

EPAM University Programs

DevOps external course

Module 2 Virtualization and Cloud Basic

TASK 2.2

PART 1. WORKING WITH VIRTUALBOX

1. The first launch of VirtualBox and Virtual Machine (VM).

1.1 Review the structure of the VirtualBox User Guide [1]

Oracle® VM VirtualBox®

User Manual

Oracle Corporation

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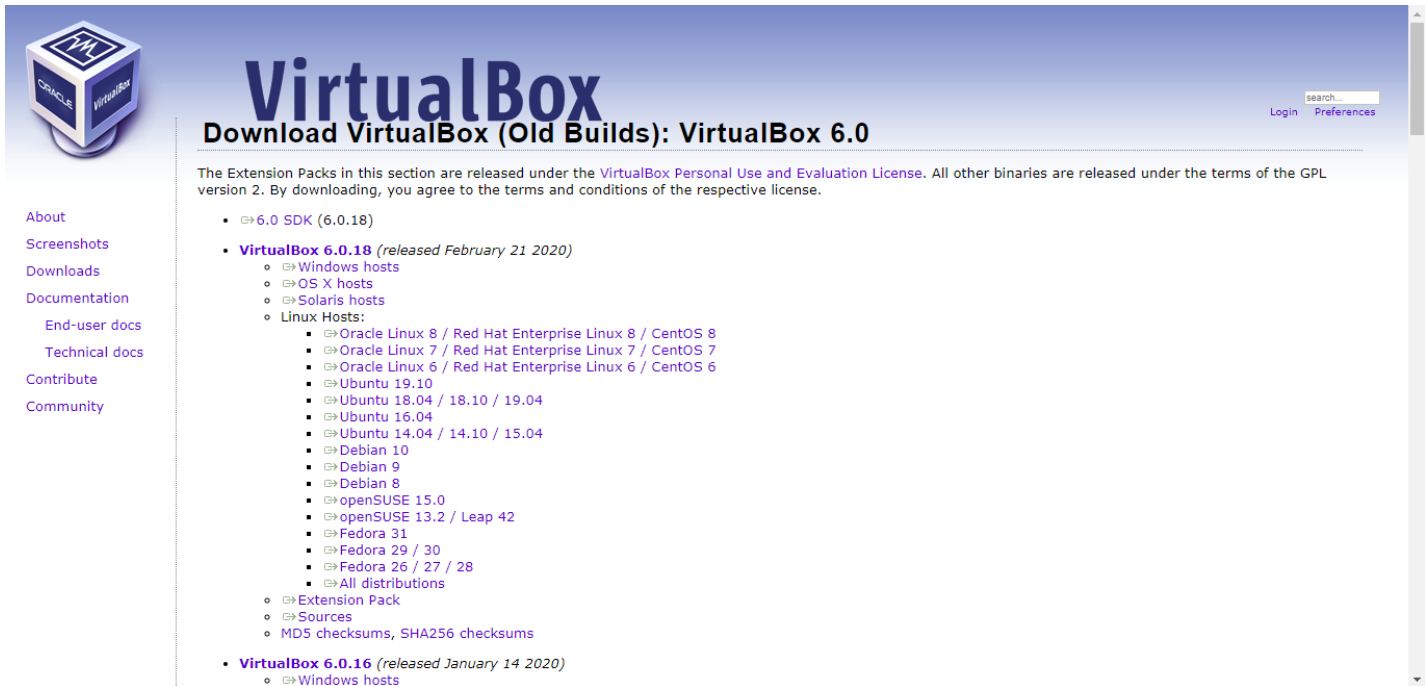
[1.10.1. Taking, Restoring, and Deleting Snapshots](#)

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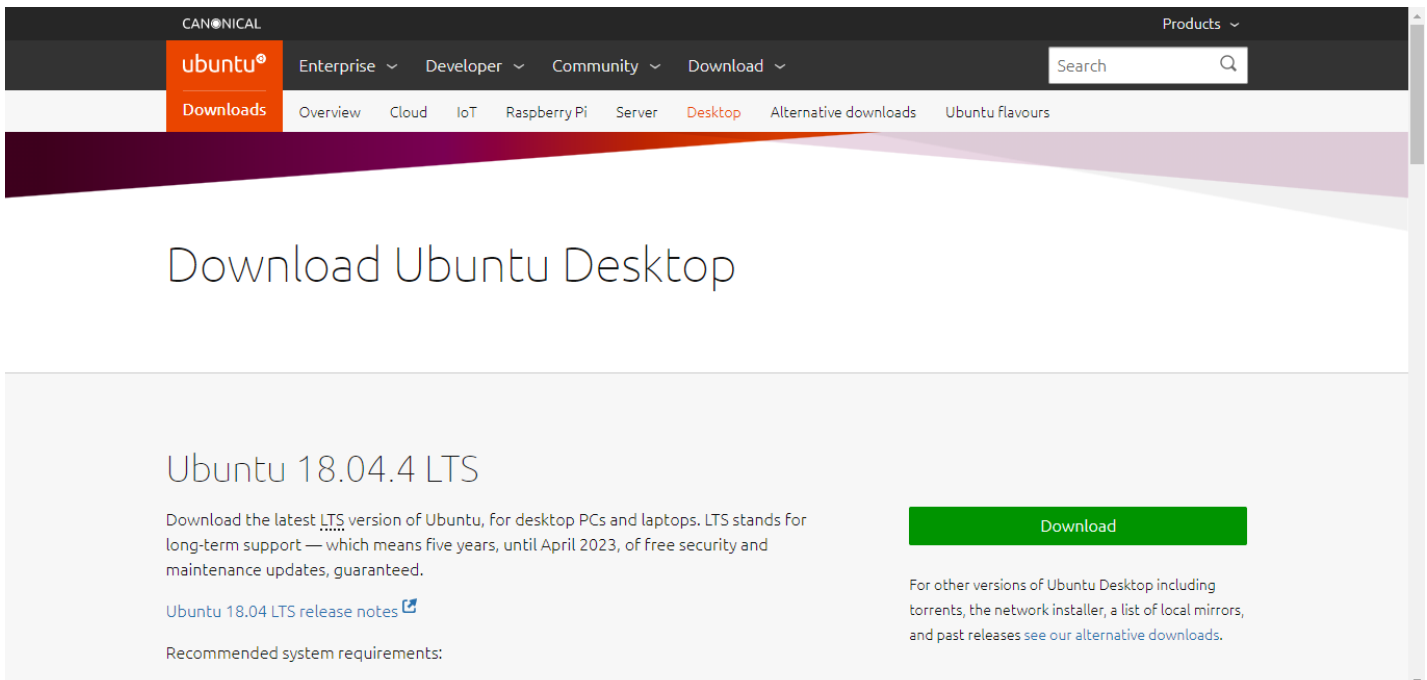
1.2 Download the latest stable version of VirtualBox from the official VirtualBox site [2] according to the host operating system (OS) installed on the student workplace. For Windows, the file may be named, for example, VirtualBox-6.0.12-133076-Win.exe. Perform a VirtualBox installation.



