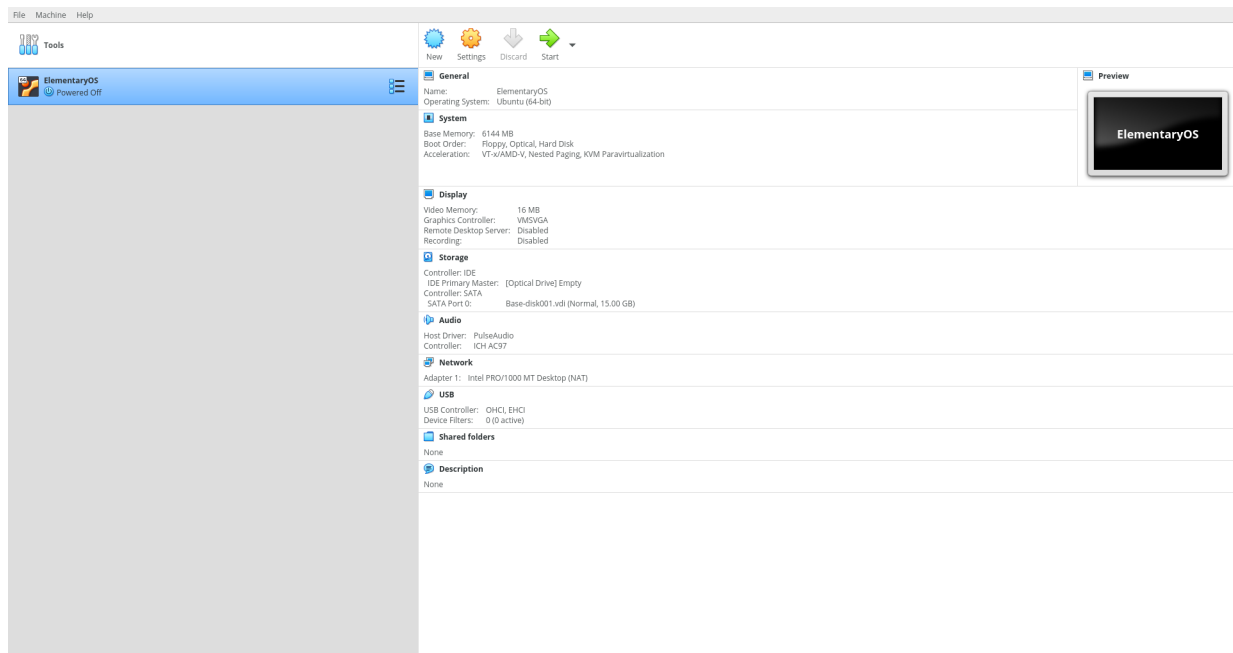# 1 Introduction

You may **either** setup your personal computer (PC) with the pre-configured Linux-based Virtual Machine (VM) (see Section 2) **or** set it up natively (see Section 3). The latter approach is recommended only if you are unable to run the VM on your computer for technical reasons, or if you prefer a native setup and don't mind poking around on the Internet should any issues arise along the way.

2 VM Setup

For the VM to work properly, you will need a 64-bit, virtualization-enabled machine with at least 8GB of RAM and 20GB of free disk space.

2.1 Steps

1. Download the following from `http://download.virtualbox.org/virtualbox/6.1.2/` ⎘:

   a. VirtualBox for your operating system (a `.deb` file for Ubuntu Linux, `.dmg` file for Mac OS X, and `.exe` file for Windows)

   b. VirtualBox Extension Pack (a `.vbox-extpack` file)

2. Install VirtualBox.

3. Launch VirtualBox, go to *File → Preferences → Extensions* and add the Virtual Box Extension Pack you downloaded in step 1b.

