d4d5c075f6676d4 => /var/tmp/eademidova/packer/Rocky-9.2-x86_64-minimal.iso
== virtualbox-iso.virtualbox: Starting HTTP server on port 8212
== virtualbox-iso.virtualbox: Creating virtual machine...
== virtualbox-iso.virtualbox: Creating hard drive build/packer-rocky-virtualbox-vm.vdi with size 40960 MB...
== virtualbox-iso.virtualbox: Mounting ISOs...
== virtualbox-iso.virtualbox: Mounting host ISO...
== virtualbox-iso.virtualbox: Creating forwarded port mapping for communicator (SSH, WinRM, etc) (host port 3008)
== virtualbox-iso.virtualbox: Executing custom VBoxManage commands...
== virtualbox-iso.virtualbox: Executing: modifyvm packer-rocky-virtualbox-vm --memory 2048
== virtualbox-iso.virtualbox: Executing: modifyvm packer-rocky-virtualbox-vm --cpus 1
== virtualbox-iso.virtualbox: Executing: modifyvm packer-rocky-virtualbox-vm --nat-localhostreachable on
== virtualbox-iso.virtualbox: Starting the virtual machine...
== virtualbox-iso.virtualbox: Waiting 30s for boot...
== virtualbox-iso.virtualbox: Typing the host command...
== virtualbox-iso.virtualbox: Using SSH communicator to connect: 127.0.0.1
== virtualbox-iso.virtualbox: Waiting for SSH to become available...
```

Рис. 3: Формирование box-файла

# Развёртывание лабораторного стенда на ОС Linux

A terminal window with a dark purple background and white text. The window title is "eademidova@eademidova-ThinkBook-14s-Yoga-ITL: /var/tmp/eademidova/vagrant". The terminal shows a sequence of commands and their outputs. First, the user navigates from a "packer" directory to a "vagrant" directory. Then, they run "make help", which lists various targets like "addbox", "client-destroy", "client-provision", etc. Finally, they run "make addbox", which triggers a series of messages from the "box" provider, including "Box file was not detected as metadata. Adding it directly...", "Adding box 'rocky9' (v0) for provider:", and "Unpacking necessary files from: file:///var/tmp/eademidova/vagrant/vagrant-virtualbox-rocky-9-x86\_64.box". The process concludes with "Successfully added box 'rocky9' (v0) for ''!".

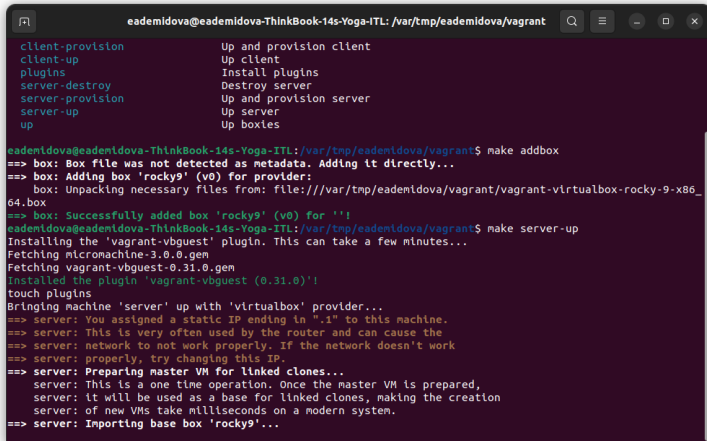
```
eademidova@eademidova-ThinkBook-14s-Yoga-ITL: /var/tmp/eademidova/packer$ cd ..
eademidova@eademidova-ThinkBook-14s-Yoga-ITL: /var/tmp/eademidova$ cd vagrant/
eademidova@eademidova-ThinkBook-14s-Yoga-ITL: /var/tmp/eademidova/vagrant$ make help
Usage:
  make <target>

Targets:
  addbox                Add the built box to Vagrant
  client-destroy        Destroy client
  client-provision      Up and provision client
  client-up            Up client
  plugins              Install plugins
  server-destroy        Destroy server
  server-provision      Up and provision server
  server-up            Up server
  up                   Up boxies

eademidova@eademidova-ThinkBook-14s-Yoga-ITL: /var/tmp/eademidova/vagrant$ make addbox
==> box: Box file was not detected as metadata. Adding it directly...