The screenshot shows the VirtualBox website with the title "Download VirtualBox (Old Builds): VirtualBox 6.0". The page includes a sidebar with links like "About", "Screenshots", "Downloads", "Documentation", "End-user docs", "Technical docs", "Contribute", and "Community". The main content area lists the following download options:

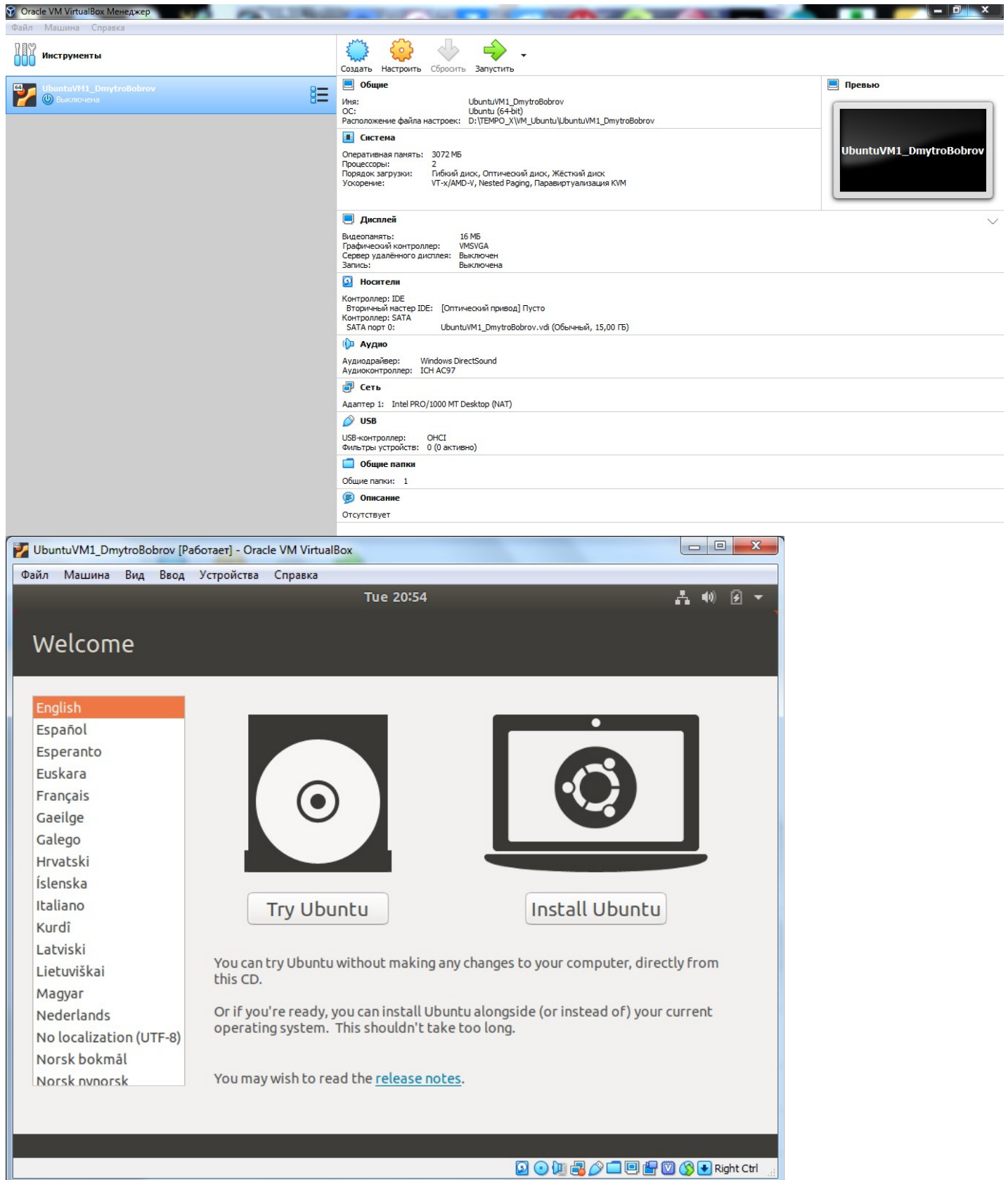
- 6.0 SDK (6.0.18)
- VirtualBox 6.0.18** (released February 21 2020)
 - Windows hosts
 - OS X hosts
 - Solaris hosts
 - Linux Hosts:
 - Oracle Linux 8 / Red Hat Enterprise Linux 8 / CentOS 8
 - Oracle Linux 7 / Red Hat Enterprise Linux 7 / CentOS 7
 - Oracle Linux 6 / Red Hat Enterprise Linux 6 / CentOS 6
 - Ubuntu 19.10
 - Ubuntu 18.04 / 18.10 / 19.04
 - Ubuntu 16.04
 - Ubuntu 14.04 / 14.10 / 15.04
 - Debian 10
 - Debian 9
 - Debian 8
 - openSUSE 15.0
 - openSUSE 13.2 / Leap 42
 - Fedora 31
 - Fedora 29 / 30
 - Fedora 26 / 27 / 28
 - All distributions
 - Extension Pack
 - Sources
 - MD5 checksums, SHA256 checksums
- VirtualBox 6.0.16** (released January 14 2020)
 - Windows hosts