4. Download the pre-configured VM (`ElementaryOS.ova file`) from `https://www.swamiiyer.net/teaching/` ⎘.

5. Go to *File → Import Appliance*. Choose the appliance `ElementaryOS.ova` you obtained in step 4. Once the import is complete, your VirtualBox window should look like this:

6. Select *ElementaryOS*, go to *Settings → USB*, and select *Enable USB Controller → USB 3.0 (xHCI) Controller*.

7. Stop the VM by clicking ⏻ and selecting *Shut Down...*.

2.2 FAQ

Q1. What do I do if I receive a "corrupted image error" when I try to import the appliance (`ElementaryOS.ova`)?

Answer: Compare the size of the `ElementaryOS.ova` file you downloaded (or alternatively its MD5 hash) with the expected value listed on the Resources page of the course website and make sure it matches exactly.

Q2. What do I do if I receive a "virtualization error" when starting the VM?

Answer: Reboot your computer and as it starts hit the appropriate key ⤢ to get into the BIOS setup. Then find the virtualization option under one of the menus (usually system or something similar) and enable it. Save your changes and continue booting.

Q3. How do I get back in if I get locked out of the VM?

Answer: Use the password `enigma`.

Q4. How do I run the VM in full-screen mode?

Answer: Start the VM and click *View → Auto-resize Guest Display*. Then, hit key combination $\boxed{\text{HOST + F}}$ to go back and forth between full-screen mode and windowed mode, where the $\boxed{\text{HOST}}$ key is typically the $\boxed{\text{Right CTRL}}$ key.

Q5. What do I do to improve the performance of the VM?

Answer: Go to *ElementaryOS → Settings → System → Processor*, and increase the number of CPUs to 2 if allowed. Also, lick *ElementaryOS → Settings → Display → Screen*, increase video memory to 32MB, set graphics controller to VMSVGA, and enable 3D acceleration if allowed.

Q6. How do I share a clipboard between the host computer and the VM?

Answer: Within the VM, select *Devices → Shared Clipboard → Bidirectional*.

Q7. How do I access my USB drive within the VM?

Answer: To access your USB drive within the VM, insert the drive and select it from *Devices → USB*. To safely remove the drive from the VM, open file manager and click the *eject* icon next to the name of the drive. Note that on Linux hosts, the user on the *host* computer must be a member of the `vboxusers` group, which can be done by running the following command on the *host* terminal:

```
>_ ~/
$ sudo usermod -aG vboxusers $USER
```

Q8. How do I share a folder between the host computer and the VM?

Answer: Go to *ElementaryOS → Settings → Shared Folders*, click the *Adds new shared folder* icon, specify the path of the folder from your host computer that you want to share with the VM, specify a folder name (say, `share`) and select *Auto-mount*. Inside the VM, the shared folder will appear as `sf_share`.

Always have a backup of your files in the VM. You can use an USB drive (see Q7 in FAQ) or a shared folder on the host computer (see Q8 in FAQ) for this purpose.

3 Native Setup

In the following sections, when you run the suggested commands in the terminal, do **not** copy-paste the commands into the terminal; type them into the terminal instead.

3.1 On Ubuntu Linux

1. Launch a terminal and run the following commands.

```
>_ ~/
1   $ cd $HOME
2   $ sudo apt-get install openjdk-11-jdk
3   $ mkdir workspace lib bin
4   $ wget https://www.swamiiyer.net/teaching/stdlib.jar -P lib
5   $ wget https://www.swamiiyer.net/teaching/dsa.jar -P lib
6   $ wget https://www.swamiiyer.net/teaching/checkstyle-8.21-all.jar -P lib
7   $ wget https://www.swamiiyer.net/teaching/checkstyle-lift.jar -P lib
8   $ wget https://www.swamiiyer.net/teaching/checkstyle.xml -P lib
9   $ wget https://www.swamiiyer.net/teaching/checkstyle-suppressions.xml -P lib
10  $ wget https://www.swamiiyer.net/teaching/check_style -P bin
11  $ chmod 755 bin/check_style
12  $ echo "export PROJECT_HOME=$HOME/workspace" >> $HOME/.bashrc
13  $ echo "export CLASSPATH=.:.:/out:$HOME/lib/stdlib.jar:$HOME/lib/dsa.jar" >> $HOME/.bashrc
14  $ echo "export PATH=$HOME/bin:$PATH" >> $HOME/.bashrc
```

