Installing QEMU and RISCV Toolchain

Steps:

Part 1: Toolchain

1. Download the `riscv-unknown-elf` toolchain (will be given to you in the lab)
2. You will have a folder structure something like this: `riscv64-elf-ubuntu-22.04-gcc-nightly-2025.01.16-nightly/riscv/...`
   which will contain the following folders:
   1. `bin`
   2. `include`
   3. `lib`
   4. `libexec`
   5. `riscv64-unknown-elf`
   6. `share`
3. Get the location of the `bin` folder by:

```
cd bin && pwd
```

Copy the path on the terminal. You need to add this in your path environment variable `PATH`. The path will look something like this:
`/home/<user>/riscv64-elf-ubuntu-22.04-gcc-nightly-2025.01.16-nightly/riscv/bin`

4. Open `bashrc` by

```
vim ~/.bashrc
```

5. Add the following line:

```
## this adds the risc-v binaries to the path variable
export PATH=/home/<user>/riscv64-elf-ubuntu-22.04-gcc-nightly-2025.01.16-nightly/riscv/bin:$PATH
## end
```

6. Save the file. Now you can access the RISCV toolchain from your system.

Part 2: QEMU

1. Download QEMU (will be given in lab)

2. You will have a folder named something like `qemu-master` or `qemu-stable-xx`.

3. `cd` into the folder, there will be lots of files in this folder.

4. Make a new folder called `build`

```
mkdir build
```

5. `cd` into `build`

```
cd build
```

6. Choose a new installation directory, in my case: `/home/<user>/qemu-install`

7. Run a configure script in the parent folder from the `build` folder:

```
../configure --target-list=riscv64-softmmu --prefix=/home/<user>/qemu-install
```

`--prefix` is the location of your installation directory
`--target` is the target you want to build QEMU for, here, `riscv64-softmmu`

8. Run the following commands one after the other:

```
make -j $(nproc)
```

```
make install
```

9. QEMU files should now be present in your installation folder, including a `bin` folder.

10. Add this `bin` folder location to `bashrc` just as we did before, in my case:

```
## this add QEMU binaries to the path variable
export PATH=/home/raagam/qemu-install/bin:$PATH
## end
```

11. QEMU has been installed and can now be accessed by your system and `xv6`

All The Best for the exam, Friends!