1.2 Download the latest stable version of Ubuntu Desktop or Ubuntu Server image from the official site [3].



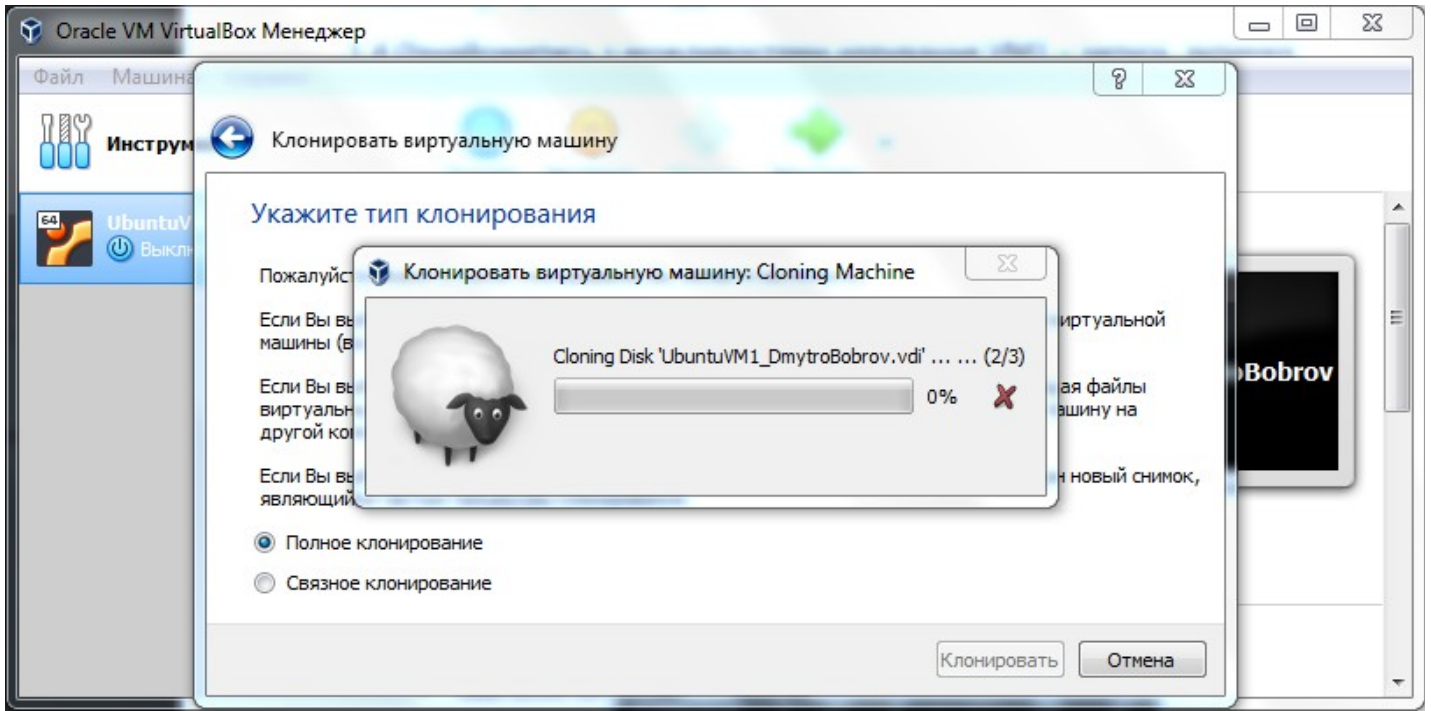
The screenshot shows the Ubuntu website with the title "Download Ubuntu Desktop". The page includes a navigation bar with links like "Enterprise", "Developer", "Community", "Download", and "Search". The main content area features the heading "Download Ubuntu Desktop" and the version "Ubuntu 18.04.4 LTS". Below this, it states: "Download the latest LTS version of Ubuntu, for desktop PCs and laptops. LTS stands for long-term support — which means five years, until April 2023, of free security and maintenance updates, guaranteed." A green "Download" button is prominently displayed. To the right of the button, it says: "For other versions of Ubuntu Desktop including torrents, the network installer, a list of local mirrors, and past releases see our alternative downloads." At the bottom, there is a link to "Ubuntu 18.04 LTS release notes" and a section for "Recommended system requirements:".

1.3 Create VM1 and install Ubuntu using the instructions [1, 1.7]. Set machine name as "hostname" _ "student name"



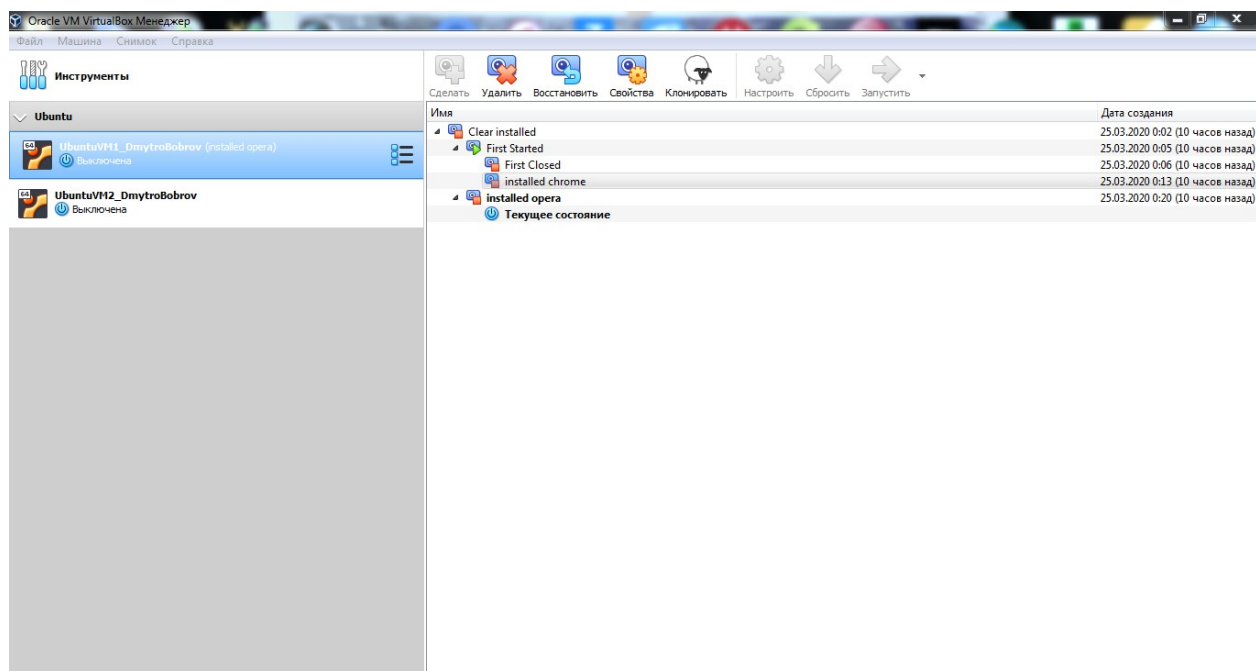
1.4 Learn about VM1 management capabilities - start, stop, reboot, save status, use Host key and keyboard shortcuts, mouse capture, and more. [1, item 1.8].

