Operating Systems
Communication Networks [2020-2021]

Support doc - Linux Virtual Machine to support practical exercises

Introduction

Linux is required in the courses of Operating Systems ("SO") and Communication Networks ("RC"). This support document explains how to install a pre-built image of a Linux Virtual Machine (VM) with all the necessary tools for both courses.

Students willing to install a complete Linux distribution step-by-step (either as a dual boot or in a VM) should follow the instructions provided in Operating Systems support documentation *Tutorial 01 – Installing Linux and the required tools*. This is recommended for Operating System students.

Virtual Machine with pre-installed Linux

The pre-built virtual machine is provided in the OVA format, which is compatible with VirtualBox and VMWare virtualization software.

To proceed with the installation of the virtualization software, please follow one of the options:

VirtualBox:	https://www.virtualbox.org/
	- Free
	- After version 6 it does not support 32 bits hosts
VMWare:	https://my.vmware.com/web/vmware/downloads
	- Free only to run existing machines
	- In Mac it must be used VMWare Fusion which is not free

Next, download the Linux virtual machine image from https://eden.dei.uc.pt/~vasco/classes.html. Choose **LUbuntu** version for classes.

Details about the image provided:

- File: LUbuntu_2021.ova
- File size around 4GB
- Operating system version: LUbuntu 20.04 (64 bit)
- Additional software installed:
    - gcc, gdb, ddd, make
    - traceroute
    - net-tools
    - NS-2 2.35 (allinone)
    - GNS3 2.2.17
    - Atom
    - Wireshark
    - Docker (a container was created for RC classes and added to GNS3)

Note: the image file must be imported in the virtualization software (e.g. VirtualBox or VMWare). In Virtual Box use the option "File → Import Appliance…" ().

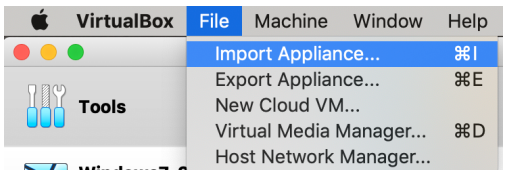

Fig. 1 – Import the VM using Virtual Box

Credentials to access the operating system:

Login/username: **user**

Password: **password**

Notes regarding the installation on VirtualBox

This section includes some notes regarding common issues with VirtualBox virtualization software.

Note 1:

Guest Additions allow a better integration between the virtual machine and the host running the virtualization software. Besides improvements in performance, it also supports clipboard sharing and folders sharing between the virtual machine and the host. Remove the installed Guest Additions and install the most recent and more appropriate to your system.

- Remove the installed version:
  `$ sudo apt remove --purge virtualbox-guest-additions-iso`
- After removing, install the appropriate Guest Additions according to the VirtualBox version: "Devices → Insert Guest Additions CD image..." (https://en.wikibooks.org/wiki/VirtualBox/Setting_up_an_Ubuntu_virtual_machine)

- After install, reboot the machine.

To use clipboard sharing and folder sharing facilities, these options must be activated in the respective menus options of VirtualBox.

Note 2:
Sharing between the guest OS (Ubuntu) and the host OS is possible through VirtualBox. Guest Additions software should be installed to enable sharing options.

To share the clipboard
In the VirtualBox menu, select "Devices → Shared Clipboard → Bidirectional".

To enable Drag and Drop
In the VirtualBox menu, select "Devices → Drag and Drop → Bidirectional".

To share Folders
In the VirtualBox menu, select "Devices → Shared Folders".
Select the host folder to share and mark the options "Auto-mount" and "Make Permanent".
(reboot may be necessary to enable the shared folder)

If it is not possible to see the *shared folders* in VirtualBox:
- Assure that Guest Additions are installed (see **Note 1**).
- Try to access to `/media/sf_name_of_shared_folder` . If this fails, do the following:

```
$ sudo usermod –a –G vboxsf {your username}
```

Check if your user belongs to the `vboxsf` group, by executing:

```
$ groups
```

If your user does not belong to the group, restart the machine.

Note 3:
The virtual machine is very slow.

Possible solution:
- Check if the option in the BIOS to support virtual machines is activated.
- In the settings of the virtual machine, increase the video memory and increase the number of used CPUs to 2 (if your system allows it).

Note 4:
Issues with graphics:
- Windows are drawn very slowly in the screen
- It is not possible to perform automatic resizing of the virtual screen (for instance, it is not possible to select the option "View → Auto-resize Guest Display" or it is deactivated)

Possible solution:
- Try to remove the *Guest Additions* (see **Note 1**)

Note 5:
If you have issues with the video resolution in the Ubuntu virtual machine, execute the following command in Linux:

```
$ sudo apt install virtualbox-guest-dkms virtualbox-guest-utils virtualbox-guest-x11
```

Note 6:
The mouse pointer disappears inside the VM.

It may be necessary to modify the virtual machine configuration in the following menu:

Machine -> Settings -> System -> Motherboard *tab*

Choose the option **Enable I/O APIC**.

Note 7:
The installation of VirtualBox gives an error on MacOS[1]:
- Starting on MacOS 10.13, it may give an error the first installation of VirtualBox, due to permission settings. Check in System Preferences, under Security and Privacy if the installation of VirtualBox software is blocked.

Note 8:
The installation gives the following error: "VT-x/AMD-V hardware acceleration is not available (...)":
- The image requires support for virtualization by hardware, and it is not activated. Check if UEFI/BIOS has the virtualization by hardware activated.

`Inter (R) Virtualization Technology [Enabled]` or
`AMD-V [Enabled]`

(if you do not have experience changing the BIOS configuration, ask support from your teacher in the PL's classes)

[1] Issue documented in https://github.com/docksal/docksal/issues/417