==> box: Adding box 'rocky9' (v0) for provider:
      box: Unpacking necessary files from: file:///var/tmp/eademidova/vagrant/vagrant-virtualbox-rocky-9-x86_
64.box
==> box: Successfully added box 'rocky9' (v0) for ''!
eademidova@eademidova-ThinkBook-14s-Yoga-ITL: /var/tmp/eademidova/vagrant$
```

Рис. 4: Регистрация образа

# Развёртывание лабораторного стенда на ОС Linux

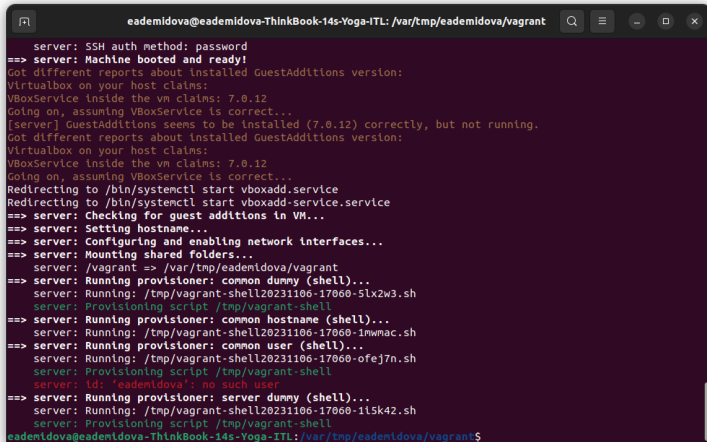


```
eademidova@eademidova-ThinkBook-14s-Yoga-ITL: /var/tmp/eademidova/vagrant
client-provision      Up and provision client
client-up             Up client
plugins              Install plugins
server-destroy        Destroy server
server-provision      Up and provision server
server-up             Up server
up                   Up boxes

eademidova@eademidova-ThinkBook-14s-Yoga-ITL:/var/tmp/eademidova/vagrant$ make addbox
==> box: Box file was not detected as metadata. Adding it directly...
==> box: Adding box 'rocky9' (v0) for provider:
    box: Unpacking necessary files from: file:///var/tmp/eademidova/vagrant/vagrant-virtualbox-rocky-9-x86_
64.box
==> box: Successfully added box 'rocky9' (v0) for ''!
eademidova@eademidova-ThinkBook-14s-Yoga-ITL:/var/tmp/eademidova/vagrant$ make server-up
Installing the 'vagrant-vbguest' plugin. This can take a few minutes...
Fetching micromachine-3.0.0.gem
Fetching vagrant-vbguest-0.31.0.gem
Installed the plugin 'vagrant-vbguest (0.31.0)'!
touch plugins
Bringing machine 'server' up with 'virtualbox' provider...
==> server: You assigned a static IP ending in ".1" to this machine.
==> server: This is very often used by the router and can cause the
==> server: network to not work properly. If the network doesn't work
==> server: properly, try changing this IP.
==> server: Preparing master VM for linked clones...
server: This is a one time operation. Once the master VM is prepared,
server: it will be used as a base for linked clones, making the creation
server: of new VMs take milliseconds on a modern system.
==> server: Importing base box 'rocky9'...