2. Download and install IntelliJ (Community Edition) ⬈.

3.2 On Mac OS X

1. Launch a terminal and run the following commands.

```
>_ ~/
1   $ cd $HOME
2   $ /usr/bin/ruby -e "$(curl -fsSL https://raw.githubusercontent.com/Homebrew/install/master/install)"
3   $ brew install openjdk@11
4   $ mkdir workspace lib bin
5   $ wget https://www.swamiiyer.net/teaching/stdlib.jar -P lib
6   $ wget https://www.swamiiyer.net/teaching/dsa.jar -P lib
7   $ wget https://www.swamiiyer.net/teaching/checkstyle-8.21-all.jar -P lib
8   $ wget https://www.swamiiyer.net/teaching/checkstyle-lift.jar -P lib
9   $ wget https://www.swamiiyer.net/teaching/checkstyle.xml -P lib
10  $ wget https://www.swamiiyer.net/teaching/checkstyle-suppressions.xml -P lib
11  $ wget https://www.swamiiyer.net/teaching/check_style -P bin
12  $ chmod 755 bin/check_style
13  $ echo "export PROJECT_HOME=$HOME/workspace" >> $HOME/.bash_profile
14  $ echo "export CLASSPATH=.:.:/out:$HOME/lib/stdlib.jar:$HOME/lib/dsa.jar" >> $HOME/.bash_profile
15  $ echo "export PATH=$HOME/bin:$PATH" >> $HOME/.bash_profile
```

2. Download and install IntelliJ (Community Edition) ⬈.

3.3 On Windows

1. Launch a powershell terminal and run the following commands.

```
>_ ~/
1   $ cd $HOME
2   $ mkdir workspace,lib,bin
3   $ wget -O lib\stdlib.jar https://www.swamiiyer.net/teaching/stdlib.jar
4   $ wget -O lib\dsa.jar https://www.swamiiyer.net/teaching/dsa.jar
5   $ wget -O lib\checkstyle-8.21-all.jar https://www.swamiiyer.net/teaching/checkstyle-8.21-all.jar
6   $ wget -O lib\checkstyle-lift.jar https://www.swamiiyer.net/teaching/checkstyle-lift.jar
7   $ wget -O lib\checkstyle.xml https://www.swamiiyer.net/teaching/checkstyle.xml
8   $ wget -O lib\checkstyle-suppressions.xml https://www.swamiiyer.net/teaching/checkstyle-suppressions.xml
9   $ wget -O bin\check_style.bat https://www.swamiiyer.net/teaching/check_style.bat
10  $ setx PROJECT_HOME "$HOME\workspace"
11  $ setx CLASSPATH ".;.\out;$HOME\lib\stdlib.jar;$HOME\lib\dsa.jar"
```

```
12  $ setx PATH "$env:PATH;$HOME\bin"
```

2. Download and unzip OpenJDK 11 ☑ for Windows under some folder. Run the following command, replacing the xyz with the path to the folder within that contains the bin folder.

```
>_ ~/
13  $ setx PATH "$env:PATH;XYZ\bin"
```

3. Download and install IntelliJ (Community Edition) ☑. Launch IntelliJ, go to *Configure → Settings → Tools → Terminal* and set *Shell path* to powershell.

3.4 FAQ

Q1. What do I do if I get a "Project JDK is not defined" message when I open a Java program in IntelliJ?

Answer: Click on "Setup SDK" and select OpenJDK 11 available under "Detected SDKs".

Q2. How do I tell IntelliJ to automatically wrap lines at 100 columns and enable visual guides at 80 and 100 columns?

Answer: Go to *File → Settings → Editor → Code Style*, set "Hard wrap at" to 100, enable "Wrap on typing", and set "Visual guides" to 80, 100.

Q3. How do I tell IntelliJ to assign each parameter or variable its own color?

Answer: Go to *File → Settings → Editor → Color Scheme → Language Defaults → Semantic highlighting*, and enable it.