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# EXPERIMENT 1

**Lab Exercise: Introduction to Vagrant and Vagrantfile**

This exercise will guide them through setting up a virtual environment using Vagrant, configuring the environment via a Vagrantfile, and managing the virtual machines (VMs) with basic Vagrant commands.

**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.
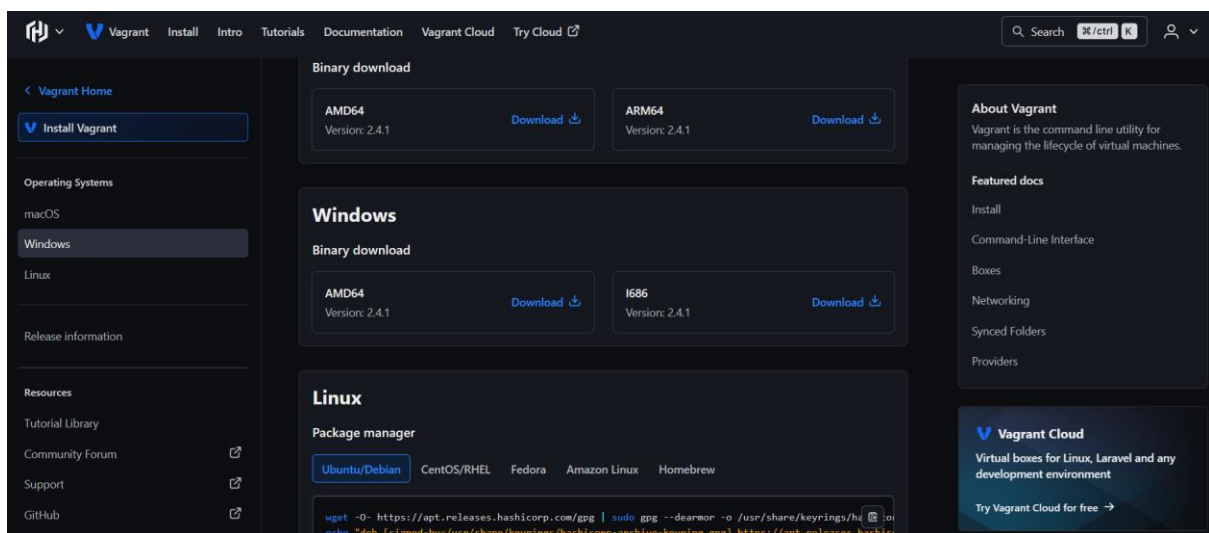
**Prerequisites:**

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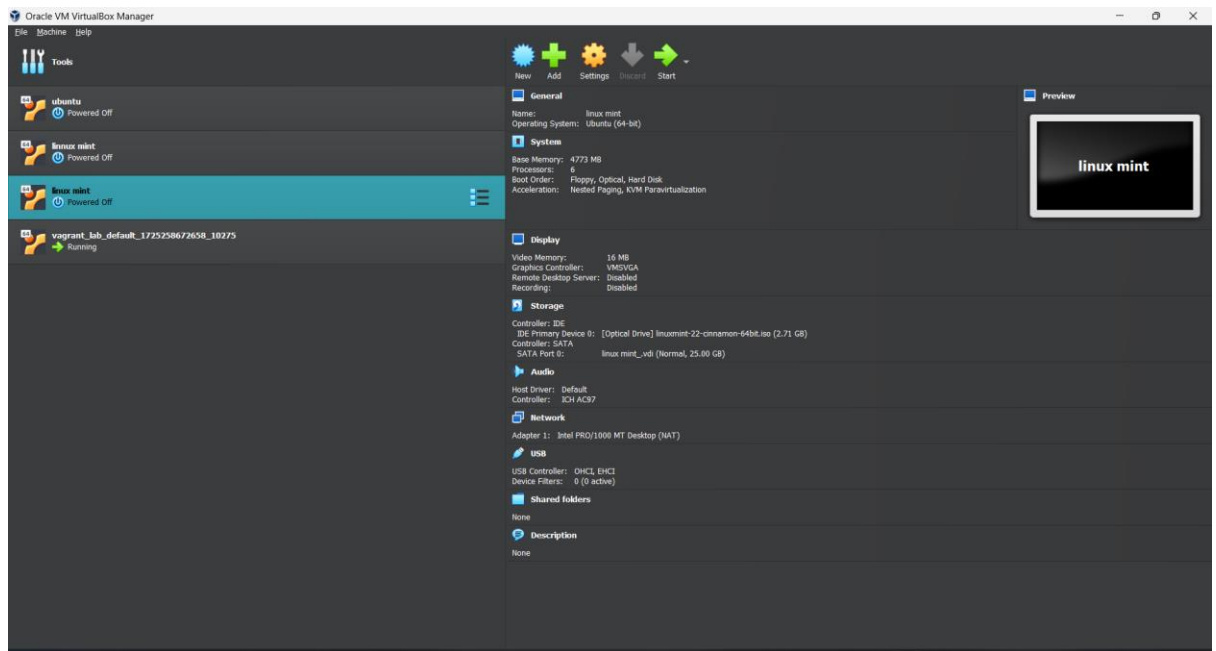
**Step-by-Step Exercise:**

**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



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

PS C:\Users\Asus> vagrant --version
Vagrant 2.4.1
PS C:\Users\Asus> |
```

## 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
```

```
PS C:\Users\Asus> cd desktop
PS C:\Users\Asus\desktop> mkdir vagrant_lab


    Directory: C:\Users\Asus\desktop


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
d-----         02-09-2024     11:50                vagrant_lab
```

**Initialize Vagrant:**

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

```
vagrant init
```

```
PS C:\Users\Asus\desktop> cd vagrant_lab
PS C:\Users\Asus\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\Asus\desktop\vagrant_lab> vagrant up
Bringing machine 'default' up with 'virtualbox' provider...
==> default: Box 'ubuntu/bionic64' could not be found. Attempting to find and in
    default: Box Provider: virtualbox
    default: Box Version: >= 0
==> default: Loading metadata for box 'ubuntu/bionic64'
    default: URL: https://vagrantcloud.com/api/v2/vagrant/ubuntu/bionic64
```

This command will generate a Vagrantfile in the current directory.