1.5 Clone an existing VM1 by creating VM2 [1, p.1.13].



1.6 To create a group of two VMs: VM1, VM2 and to study functions related to groups [1, item 1.9].

1.7 For VM1 changing its state, take several different pictures, forming a branched tree of pictures [1, item 1.10].

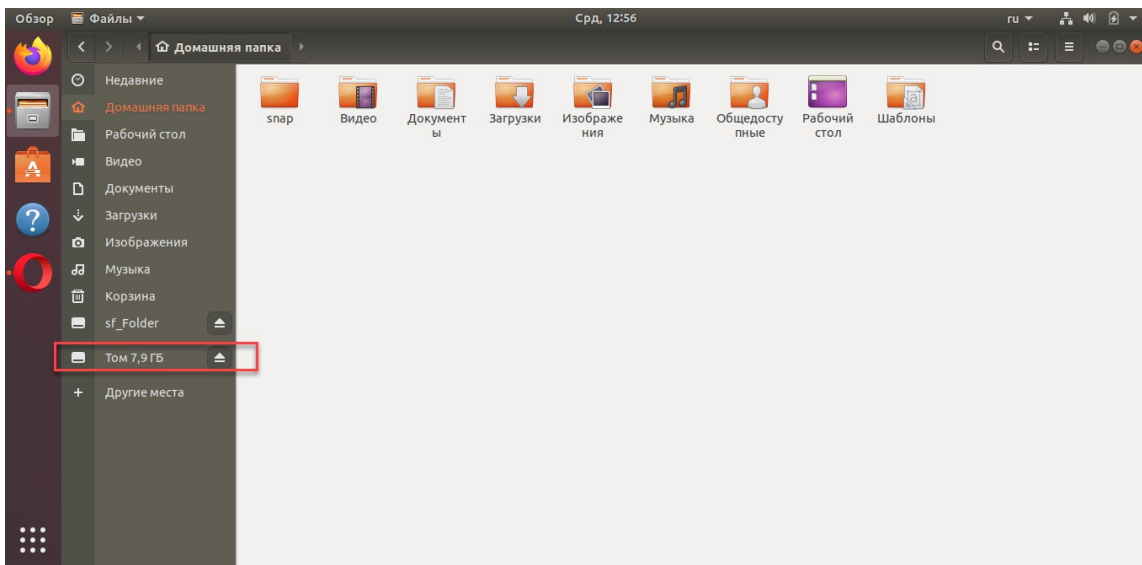


1.8 Export VM1 to save *.ova file on a shared network drive. On the same drive, select the *.ova file created by another student and import it [1, para.1.14].

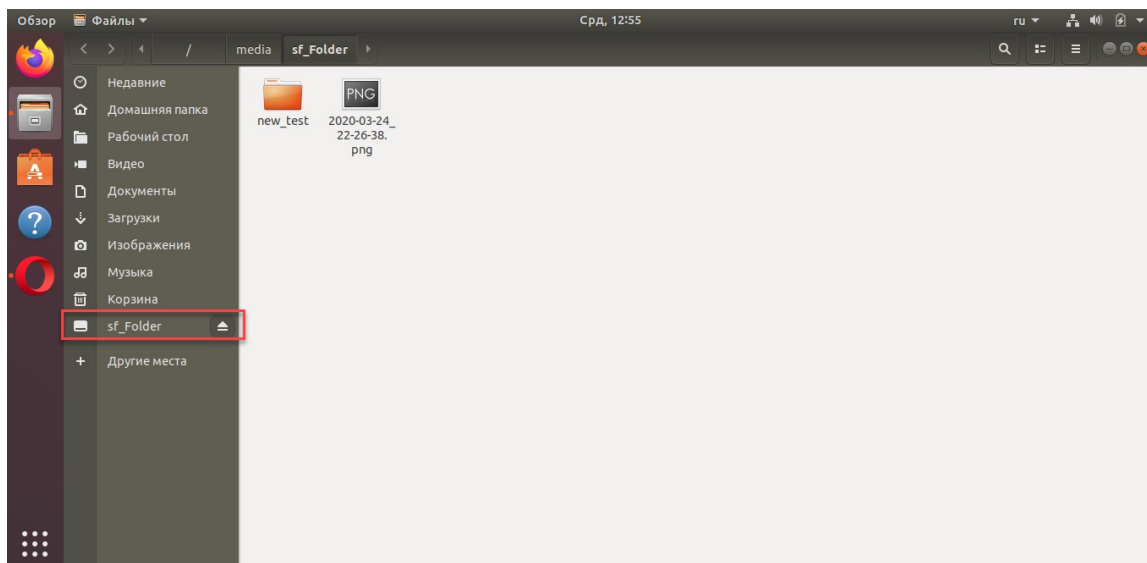
2. Configuration of virtual machines

2.1 Explore VM configuration options (general settings, system settings, display, storage, audio, networks, etc.).

2.2 Conduct USB settings to connect the USB ports of the host machine to the VM [1, Section 3.11].



2.3 To configure a shared folder for communication between the virtual machine and the host [1, clause 4.3].



2.4 Configure different network modes for VM1, VM2. Check for connection between VM1, VM2, Host, Internet for different network modes. You can use the ping command to do this. Make an appropriate table of possible connections.

```

bobrov@bobrov-virtualbox1:~$ ping 192.168.0.104
PING 192.168.0.104 (192.168.0.104) 56(84) bytes of data.
64 bytes from 192.168.0.104: icmp_seq=1 ttl=127 time=1.05 ms
64 bytes from 192.168.0.104: icmp_seq=2 ttl=127 time=0.827 ms
64 bytes from 192.168.0.104: icmp_seq=3 ttl=127 time=0.550 ms
64 bytes from 192.168.0.104: icmp_seq=4 ttl=127 time=0.570 ms
64 bytes from 192.168.0.104: icmp_seq=5 ttl=127 time=0.674 ms
^C
--- 192.168.0.104 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4085ms
rtt min/avg/max/mdev = 0.550/0.735/1.054/0.187 ms

bobrov@bobrov-virtualbox1:~$ ping 192.168.161.5
PING 192.168.161.5 (192.168.161.5) 56(84) bytes of data.
64 bytes from 192.168.161.5: icmp_seq=1 ttl=64 time=1.38 ms
64 bytes from 192.168.161.5: icmp_seq=2 ttl=64 time=0.474 ms
64 bytes from 192.168.161.5: icmp_seq=3 ttl=64 time=0.349 ms
64 bytes from 192.168.161.5: icmp_seq=4 ttl=64 time=0.322 ms
64 bytes from 192.168.161.5: icmp_seq=5 ttl=64 time=0.395 ms
^C
--- 192.168.161.5 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4132ms
rtt min/avg/max/mdev = 0.322/0.585/1.388/0.405 ms

bobrov@bobrov-virtualbox1:~$ ping google.com
PING google.com (216.58.215.110) 56(84) bytes of data.
64 bytes from waw02s17-in-f14.1e100.net (216.58.215.110): icmp_seq=1 ttl=54 time=107 ms
64 bytes from waw02s17-in-f14.1e100.net (216.58.215.110): icmp_seq=2 ttl=54 time=23.6 ms
64 bytes from waw02s17-in-f14.1e100.net (216.58.215.110): icmp_seq=3 ttl=54 time=25.7 ms
64 bytes from waw02s17-in-f14.1e100.net (216.58.215.110): icmp_seq=4 ttl=54 time=23.5 ms
^C
--- google.com ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3018ms
rtt min/avg/max/mdev = 23.579/45.118/107.504/36.029 ms
  
```

	VM ↔ Host	VM1 ↔ VM2	VM → Internet	VM ← Internet
Host-only	+	+	-	-
Internal	-	+	-	-
Bridged	+	+	+	+
NAT	-	-	+	Port forwarding
NAT Network	-	+	+	Port forwarding