```

Рис. 5: Команда make server-up

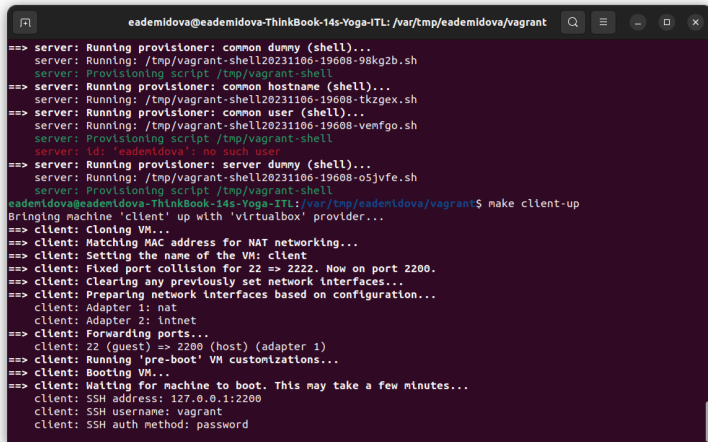
# Развёртывание лабораторного стенда на ОС Linux



```
eademidova@eademidova-ThinkBook-14s-Yoga-ITL: /var/tmp/eademidova/vagrant
server: SSH auth method: password
==> server: Machine booted and ready!
Got different reports about installed GuestAdditions version:
Virtualbox on your host claims:
VBoxService inside the vm claims: 7.0.12
Going on, assuming VBoxService is correct...
[server] GuestAdditions seems to be installed (7.0.12) correctly, but not running.
Got different reports about installed GuestAdditions version:
Virtualbox on your host claims:
VBoxService inside the vm claims: 7.0.12
Going on, assuming VBoxService is correct...
Redirecting to /bin/systemctl start vboxadd.service
Redirecting to /bin/systemctl start vboxadd-service.service
==> server: Checking for guest additions in VM...
==> server: Setting hostname...
==> server: Configuring and enabling network interfaces...
==> server: Mounting shared folders...
server: /vagrant => /var/tmp/eademidova/vagrant
==> server: Running provisioner: common dummy (shell)...
server: Running: /tmp/vagrant-shell20231106-17060-5lx2w3.sh
server: Provisioning script /tmp/vagrant-shell
==> server: Running provisioner: common hostname (shell)...
server: Running: /tmp/vagrant-shell20231106-17060-1mwmac.sh
==> server: Running provisioner: common user (shell)...
server: Running: /tmp/vagrant-shell20231106-17060-ofej7n.sh
server: Provisioning script /tmp/vagrant-shell
server: id: 'eademidova': no such user
==> server: Running provisioner: server dummy (shell)...
server: Running: /tmp/vagrant-shell20231106-17060-1l5k42.sh
server: Provisioning script /tmp/vagrant-shell
eademidova@eademidova-ThinkBook-14s-Yoga-ITL: /var/tmp/eademidova/vagrant$
```

Рис. 6: Успешный запуск виртуальной машины Server

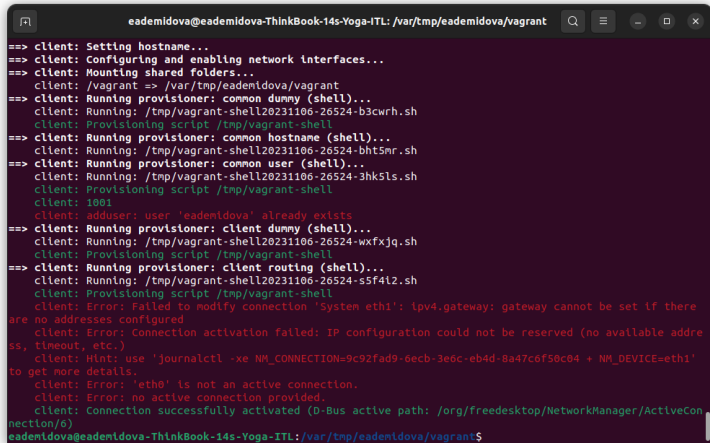
# Развёртывание лабораторного стенда на ОС Linux

A terminal window with a dark purple background and white text. The window title is 'eademidova@eademidova-ThinkBook-14s-Yoga-ITL: /var/tmp/eademidova/vagrant'. The terminal shows the output of a 'make client-up' command, which triggers a series of provisioning steps for a VM named 'client'. The steps include running dummy scripts, provisioning a shell, setting a hostname, creating a user, and configuring network interfaces. The process concludes with the VM being booted and SSH access details provided.

