

School of Computer Science
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
DEHRADUN, UTTARAKHAND



Containers & Docker Security

Lab File (2022-2026)
5th Semester

Submitted To:

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EXPERIMENT 1

Lab Exercise: Introduction to Vagrant and Vagrantfile

Objective:

- Learn how to set up and configure virtual environments using Vagrant.
- Understand the structure and components of a Vagrantfile.
- Gain hands-on experience in managing virtual machines using Vagrant commands.

Prerequisites:

- Basic knowledge of virtualization concepts.
- Familiarity with command-line interfaces.
- Installation of Vagrant and VirtualBox (or any other supported provider) on your local machine.

Step-by-Step Exercise:

1. Setting Up the Environment:

Install Vagrant:

- Download and install Vagrant from the official website.
- Ensure you have VirtualBox installed as it is a commonly used provider with Vagrant.
- Verify Installation:
- Open a terminal or command prompt.
- Run the following commands to verify the installation:

```
vagrant --version
```

```
PS C:\Users\KHUSHI JAIN\OneDrive\Desktop\vagrant_lab> vagrant --version
Vagrant 2.4.1
PS C:\Users\KHUSHI JAIN\OneDrive\Desktop\vagrant_lab> |
```

2. Creating a New Vagrant Project:

- Create a Project Directory:
- In your terminal, create a new directory for your Vagrant project and navigate into it:

```
mkdir vagrant_lab
```

```
cd vagrant_lab
```

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

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\KHUSHI JAIN> cd Desktop
PS C:\Users\KHUSHI JAIN\Desktop> cd vagrant_lab
PS C:\Users\KHUSHI JAIN\Desktop\vagrant_lab> |
```

Initialize Vagrant:

- Run the following command to initialize a new Vagrantfile in your project directory:

```
vagrant init
```

This command will generate a Vagrantfile in the current directory.

```
PS C:\Users\KHUSHI JAIN\Desktop> cd vagrant_lab
PS C:\Users\KHUSHI JAIN\Desktop\vagrant_lab> vagrant init
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 C:\Users\KHUSHI JAIN\Desktop\vagrant_lab> |
```

3. Understanding the Vagrantfile:

- Open the Vagrantfile:
- Open the Vagrantfile in a text editor of your choice.
- The Vagrantfile is a Ruby-based configuration file used to define the virtual environment.
- Basic Vagrantfile Configuration:
- Modify the Vagrantfile to configure a basic virtual machine. For example:

```
# All Vagrant configuration is done below. The "2" in Vagrant.configure
# configures the configuration version (we support older styles for
# backwards compatibility). Please don't change it unless you know what
# you're doing.

Vagrant.configure("2") do |config|

  # The most common configuration options are documented and commented below.
  # For a complete reference, please see the online documentation at
  # https://docs.vagrantup.com.

  # Every Vagrant development environment requires a box. You can search for
  # boxes at https://vagrantcloud.com/search.

  config.vm.box = "ubuntu/trusty64"
```

```
# Disable automatic box update checking. If you disable this, then  
# boxes will only be checked for updates when the user runs  
# `vagrant box outdated`. This is not recommended.  
# config.vm.box_check_update = false  
end
```

```
Install the latest PowerShell for new features and improvements! https://aka.ms/PSW  
PS C:\Users\KHUSHI JAIN\OneDrive\Desktop\vagrant_lab> notepad .\Vagrantfile  
PS C:\Users\KHUSHI JAIN\OneDrive\Desktop\vagrant_lab> |
```

4. Launching and Managing the VM:

Start the VM:

In the terminal, start the VM using the following command:

```
vagrant up
```

Vagrant will download the specified box (if not already downloaded) and launch the VM.

- SSH into the VM:
- Connect to the running VM using SSH:

```

PS C:\Users\KHUSHI JAIN\OneDrive\Desktop\vagrant_lab> vagrant up
Bringing machine 'default' up with 'virtualbox' provider...
==> default: Box 'ubuntu/trusty64' could not be found. Attempting to find and install..
default: Box Provider: virtualbox
default: Box Version: >= 0
==> default: Loading metadata for box 'ubuntu/trusty64'
default: URL: https://vagrantcloud.com/api/v2/vagrant/ubuntu/trusty64
==> default: Adding box 'ubuntu/trusty64' (v20191107.0.0) for provider: virtualbox
default: Downloading: https://vagrantcloud.com/ubuntu/boxes/trusty64/versions/20191107.0.0/vagrant.box
Download redirected to host: cloud-images.ubuntu.com
default:
==> default: Successfully added box 'ubuntu/trusty64' (v20191107.0.0) for 'virtualbox'!
==> default: Importing base box 'ubuntu/trusty64'...
==> default: Matching MAC address for NAT networking...
==> default: Checking if box 'ubuntu/trusty64' version '20191107.0.0' is up to date...
==> default: Setting the name of the VM: vagrant_lab_default_1724992643417_24410
==> default: Clearing any previously set forwarded ports...
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_VBOXSYMLINKCREATE=1

or on a per folder basis within the Vagrantfile:

config.vm.synced_folder '/host/path', '/guest/path', SharedFoldersEnableSymlinksCreate=>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

```

vagrant ssh

- This command will log you into the VM's shell.
- Exploring the VM:
- Inside the VM, explore the filesystem, install packages, and run commands to understand the environment.
- Stop the VM:
- Exit the SSH session by typing exit.
- Stop the VM with the following command:

```
PS C:\Users\KHUSHI JAIN\OneDrive\Desktop\vagrant_lab> vagrant ssh
Welcome to Ubuntu 14.04.6 LTS (GNU/Linux 3.13.0-170-generic x86_64)
```

```
* Documentation:  https://help.ubuntu.com/
```

```
System information disabled due to load higher than 1.0
```

```
UA Infrastructure Extended Security Maintenance (ESM) is not enabled.
```

```
0 updates
```

```
can be installed immediately.
```

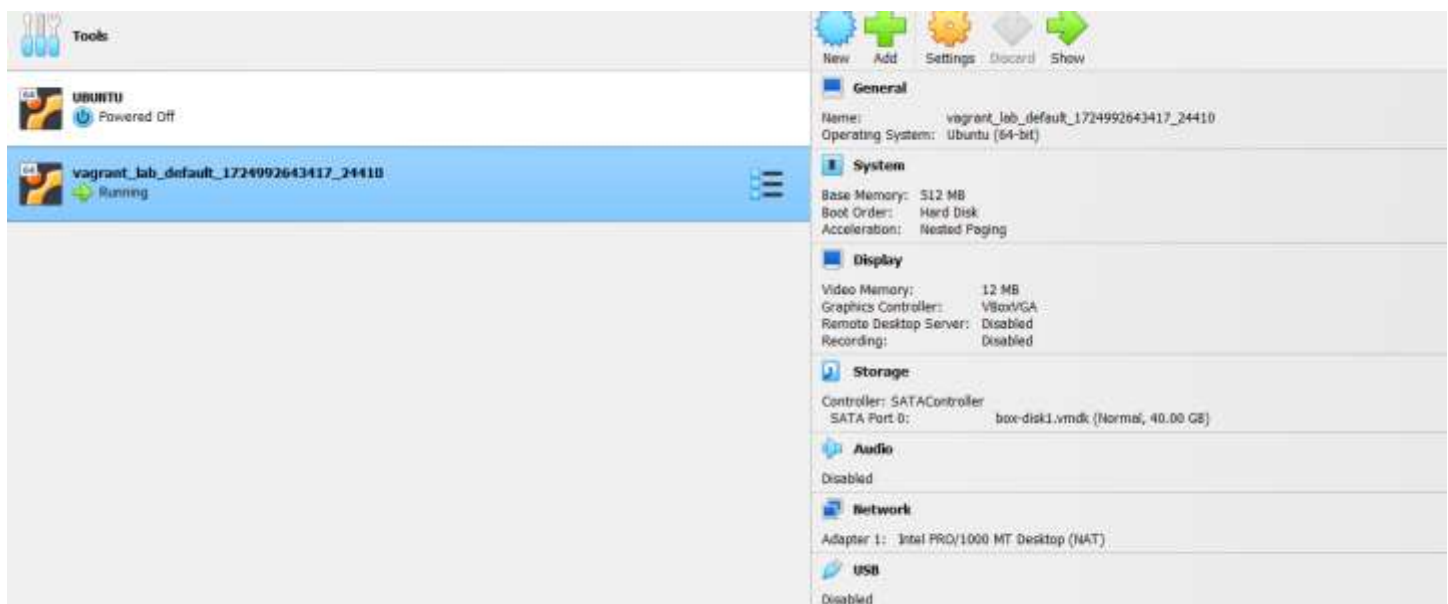
```
0 of these updates are security updates.
```