3. Working with CLI via VBoxManage.

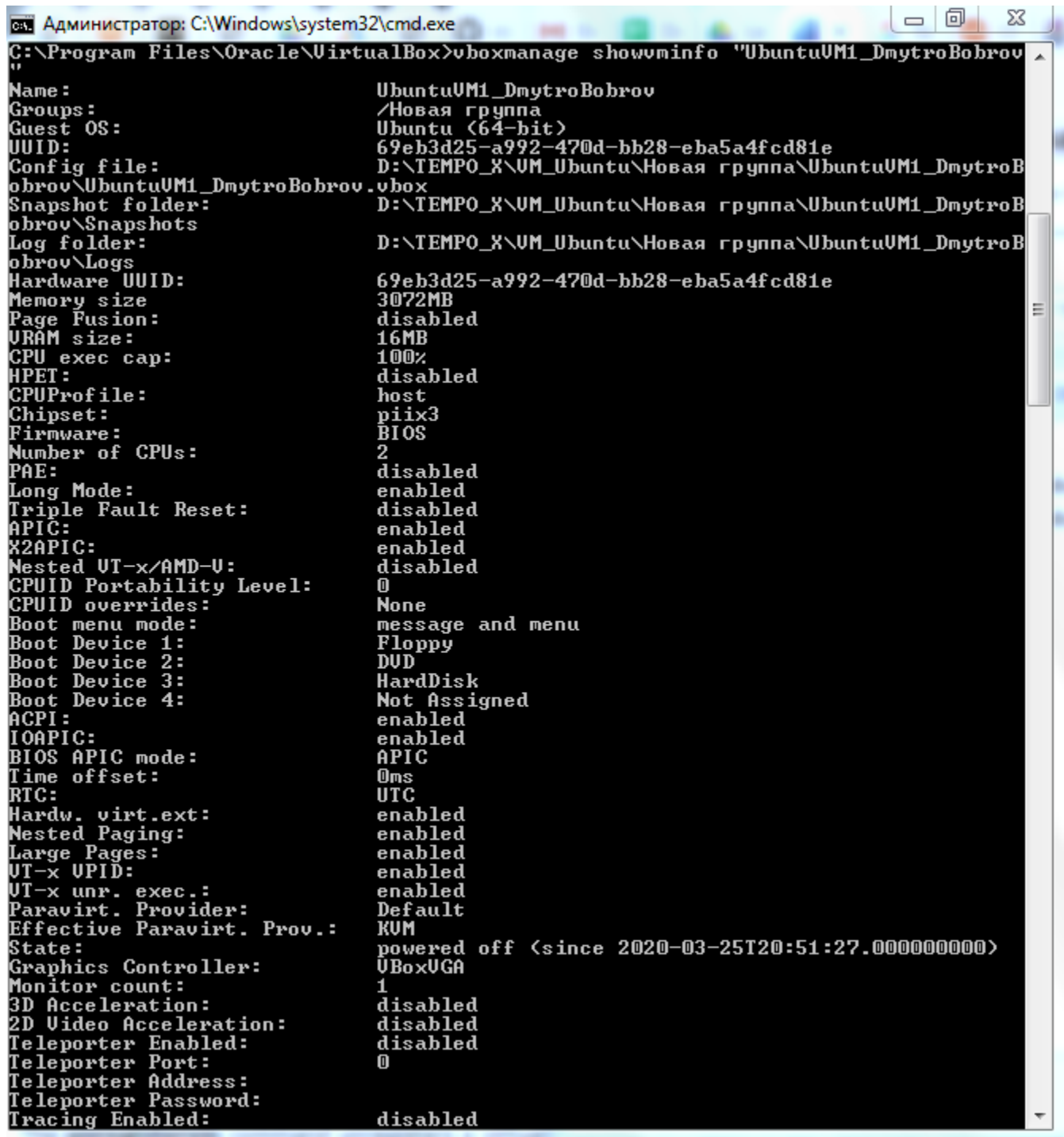
3.1 Run cmd.exe command line.

```

C:\Program Files\Oracle\VirtualBox>vboxmanage list vms
"UbuntuVM1_DmytroBobrov" <69eb3d25-a992-470d-bb28-eba5a4fcd81e>
"UbuntuVM2_DmytroBobrov" <7e4c8882-0f20-4140-8651-a55dc4088825>

C:\Program Files\Oracle\VirtualBox>
  
```

3.2 Examine the purpose and execute the basic commands of VBoxManage list, showvminfo, createvm, startvm, modifyvm, clonevm, snapshot, controlvm [1, 8].