```
eademidova@eademidova-ThinkBook-14s-Yoga-ITL: /var/tmp/eademidova/vagrant
==> server: Running provisioner: common dummy (shell)...
server: Running: /tmp/vagrant-shell20231106-19608-98kg2b.sh
server: Provisioning script /tmp/vagrant-shell
==> server: Running provisioner: common hostname (shell)...
server: Running: /tmp/vagrant-shell20231106-19608-tkzgex.sh
==> server: Running provisioner: common user (shell)...
server: Running: /tmp/vagrant-shell20231106-19608-vemfgo.sh
server: Provisioning script /tmp/vagrant-shell
server: id: 'eademidova': no such user
==> server: Running provisioner: server dummy (shell)...
server: Running: /tmp/vagrant-shell20231106-19608-o5jvfe.sh
server: Provisioning script /tmp/vagrant-shell
eademidova@eademidova-ThinkBook-14s-Yoga-ITL:/var/tmp/eademidova/vagrant$ make client-up
Bringing machine 'client' up with 'virtualbox' provider...
==> client: Cloning VM...
==> client: Matching MAC address for NAT networking...
==> client: Setting the name of the VM: client
==> client: Fixed port collision for 22 => 2222. Now on port 2200.
==> client: Clearing any previously set network interfaces...
==> client: Preparing network interfaces based on configuration...
client: Adapter 1: nat
client: Adapter 2: intnet
==> client: Forwarding ports...
client: 22 (guest) => 2200 (host) (adapter 1)
==> client: Running 'pre-boot' VM customizations...
==> client: Booting VM...
==> client: Waiting for machine to boot. This may take a few minutes...
client: SSH address: 127.0.0.1:2200
client: SSH username: vagrant
client: SSH auth method: password
```

Рис. 7: Команда `make client-up`

# Развёртывание лабораторного стенда на ОС Linux

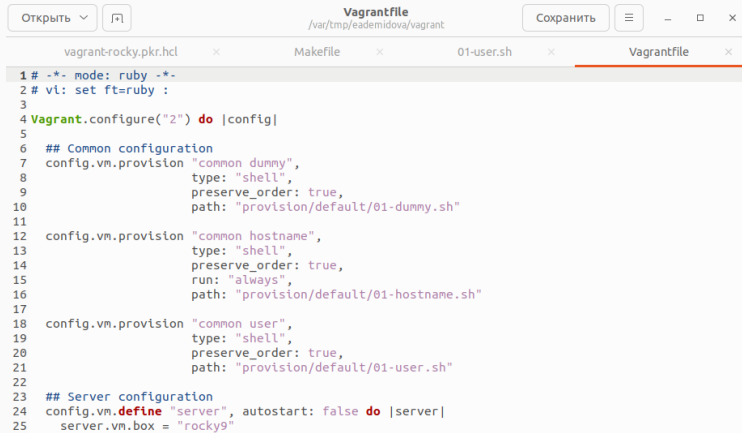


```
eademidova@eademidova-ThinkBook-14s-Yoga-ITL: /var/tmp/eademidova/vagrant
==> client: Setting hostname...
==> client: Configuring and enabling network interfaces...
==> client: Mounting shared folders...
client: /vagrant => /var/tmp/eademidova/vagrant
==> client: Running provisioner: common dummy (shell)...
client: Running: /tmp/vagrant-shell20231106-26524-b3cwrh.sh
client: Provisioning script /tmp/vagrant-shell
==> client: Running provisioner: common hostname (shell)...
client: Running: /tmp/vagrant-shell20231106-26524-bht5mr.sh
==> client: Running provisioner: common user (shell)...
client: Running: /tmp/vagrant-shell20231106-26524-3hk5ls.sh
client: Provisioning script /tmp/vagrant-shell
client: 1001
client: adduser: user 'eademidova' already exists
==> client: Running provisioner: client dummy (shell)...