**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:

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

 config.vm.box = "ubuntu/bionic64"  # Specifies the base box to use (Ubuntu 18.04)

 config.vm.network "private_network", type: "dhcp"  # Configures a private network

 config.vm.provider "virtualbox" do |vb|

  vb.memory = "1024"  # Allocates 1GB of RAM to the VM

 end

end
```

```ruby
1   # -*- mode: ruby -*-
2   # vi: set ft=ruby :
3
4   # All Vagrant configuration is done below. The "2" in Vagrant.configure
5   # configures the configuration version (we support older styles for
6   # backwards compatibility). Please don't change it unless you know what
7   # you're doing.
8   Vagrant.configure("2") do |config|
9       # The most common configuration options are documented and commented below.
10      # For a complete reference, please see the online documentation at
11      # https://docs.vagrantup.com.
12
13      # Every Vagrant development environment requires a box. You can search for
14      # boxes at https://vagrantcloud.com/search.
15      config.vm.box = "ubuntu/bionic64"
16
17      # Disable automatic box update checking. If you disable this, then
18      # boxes will only be checked for updates when the user runs
19      # `vagrant box outdated`. This is not recommended.
20      # config.vm.box_check_update = false
21
22      # Create a forwarded port mapping which allows access to a specific port
23      # within the machine from a port on the host machine. In the example below,
24      # accessing "localhost:8080" will access port 80 on the guest machine.
25      # NOTE: This will enable public access to the opened port
26      # config.vm.network "forwarded_port", guest: 80, host: 8080
27
28      # Create a forwarded port mapping which allows access to a specific port
29      # within the machine from a port on the host machine and only allow access
30      # via 127.0.0.1 to disable public access
31      # config.vm.network "forwarded_port", guest: 80, host: 8080, host_ip: "127.0.0.1"
```

## 4. Launching and Managing the VM:

Start the VM:

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

```
vagrant up
```

```
'vagrantup.com' for more information on using Vagrant.
PS C:\Users\Asus\desktop\vagrant_lab> vagrant up
Bringing machine 'default' up with 'virtualbox' provider...
==> default: Box 'ubuntu/bionic64' could not be found. Attempting to find and
    default: Box Provider: virtualbox
    default: Box Version: >= 0
==> default: Loading metadata for box 'ubuntu/bionic64'
    default: URL: https://vagrantcloud.com/api/v2/vagrant/ubuntu/bionic64
==> default: Adding box 'ubuntu/bionic64' (v20230607.0.2) for provider: virtua
    default: Downloading: https://vagrantcloud.com/ubuntu/boxes/bionic64/versi
Download redirected to host: cloud-images.ubuntu.com
    default:
==> default: Successfully added box 'ubuntu/bionic64' (v20230607.0.2) for 'vir
==> default: Importing base box 'ubuntu/bionic64'...
==> default: Matching MAC address for NAT networking...
==> default: Checking if box 'ubuntu/bionic64' version '20230607.0.2' is up to
==> default: Setting the name of the VM: vagrant_lab_default_1725258672658_102
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', SharedFoldersEnableSyml
==> default: Clearing any previously set network interfaces...
```

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:

```
vagrant ssh
```

```
default: /vagrant => C:/Users/Asus/Desktop/vagrant_lab
PS C:\Users\Asus\desktop\vagrant_lab> vagrant ssh
Welcome to Ubuntu 18.04.6 LTS (GNU/Linux 4.15.0-212-generic x86_64)

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

  System information as of Mon Sep  2 06:32:21 UTC 2024

  System load:  0.19                Processes:             101
  Usage of /:   3.0% of 38.70GB     Users logged in:       0
  Memory usage: 13%                 IP address for enp0s3: 10.0.2.15
  Swap usage:   0%


Expanded Security Maintenance for Infrastructure is not enabled.

0 updates can be applied immediately.

Enable ESM Infra to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

New release '20.04.6 LTS' available.
Run 'do-release-upgrade' to upgrade to it.


vagrant@ubuntu-bionic:~$
```

- 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:

vagrant halt

Destroy the VM (optional):

To remove the VM completely, use the following command:

```
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.

**Submission:**

- Submit a brief report including the Vagrantfile you configured, screenshots of the running VM, and the output of any commands run within the VM.

```
vagrant@ubuntu-bionic:~$ mkdir jahesh
vagrant@ubuntu-bionic:~$ ls
jahesh
vagrant@ubuntu-bionic:~$
```

- Reflect on the learning experience and any challenges faced during the exercise.

    Learning experience : got to know about vagrant and how to install it

    Any challenges : its was challenging to install it

This lab exercise provides a hands-on introduction to Vagrant, focusing on creating and managing virtual environments through a Vagrantfile. It offers both foundational learning and opportunities to explore more advanced features.