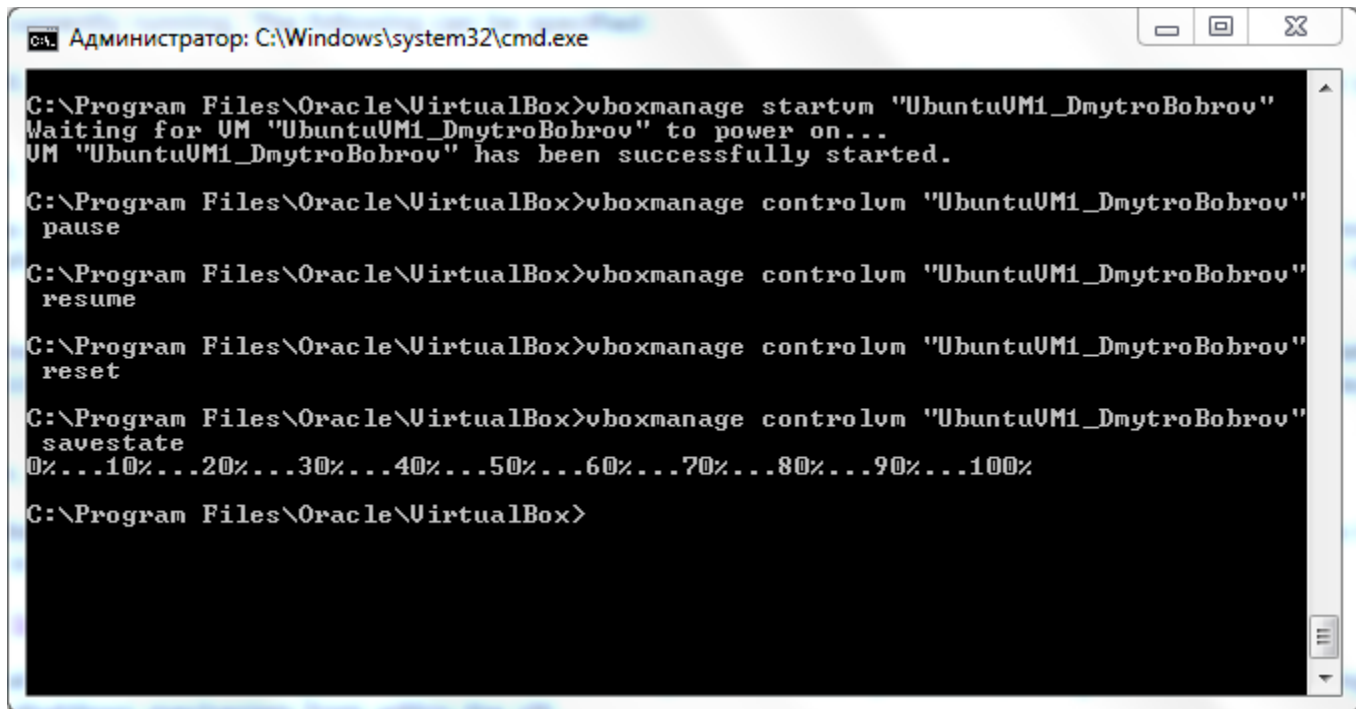


```

Администратор: C:\Windows\system32\cmd.exe
C:\Program Files\Oracle\VirtualBox>vboxmanage showvminfo "UbuntuVM1_DmytroBobrov"

Name:                                UbuntuVM1_DmytroBobrov
Groups:                              /Новая группа
Guest OS:                            Ubuntu (64-bit)
UUID:                                69eb3d25-a992-470d-bb28-eba5a4fcd81e
Config file:                         obrov\UbuntuVM1_DmytroBobrov.vbox
Snapshot folder:                     D:\TEMPO_X\UM_Ubuntu\Новая группа\UbuntuVM1_DmytroB
obrov\Snapshots
Log folder:                           D:\TEMPO_X\UM_Ubuntu\Новая группа\UbuntuVM1_DmytroB
obrov\Logs
Hardware UUID:                       69eb3d25-a992-470d-bb28-eba5a4fcd81e
Memory size:                         3072MB
Page Fusion:                         disabled
VRAM size:                           16MB
CPU exec cap:                        100%
HPET:                                disabled
CPUProfile:                          host
Chipset:                             piix3
Firmware:                            BIOS
Number of CPUs:                      2
PAE:                                  disabled
Long Mode:                           enabled
Triple Fault Reset:                 disabled
APIC:                                enabled
x2APIC:                              enabled
Nested VT-x/AMD-V:                  disabled
CPUID Portability Level:             0
CPUID overrides:                    None
Boot menu mode:                     message and menu
Boot Device 1:                      Floppy
Boot Device 2:                      DVD
Boot Device 3:                      HardDisk
Boot Device 4:                      Not Assigned
ACPI:                                enabled
IOAPIC:                              enabled
BIOS APIC mode:                     APIC
Time offset:                         0ms
RTC:                                 UTC
Hardw. virt.ext:                    enabled
Nested Paging:                      enabled
Large Pages:                        enabled
VT-x UPID:                          enabled
VT-x unr. exec.:                   enabled
Paravirt. Provider:                 Default
Effective Paravirt. Prov.:          KVM
State:                              powered off (since 2020-03-25T20:51:27.000000000)
Graphics Controller:                VBoxVGA
Monitor count:                      1
3D Acceleration:                    disabled
2D Video Acceleration:              disabled
Teleporter Enabled:                 disabled
Teleporter Port:                    0
Teleporter Address:                 disabled
Teleporter Password:                disabled
Tracing Enabled:                    disabled

```



```

C:\Program Files\Oracle\VirtualBox>vboxmanage startvm "UbuntuVM1_DmytroBobrov"
Waiting for VM "UbuntuVM1_DmytroBobrov" to power on...
VM "UbuntuVM1_DmytroBobrov" has been successfully started.

C:\Program Files\Oracle\VirtualBox>vboxmanage controlvm "UbuntuVM1_DmytroBobrov"
pause

C:\Program Files\Oracle\VirtualBox>vboxmanage controlvm "UbuntuVM1_DmytroBobrov"
resume

C:\Program Files\Oracle\VirtualBox>vboxmanage controlvm "UbuntuVM1_DmytroBobrov"
reset

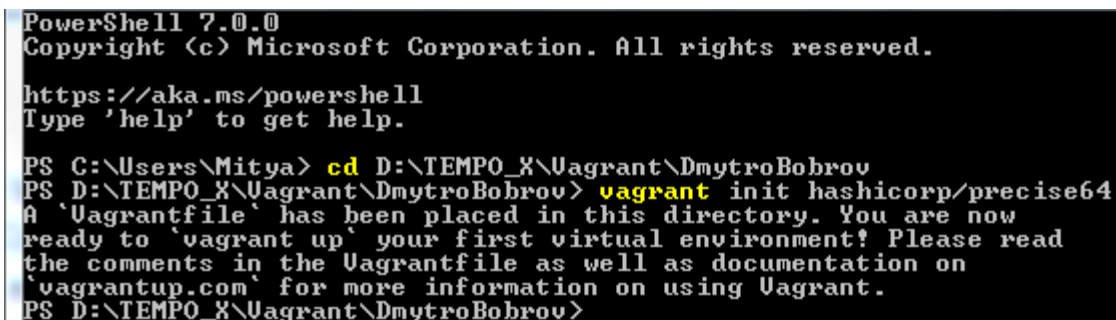
C:\Program Files\Oracle\VirtualBox>vboxmanage controlvm "UbuntuVM1_DmytroBobrov"
savestate
0%...10%...20%...30%...40%...50%...60%...70%...80%...90%...100%

C:\Program Files\Oracle\VirtualBox>

```

PART 2. WORKING WITH VAGRANT

1. Download the required version of Vagrant according to the instructions [5] and according to the host operating system (OS) installed in the workplace of the student. For Windows, the file may be named, for example, vagrant_2.2.0_x86_64.msi. Perform a Vagrant installation. Check for a path to the Vagrant bin in the Path variable (My computer -> Properties -> Advanced system settings-> Advanced -> Environment Variables).
2. Run powershell. Create the Student Last Name folder (in English). In this example, we create the vagrant_test folder. Next we go to the folder.
3. Let's initialize the environment with the default Vagrant box indication: init hashicorp / precise64



```

PowerShell 7.0.0
Copyright (c) Microsoft Corporation. All rights reserved.

https://aka.ms/powershell
Type 'help' to get help.

PS C:\Users\Mitya> cd D:\TEMPO_X\Vagrant\DmytroBobrov
PS D:\TEMPO_X\Vagrant\DmytroBobrov> vagrant init hashicorp/precise64
A 'Vagrantfile' has been placed in this directory. You are now
ready to 'vagrant up' your first virtual environment! Please read
the comments in the Vagrantfile as well as documentation on
'vagrantup.com' for more information on using Vagrant.
PS D:\TEMPO_X\Vagrant\DmytroBobrov>