client: Running: /tmp/vagrant-shell20231106-26524-wxfxjq.sh
client: Provisioning script /tmp/vagrant-shell
==> client: Running provisioner: client routing (shell)...
client: Running: /tmp/vagrant-shell20231106-26524-s5f4i2.sh
client: Provisioning script /tmp/vagrant-shell
client: Error: Failed to modify connection 'System eth1': ipv4.gateway: gateway cannot be set if there
are no addresses configured
client: Error: Connection activation failed: IP configuration could not be reserved (no available addre
ss, timeout, etc.)
client: Hint: use 'journalctl -xe NM_CONNECTION=9c92fad9-6ecb-3e6c-eb4d-8a47c6f50c04 + NM_DEVICE=eth1'
to get more details.
client: Error: 'eth0' is not an active connection.
client: Error: no active connection provided.
client: Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveCon
nection/6)
eademidova@eademidova-ThinkBook-14s-Yoga-ITL: /var/tmp/eademidova/vagrant$
```

Рис. 8: Успешный запуск виртуальной машины Client



# Внесение изменений в настройки внутреннего окружения виртуальной машины

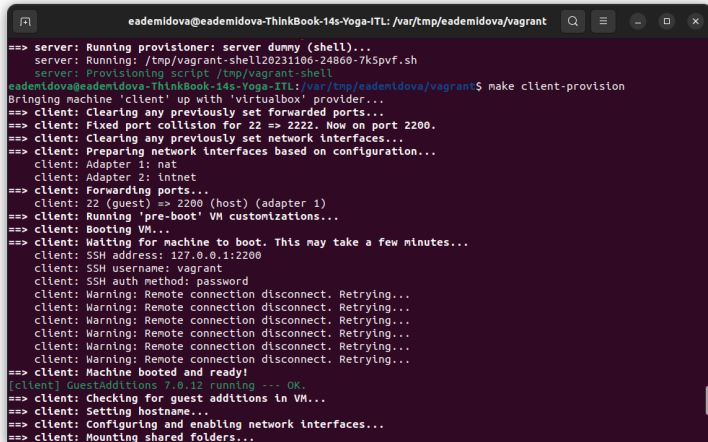


The image shows a code editor window titled "Vagrantfile" with the path "/var/tmp/eademidova/vagrant". The editor has tabs for "vagrant-rocky.pkr.hcl", "Makefile", "01-user.sh", and "Vagrantfile". The "Vagrantfile" tab is active, displaying the following code:

```
1 # -*- mode: ruby -*-
2 # vi: set ft=ruby :
3
4 Vagrant.configure("2") do |config|
5
6   ## Common configuration
7   config.vm.provision "common dummy",
8                       type: "shell",
9                       preserve_order: true,
10                      path: "provision/default/01-dummy.sh"
11
12   config.vm.provision "common hostname",
13                       type: "shell",
14                       preserve_order: true,
15                       run: "always",
16                       path: "provision/default/01-hostname.sh"
17
18   config.vm.provision "common user",
19                       type: "shell",
20                       preserve_order: true,
21                       path: "provision/default/01-user.sh"
22
23   ## Server configuration
24   config.vm.define "server", autostart: false do |server|
25     server.vm.box = "rocky9"
```

Рис. 9: Проверка конфигурационного файла Vagrant

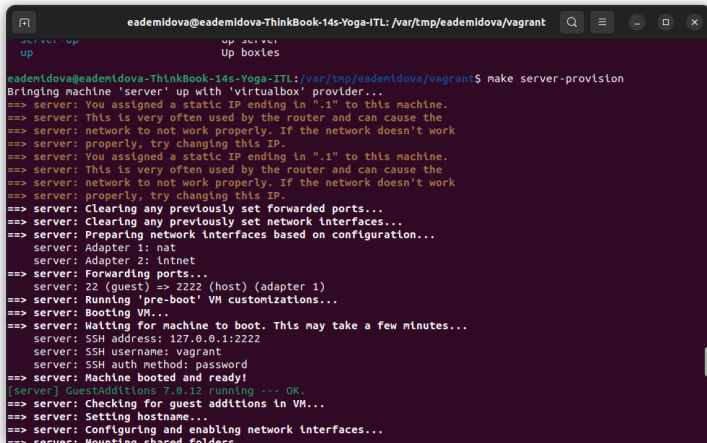
# Внесение изменений в настройки внутреннего окружения виртуальной машины

A terminal window titled 'eademidova@eademidova-ThinkBook-14s-Yoga-ITL: /var/tmp/eademidova/vagrant'. The terminal output shows the process of provisioning a client machine. It starts with running a dummy server, then the user enters 'make client-provision'. The system brings up a 'client' machine using the 'virtualbox' provider. It clears previous port and network settings, prepares new ones (Adapter 1: nat, Adapter 2: intnet), and forwards port 22 from guest to host. It then runs 'pre-boot' customizations, boots the VM, and waits for it to be ready. The SSH address is 127.0.0.1:2200, username is 'vagrant', and the auth method is 'password'. There are several warnings about remote connection disconnects and retries. Finally, it checks for guest additions, sets the hostname, configures network interfaces, and mounts shared folders.