```
Enable UA Infrastructure ESM to receive 64 additional security updates.
See https://ubuntu.com/advantage or run: sudo ua status
```

```
New release '16.04.7 LTS' available.
```

```
Run 'do-release-upgrade' to upgrade to it.
```

```
vagrant@vagrant-ubuntu-trusty-64:~$ ls
vagrant@vagrant-ubuntu-trusty-64:~$ mkdir lab1
vagrant@vagrant-ubuntu-trusty-64:~$ touch lab1
vagrant@vagrant-ubuntu-trusty-64:~$ ls
lab1
vagrant@vagrant-ubuntu-trusty-64:~$ |
```

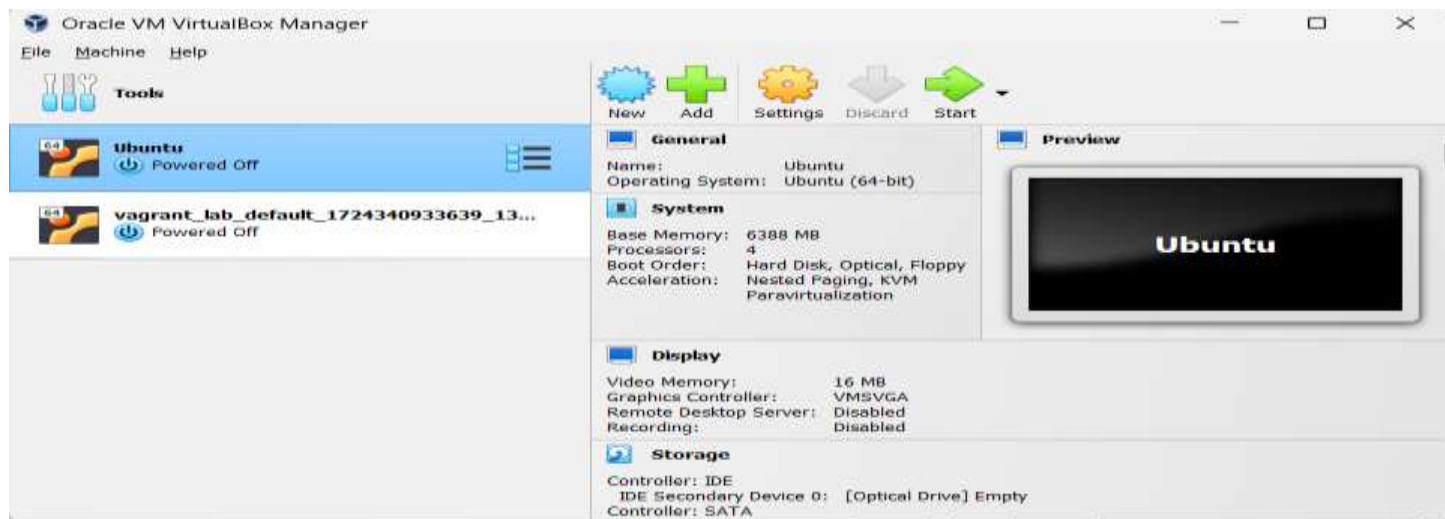


```
vagrant halt
```

Destroy the VM (optional):

To remove the VM completely, use the following command:

```
vagrant@vagrant-ubuntu-trusty-64:~$ exit
logout
Connection to 127.0.0.1 closed.
PS C:\Users\KHUSHI JAIN\OneDrive\Desktop\vagrant_lab> vagrant halt
==> default: Attempting graceful shutdown of VM...
PS C:\Users\KHUSHI JAIN\OneDrive\Desktop\vagrant_lab> |
```

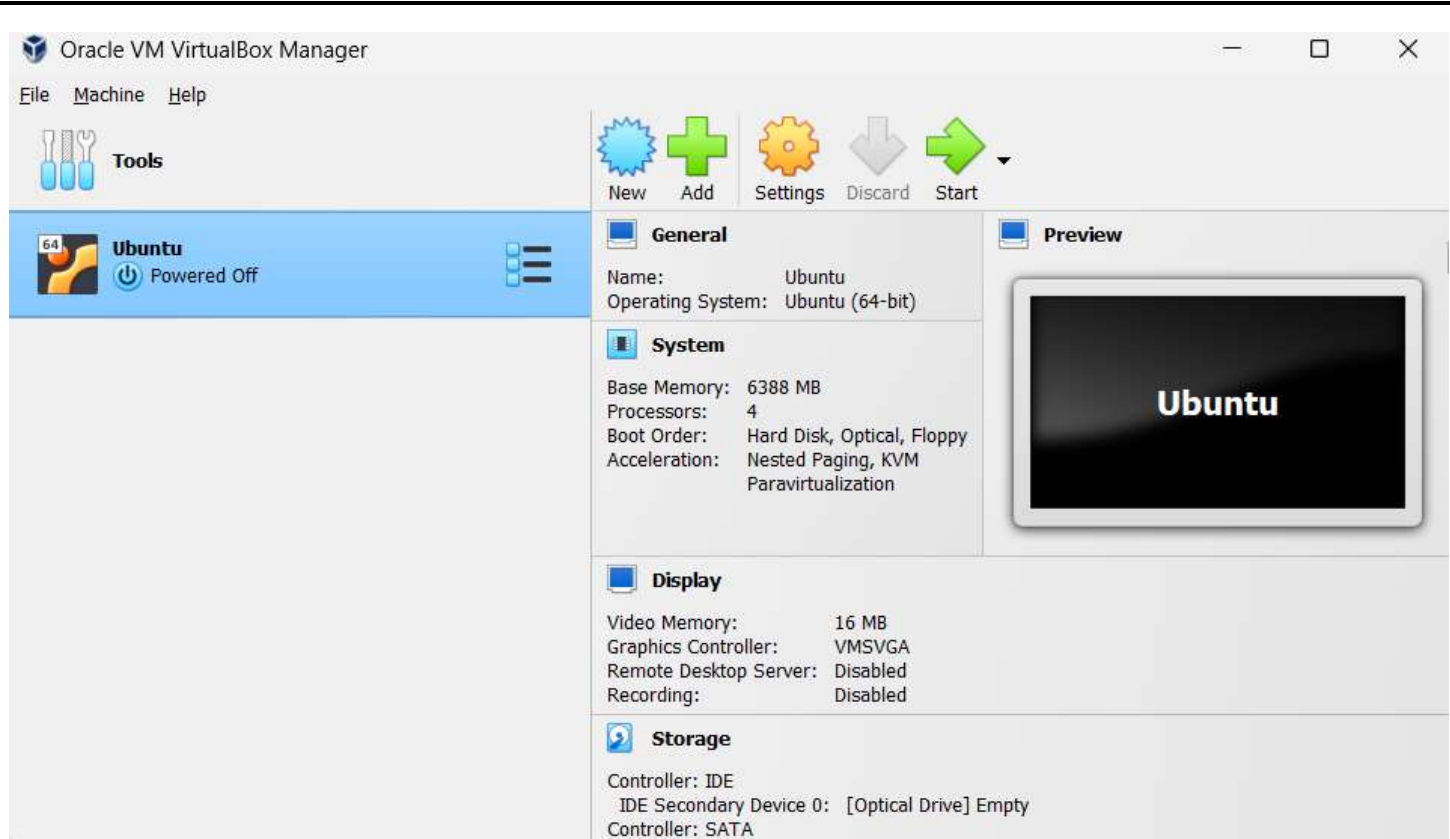


```
vagrant destroy
```

This will remove all traces of the VM, including any data stored on it.

Explore the benefits of using Vagrant for development and testing environments.

```
PS C:\Users\KHUSHI JAIN\OneDrive\Desktop\vagrant_lab> vagrant destroy
default: Are you sure you want to destroy the 'default' VM? [y/N] y
==> default: Destroying VM and associated drives...
PS C:\Users\KHUSHI JAIN\OneDrive\Desktop\vagrant_lab> |
```

```
See 'docker run --help'.
PS C:\Users\KHUSHI JAIN> docker run -it ubuntu bin/bash
Unable to find image 'ubuntu:latest' locally
latest: Pulling from library/ubuntu
31e907dcc94a: Pull complete
Digest: sha256:8a37d68f4f73ebf3d4efafbcf66379bf3728902a8038616808f04e34a9ab63ee
Status: Downloaded newer image for ubuntu:latest
root@bad045719d62:/# |
```