```


4. We run vagrant up and watch for messages when loading and running a VM.

```

Administrator: PowerShell 7 (x64)
PS D:\TEMPO_X\Vagrant\DmytroBobrov> vagrant up
Bringing machine 'default' up with 'virtualbox' provider...
==> default: Box 'hashicorp/precise64' could not be found. Attempting to find an
d install...
    default: Box Provider: virtualbox
    default: Box Version: >= 0
==> default: Loading metadata for box 'hashicorp/precise64'
    default: URL: https://vagrantcloud.com/hashicorp/precise64
==> default: Adding box 'hashicorp/precise64' (v1.1.0) for provider: virtualbox
    default: Downloading: https://vagrantcloud.com/hashicorp/boxes/precise64/ver
sions/1.1.0/providers/virtualbox.box
    default: Download redirected to host: vagrantcloud-files-production.s3.amazo
naws.com
    default: Progress: 100% (Rate: 4510k/s, Estimated time remaining: --:--:-->
==> default: Successfully added box 'hashicorp/precise64' (v1.1.0) for 'virtualb
ox'!
==> default: Importing base box 'hashicorp/precise64'...
==> default: Matching MAC address for NAT networking...
==> default: Checking if box 'hashicorp/precise64' version '1.1.0' is up to date
...
==> default: Setting the name of the VM: DmytroBobrov_default_1585434526715_9799
8
Vagrant is currently configured to create VirtualBox synced folders with
the 'SharedFoldersEnableSymlinksCreate' option enabled. If the Vagrant
guest is not trusted, you may want to disable this option. For more
information on this option, please refer to the VirtualBox manual:

    https://www.virtualbox.org/manual/ch04.html#sharedfolders

This option can be disabled globally with an environment variable:

    VAGRANT_DISABLE_UBOXSMLINKCREATE=1

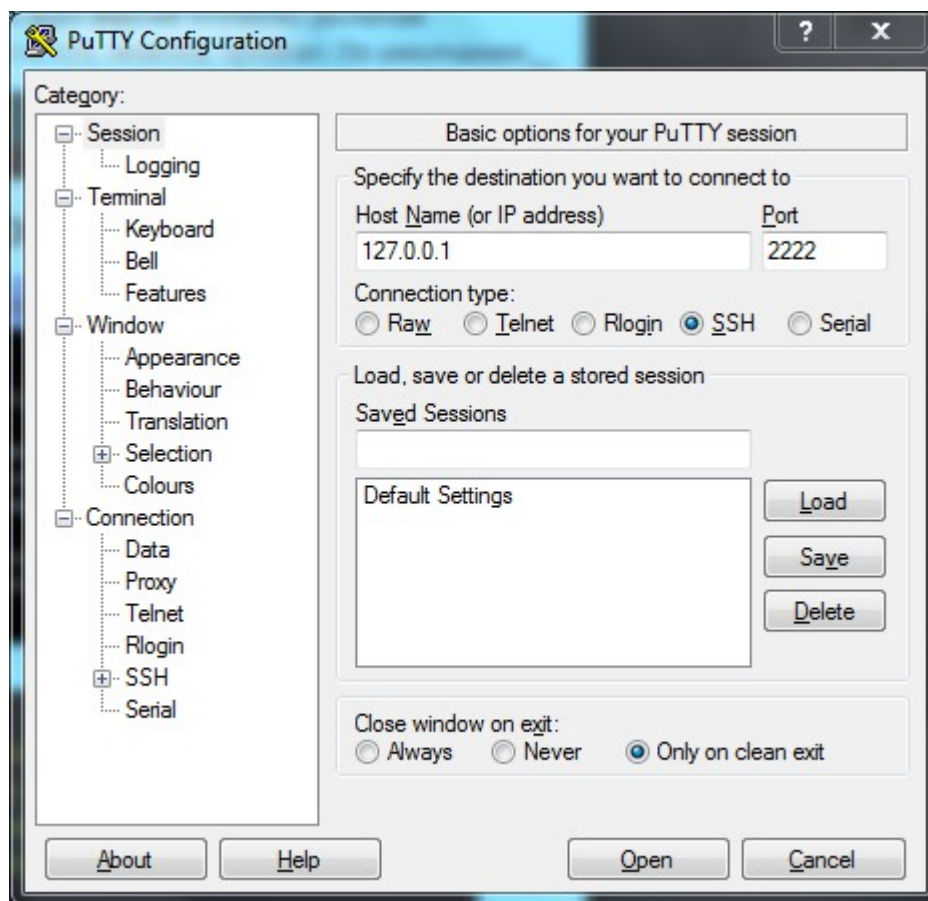
or on a per folder basis within the Vagrantfile:

    config.vm.synced_folder '/host/path', '/guest/path', SharedFoldersEnableSymlin
ksCreate: false
==> default: Clearing any previously set network interfaces...
==> default: Preparing network interfaces based on configuration...
    default: Adapter 1: nat
==> default: Forwarding ports...
    default: 22 (guest) => 2222 (host) (adapter 1)
==> default: Booting VM...
==> default: Waiting for machine to boot. This may take a few minutes...
    default: SSH address: 127.0.0.1:2222
    default: SSH username: vagrant
    default: SSH auth method: private key
    default:
    default: Vagrant insecure key detected. Vagrant will automatically replace
    default: this with a newly generated keypair for better security.
    default:
    default: Inserting generated public key within guest...
    default: Removing insecure key from the guest if it's present...
    default: Key inserted! Disconnecting and reconnecting using new SSH key...
==> default: Machine booted and ready!
==> default: Checking for guest additions in VM...
    default: The guest additions on this VM do not match the installed version o
f
    default: VirtualBox! In most cases this is fine, but in rare cases it can
    default: prevent things such as shared folders from working properly. If you
see

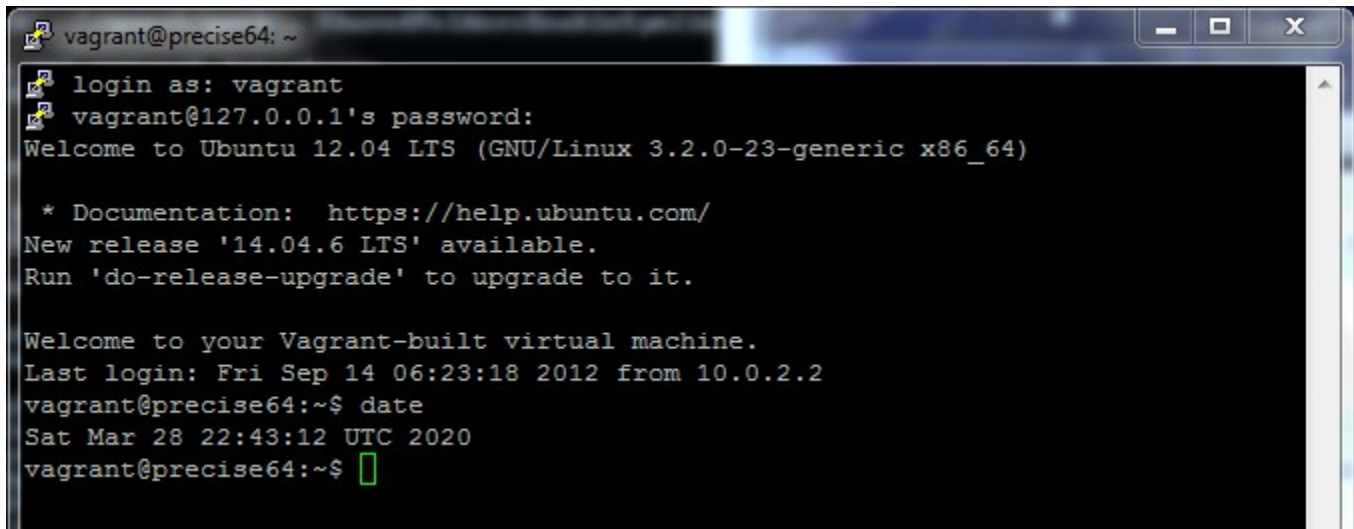
```

```
he
on
default: shared folder errors, please make sure the guest additions within t
default: virtual machine match the version of VirtualBox you have installed
default: your host and reload your VM.
default:
default: Guest Additions Version: 4.2.0
default: VirtualBox Version: 6.0
==> default: Mounting shared folders...
default: /vagrant => D:/TEMPO_X/Vagrant/DmytroBobrov
PS D:\TEMPO_X\Vagrant\DmytroBobrov>
```