```
eademidova@eademidova-ThinkBook-14s-Yoga-ITL: /var/tmp/eademidova/vagrant
==> server: Running provisioner: server dummy (shell)...
server: Running: /tmp/vagrant-shell20231106-24860-7k5pvf.sh
server: Provisioning script /tmp/vagrant-shell
eademidova@eademidova-ThinkBook-14s-Yoga-ITL:/var/tmp/eademidova/vagrant$ make client-provision
Bringing machine 'client' up with 'virtualbox' provider...
==> client: Clearing any previously set forwarded ports...
==> client: Fixed port collision for 22 => 2222. Now on port 2200.
==> client: Clearing any previously set network interfaces...
==> client: Preparing network interfaces based on configuration...
client: Adapter 1: nat
client: Adapter 2: intnet
==> client: Forwarding ports...
client: 22 (guest) => 2200 (host) (adapter 1)
==> client: Running 'pre-boot' VM customizations...
==> client: Booting VM...
==> client: Waiting for machine to boot. This may take a few minutes...
client: SSH address: 127.0.0.1:2200
client: SSH username: vagrant
client: SSH auth method: password
client: Warning: Remote connection disconnect. Retrying...
client: Warning: Remote connection disconnect. Retrying...
client: Warning: Remote connection disconnect. Retrying...
client: Warning: Remote connection disconnect. Retrying...
client: Warning: Remote connection disconnect. Retrying...
client: Warning: Remote connection disconnect. Retrying...
==> client: Machine booted and ready!
[client] GuestAdditions 7.0.12 running --- OK.
==> client: Checking for guest additions in VM...
==> client: Setting hostname...
==> client: Configuring and enabling network interfaces...
==> client: Mounting shared folders...
```

Рис. 10: Команда make server-provision

# Внесение изменений в настройки внутреннего окружения виртуальной машины

A terminal window with a dark purple background and white text. The title bar shows the user 'eademidova' and the path '/var/tmp/eademidova/vagrant'. The terminal output shows the execution of 'make server-provision', which triggers a series of messages from the 'server' and 'server:network' components. These messages include warnings about static IP addresses, clearing of forwarded ports and network interfaces, preparation of network interfaces (nat and intnet), forwarding of ports (22 to 2222), running of pre-boot VM customizations, booting of the VM, and waiting for the machine to boot. Once booted, the terminal shows the SSH address (127.0.0.1:2222), username (vagrant), and auth method (password). The final status is 'Machine booted and ready!', followed by a green message '[server] GuestAdditions 7.0.12 running --- OK.' and further steps like checking for guest additions, setting the hostname, and configuring network interfaces.

```
server up  
up  
Up server  
Up boxes  
  
eademidova@eademidova-ThinkBook-14s-Yoga-ITL: /var/tmp/eademidova/vagrant$ make server-provision  
Bringing machine 'server' up with 'virtualbox' provider...  
