VirtualBox and Vagrant [14 Nov 2022 Homework]

The homework

- Virtualization
  i. Install VirtualBox in your machine
  ii. Install Vagrant in your machine
  iii. Stand up Fedora 35 VM Server
  iv. Stand up Ubuntu 20.04.x Server LTS VM
- Concepts
  - Investigate: What is software architecture and how it is related to Enterprise Architecture

What is VirtualBox?

VirtualBox is a hypervisor used to run operating systems in a special environment, called a virtual machine, on top of the existing operating system.

What is Vagrant?

Vagrant is an open-source software product for building and maintaining portable virtual software development environments. Vagrant **IS NOT** a virtual machine provider so the user needs to have a provider as ***VirtualBox***, ***Hyper-V***, ***Docker*** or ***VMware*** to work with.

Installing VirtualBox in Arch Based Linux

1. Install the VirtualBox core packages

   ```
   └─λ sudo pacman virtualbox
   ```

2. Install host modules

   Can use virtualbox-host-modules-arch for linux kernel

   ```
   └─λ sudo pacman virtualbox-host-modules-arch
   ```

   or can use virtualbox-host-dkms for other kernels

```
└─λ sudo pacman virtualbox-host-dkms
```

3. Install the appropiate headers package for the kernel

   Example: For linux-lts kernel can use linux-lts-headers

```
└─λ sudo pacman linux-lts-headers
```

4. Validate install

```
└─λ virtualbox -h
Oracle VM VirtualBox VM Selector v7.0.2
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No special options.

If you are looking for --startvm and related options, you need to use VirtualBoxVM.</
```

Installing Vagrant

5. Install the Vagrant package

```
└─λ sudo pacman vagrant
```

6. Validate install

```
└─λ vagrant -v
Vagrant 2.3.2</pre>
```

Using Vagrant

1. Start by exploring vagrant box subcommands

```
└─λ vagrant box
Usage: vagrant box <subcommand> [<args>]

Available subcommands:
    add
```

```
    list
    outdated
    prune
    remove
    repackage
    update

For help on any individual subcommand run `vagrant box &lt;subcommand&gt; -h`
        --[no-]color                 Enable or disable color output
        --machine-readable           Enable machine readable output
    -v, --version                    Display Vagrant version
        --debug                      Enable debug output
        --timestamp                  Enable timestamps on log output
        --debug-timestamp            Enable debug output with timestamps
        --no-tty                     Enable non-interactive output
```

2. Search for the box needed. It's possible to find many templates here https://app.vagrantup.com/boxes/search

3. After you find the template add it to vagrant. Using ubuntu/focal64 as example

```
└─λ vagrant box add ubuntu/focal64
```

4. It can list all the local boxes ready to be mount in Vagrant using the following command

```
└─λ vagrant box list
generic/fedora35 (virtualbox, 4.2.2)
ubuntu/focal64   (virtualbox, 20221107.0.0)
```

5. Create a dir to store the config file for the box

```
└─λ mkdir ubuntu-vagrant-test
└─λ cd ubuntu-vagrant-test
```

6. In created dir intialize vagrant

```
└─λ vagrant init ubuntu/focal64

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.
```

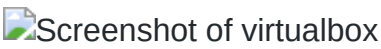
7. Stand the virtual machine

```
└─λ vagrant up
```

8. Get inside command line of virtual machine

```
└─λ vagrant ssh
Welcome to Ubuntu 20.04.5 LTS (GNU/Linux 5.4.0-131-generic x86_64)

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

System information as of Tue Nov 15 14:38:11 UTC 2022

System load: 0.0 Processes: 121
Usage of /: 3.5% of 38.70GB Users logged in: 0
Memory usage: 20% IPv4 address for enp0s3: 10.0.2.15
Swap usage: 0%

0 updates can be applied immediately.

The list of available updates is more than a week old.
To check for new updates run: sudo apt update
New release &apos;22.04.1 LTS&apos; available.
Run &apos;do-release-upgrade&apos; to upgrade to it.

vagrant@ubuntu-focal:~
```

9. Open VirtualBox to watch it running



10. To shutdown the virtual machine use

```
└─λ vagrant halt
```

11. To destroy the virtual machine use

```
└─λ vagrant destroy
```

Vagrant on Arch considerations

1. Be sure ***Safe Virtual Machine*** mode is enabled in your motherboard and OS

2. In case of finding this error:

```
The private key to connect to the machine via SSH must be owned
by the user running Vagrant. This is a strict requirement from
SSH itself. Please fix the following key to be owned by the user
running Vagrant:

/mnt/specific_dir/.vagrant/machines/default/virtualbox/private_key
```

   - If using NTFS format on file system, SSH won't work so it can be disabled on Vagrantfile adding this lines:

```
config.ssh.insert_key=false
```

   - If using a Linux file system check status with:

```
stat /mnt/specific_dir/.vagrant/machines/default/virtualbox/private_key
```

     Check actual user with:

```
id
```

     Set owner with

```
chown '[username]' /mnt/specific_dir/.vagrant/machines/default/virtualbox/private
```

Arquitecture

"Más allá de los algoritmos y estructuras de datos de la computación; el diseño y especificación de la estructura global del sistema es un nuevo tipo de problema." **An introduction to Software Architecture, David Garlan & Mary Shaw**

Architecture, referring to software, is a concept that emerged in the 1960s and refers to planning based on models, patterns and theoretical abstractions, when creating a piece of software of a certain complexity and as a prior step to any implementation. In this way, we have a detailed theoretical guide that allows us to understand how each of the pieces of our product or service will fit together.

Therefore, in architecture we call a pattern any general and reusable solution for recurring problems in software engineering in a given context, they are similar to the patterns used in programming, but specifically oriented to the structure at a higher and more generic level.

Some design patterns

- Client-server pattern
- Layered pattern
- Master-slave pattern
- Model-View-Controller (MVC) pattern
- Broker pattern
- Pipelining pattern

(Read more...)

How Software Architecture is related to Enterprise Architecture

- Similarities
  - Methods for specifing architectures
  - Modeling language and meta models
  - Reuse approach
  - Using architecture templates & architecture patterns

- Diferences

Enterprise	Software
Business requirements based	Functional and technological requirements based
Multi-system vision approach	User cases approach
Business scenarios	Software frameworks
Business strategy & Business operation guided	Software lifecycle guided