5. We connect to the VM using PuTTY (downloadable from [6]) using the SSH, IP address and port mentioned above (127.0.0.1:2222). By default, login - vagrant and password are also vagrant.

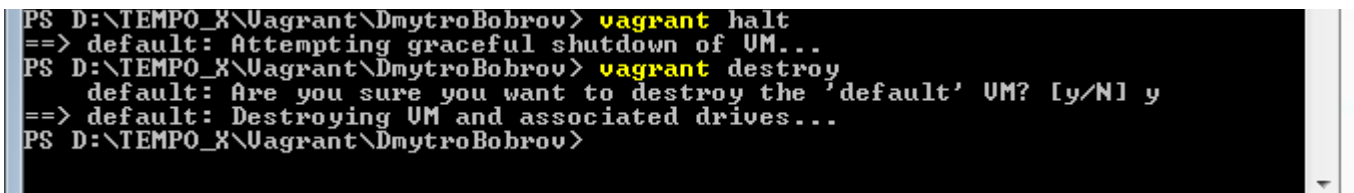


6. Fix the date and time by running the date command

A terminal window titled 'vagrant@precise64: ~' showing the login process for a vagrant user. The user enters the password and is greeted with the Ubuntu 12.04 LTS welcome message. The terminal then shows the output of the 'date' command, which displays the system date and time as 'Sat Mar 28 22:43:12 UTC 2020'.

```
vagrant@precise64: ~  
login as: vagrant  
vagrant@127.0.0.1's password:  
Welcome to Ubuntu 12.04 LTS (GNU/Linux 3.2.0-23-generic x86_64)  
  
* Documentation:  https://help.ubuntu.com/  
New release '14.04.6 LTS' available.  
Run 'do-release-upgrade' to upgrade to it.  
  
Welcome to your Vagrant-built virtual machine.  
Last login: Fri Sep 14 06:23:18 2012 from 10.0.2.2  
vagrant@precise64:~$ date  
Sat Mar 28 22:43:12 UTC 2020  
vagrant@precise64:~$
```

7. Stop and delete the created VM.

A terminal window showing the execution of Vagrant commands from a Windows command prompt. The user runs 'vagrant halt' and 'vagrant destroy'. The output shows the VM being gracefully shutdown and then destroyed, with a confirmation prompt for the 'default' VM.

```
PS D:\TEMPO_X\Vagrant\DmytroBobrov> vagrant halt  
==> default: Attempting graceful shutdown of VM...  
PS D:\TEMPO_X\Vagrant\DmytroBobrov> vagrant destroy  
default: Are you sure you want to destroy the 'default' VM? [y/N] y  
==> default: Destroying VM and associated drives...  
PS D:\TEMPO_X\Vagrant\DmytroBobrov>
```

8. Створити тестову середу з двох серверів, використовуючи інструкції [7]. Параметри серверів задаються викладачем або обираються самостійно студентом.

9. Create your own Vagrant box using instructions [8] and requirements that are determined by the teacher or student.

```
Windows PowerShell
Copyright (C) 2016 Microsoft Corporation. All rights reserved.

PS C:\Users\Mitya> cd D:\TEMPO_X\Vagrant\DmytroBobrov
PS D:\TEMPO_X\Vagrant\DmytroBobrov> vagrant box add ubuntu1804_template --name 'ubuntu1804_v2'
==> box: Box file was not detected as metadata. Adding it directly...
==> box: Adding box 'ubuntu1804_v2' (v0) for provider:
box: Unpacking necessary files from: file:///D:/TEMPO_X/Vagrant/DmytroBobrov/ubuntu1804_template
box: Progress: 100% (Rate: 753M/s, Estimated time remaining: --:--:--)
==> box: Successfully added box 'ubuntu1804_v2' (v0) for 'virtualbox'!
PS D:\TEMPO_X\Vagrant\DmytroBobrov> vagrant up
Bringing machine 'default' up with 'virtualbox' provider...
==> default: Importing base box 'ubuntu1804_v2'...
==> default: Matching MAC address for NAT networking...
==> default: Setting the name of the VM: DmytroBobrov_default_1585523395791_75431
==> default: Clearing any previously set network interfaces...
==> default: Preparing network interfaces based on configuration...
default: Adapter 1: nat
==> default: Forwarding ports...
default: 22 (guest) => 2222 (host) (adapter 1)
==> default: Booting VM...
==> default: Waiting for machine to boot. This may take a few minutes...
default: SSH address: 127.0.0.1:2222
default: SSH username: vagrant
default: SSH auth method: private key
default:
default: Vagrant insecure key detected. Vagrant will automatically replace
default: this with a newly generated keypair for better security.
default:
default: Inserting generated public key within guest...
default: Removing insecure key from the guest if it's present...
default: Key inserted! Disconnecting and reconnecting using new SSH key...
==> default: Machine booted and ready!
==> default: Checking for guest additions in VM...
==> default: Mounting shared folders...
default: /vagrant => D:/TEMPO_X/Vagrant/DmytroBobrov
The following SSH command responded with a non-zero exit status.
Vagrant assumes that this means the command failed!

mkdir -p /vagrant

Stdout from the command:

Stderr from the command:

PS D:\TEMPO_X\Vagrant\DmytroBobrov>
```

ПЕРЕЛІК ПОСИЛАНЬ

1. Oracle VM VirtualBox.User Manual <https://www.virtualbox.org/manual/>
2. Офіційна сторінка VirtualBox <https://www.virtualbox.org/>
3. Сторінка завантаження Ubuntu <https://ubuntu.com/download>
4. Сторінка документації Vagrant <https://www.vagrantup.com/docs/index.html>
5. Сторінка з інструкціями щодо інсталяції Vagrant
<https://www.vagrantup.com/docs/installation/index.html>
6. Сторінка завантаження PuTTY <https://www.putty.org/>
7. Робота з vagrantfile <http://sysadm.pp.ua/linux/sistemyvirtualizacii/vagrantfile.html>
8. Створення власного Vagrant box <http://sysadm.pp.ua/linux/sistemyvirtualizacii/vagrant-box-creation.html>