==> server: You assigned a static IP ending in ".1" to this machine.  
==> server: This is very often used by the router and can cause the  
==> server: network to not work properly. If the network doesn't work  
==> server: properly, try changing this IP.  
==> server: You assigned a static IP ending in ".1" to this machine.  
==> server: This is very often used by the router and can cause the  
==> server: network to not work properly. If the network doesn't work  
==> server: properly, try changing this IP.  
==> server: Clearing any previously set forwarded ports...  
==> server: Clearing any previously set network interfaces...  
==> server: Preparing network interfaces based on configuration...  
server: Adapter 1: nat  
server: Adapter 2: intnet  
==> server: Forwarding ports...  
server: 22 (guest) => 2222 (host) (adapter 1)  
==> server: Running 'pre-boot' VM customizations...  
==> server: Booting VM...  
==> server: Waiting for machine to boot. This may take a few minutes...  
server: SSH address: 127.0.0.1:2222  
server: SSH username: vagrant  
server: SSH auth method: password  
==> server: Machine booted and ready!  
[server] GuestAdditions 7.0.12 running --- OK.  
==> server: Checking for guest additions in VM...  
==> server: Setting hostname...  
==> server: Configuring and enabling network interfaces...  
==> server: Mounting shared folders
```

Рис. 11: Команда `make client-provision`

# Внесение изменений в настройки внутреннего окружения виртуальной машины

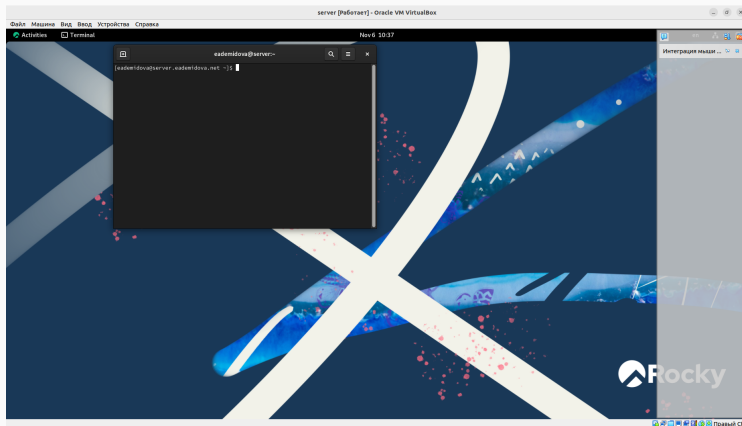


Рис. 12: Проверка работы сервера

# Внесение изменений в настройки внутреннего окружения виртуальной машины

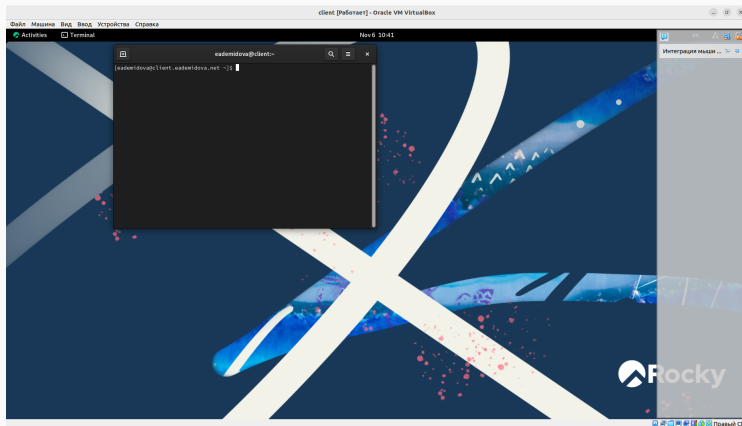


Рис. 13: Проверка работы клиента

## Заключение

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В результате выполнения данной работы были приобретены практические навыки установки Rocky Linux на виртуальную машину с помощью инструмента Vagrant.