

Installing Gem5 VM for Apple Silicon

Summary and important info

With these instructions, you can get the professor's VM running on a Mac with Apple Silicon chip.

It's quite slow, but for what we need (for now), it's sufficient with some patience. This is because we will **emulate** the x86 architecture instead of virtualizing it (which is not possible).

The file includes some information about my own Mac as a reference to have a working (though slow) environment. If you have a more powerful Mac, increase the specs during VM creation.

Finally, note that you need plenty of storage space, because during conversion processes we'll have both the .ova machine (20GB) and a converted disk of around 50GB. Together, that's roughly 70GB, plus the virtualization overhead

1) Creating and extracting the .ova archive

Download the .ova file provided by the professor from the portal.

First, turn it into a .tar archive so we can safely extract its contents.

From the **Mac terminal**:

```
1 mv machine.ova machine.tar  
2 tar -xvf machine.tar
```

Replace `machine` with the actual filename of the .ova file.

2) Converting to UTM format (QCOW2)

1. If you've never done it before, install the QEMU tools on your Mac. Otherwise, move to step 2.

From **Mac terminal**:

```
1 brew install qemu
```

Installing Homebrew

To use the terminal command above, you need Homebrew.

If you've never installed it, follow the guide at:

<https://brew.sh>

2. Convert the VMDK disk into QCOW2 format. From **Mac terminal**:

```
1 qemu-img convert -p -O qcow2 disk.vmdk ubuntu-gem5.qcow2
```

Replace `disk` with the actual .vmdk filename.

3) Creating the VM on UTM

We'll now create the VM on UTM. Follow these steps:

1. Open UTM (Download from: <https://mac.getutm.app/>)

⚠ If you already have UTM installed

Make sure your version is up to date, at least **4.7.4 (115)**.

Older versions may not support essential adjustments needed for the VM to work

2. New Virtual Machine

3. Emulate (NOT Virtualize)

4. Linux

5. Intel ICH9 based PC (2009, x86_64)

6. Allocate **Memory**, depending on your Mac's capacity.

💡 Memory amount

Generally, you'll need more than 50% of your RAM, but it's recommended not to exceed 75%

ⓘ For reference...

My Mac is a MacBook Air with 8GB RAM, I allocated 6GB

7. Define how many **CPU Cores**, depending on your Mac's capacity.

ⓘ For reference...

My Mac has an Apple Silicon M2 processor, I assigned 6 cores

8. Leave **Display Output** as proposed by UTM.
9. Choose **Import existing drive** and select the .qcow2 file you converted earlier.

⚠ Importing the disk

This step is crucial: if UTM asks to load an ISO, that's wrong — select the option to import an existing disk

10. Skip the **Shared Folder** setup (we'll configure it later, if you want).
11. In the summary, leave everything as-is (rename the **VM Name** as you like).
12. Click **Save**. The screen might take a while to load — that's normal.

4) Startup

1. Start the VM by pressing the "play" button next to its name.
2. The first boot will take a while. It's normal to see "no display output" messages.
3. If you get privacy permission requests (microphone, etc.), allow all.
4. When prompted for login, follow the professor's instructions (VM password: **0000**).
5. Once on the desktop, all required files and folders given by the professor **should** be there.
6. If Ubuntu asks to update, click "X" and ignore it.

You can now use the VM for the lab exercises as described by the professor.

5) Shutdown

To shut down the VM, go to the upper-right Ubuntu menu → power icon → **Shut Down** (not Logout or Disconnect).

⚠ Attention!

When UTM shows the large "play" button on the powered-off VM, **only then** you can close the VM window. Don't close it while it's still shutting down — that's equivalent to a forced power-off

6) Future restarts

When you want to start the VM again, follow the same steps from section 4. It should be faster this time and go straight to the login screen without any issues.

7 - Optional) Shared Folder

What's it for?

- Since the VM is generally slow, it's better not to use it for full workloads — only for compiling files as requested and for performance analysis with Gem5.
- You can open the lab's PDF from the built-in Linux viewer to copy/paste commands, but don't compile PDFs inside the VM (use Preview or your favorite PDF editor on Mac instead).
- Everything else (like coding, browsing the portal with a browser) should be done on your Mac using your preferred IDE or text editor.

The VM folder is read-only; you can't upload files out of it

However, copy-paste between Mac and VM (in either direction) works and can be handy

Creating it (first time only)

If the VM is running, shut it down before starting this section

Steps (first time only):

1. **Create a folder** on your Mac wherever you want, to use for sharing.
Make sure the folder has read/write permissions allowed for “everyone” (in the panel accessible through CMD+I).
2. Open **UTM** and, with the **VM turned off**, click its name (NOT the Play button), then scroll down the settings and choose the folder you just created for “**Shared Directory**”.
3. **Start the VM**
4. **Inside the VM**, open **Ubuntu terminal** and run:

```
1 sudo mkdir /mnt/macshare  
2 sudo mount -t 9p -o trans=virtio share /mnt/macshare
```

5. You can find this folder by opening **Ubuntu File Explorer** → **Other Locations** → **Computer** → **mnt**. Files from your Mac folder (created in step 1) will appear there.
6. You can add this folder to Favorites in the File Explorer sidebar.

Reconnecting (every next time)

Connection lost

The “connection” between Mac and VM breaks every time the VM is shut down. However, your files remain safe on Mac — you just need to reestablish the mount in order to make the files appear in the folder again on the VM (the folder itself and the links pointing to it remain untouched)

After each VM startup (after the first one), simply repeat the *mount* step:

```
1 sudo mount -t 9p -o trans=virtio share /mnt/macshare
```

Once done, open the `macshare` folder on the VM — your files should now be visible again.

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