Faculty of Engineering Technology (ET)

Installing LBM solver Musubi on Windows

Biofluid Dynamics: Theory and Analysis
Course code: 202001436

Lecturer:
dr. K. Jain

Author:
J.L. van der Hoek

Date:
23rd February 2021

UNIVERSITY OF TWENTE.

Installation instructions

In this document, you will find the instructions to install Musubi on Windows using the Linux shell Ubuntu. Various other programs have to be used to compile Musubi, which are all updated and changed over time. It could be possible that these instructions are therefore not up to date. The steps of the installation can also be found here: `https://geb.sts.nt.uni-siegen.de/doxy/musubi/page/usage/index.html`. However, the instructions on this page are explained quite briefly, so it is recommended to follow the instructions in this document.

1. Install Ubuntu on Windows. The recommended way to do this is by downloading and installing it from the Windows Store. It is recommended to use the latest version of Ubuntu (see figure 1.1, however any version should enable a working Musubi.

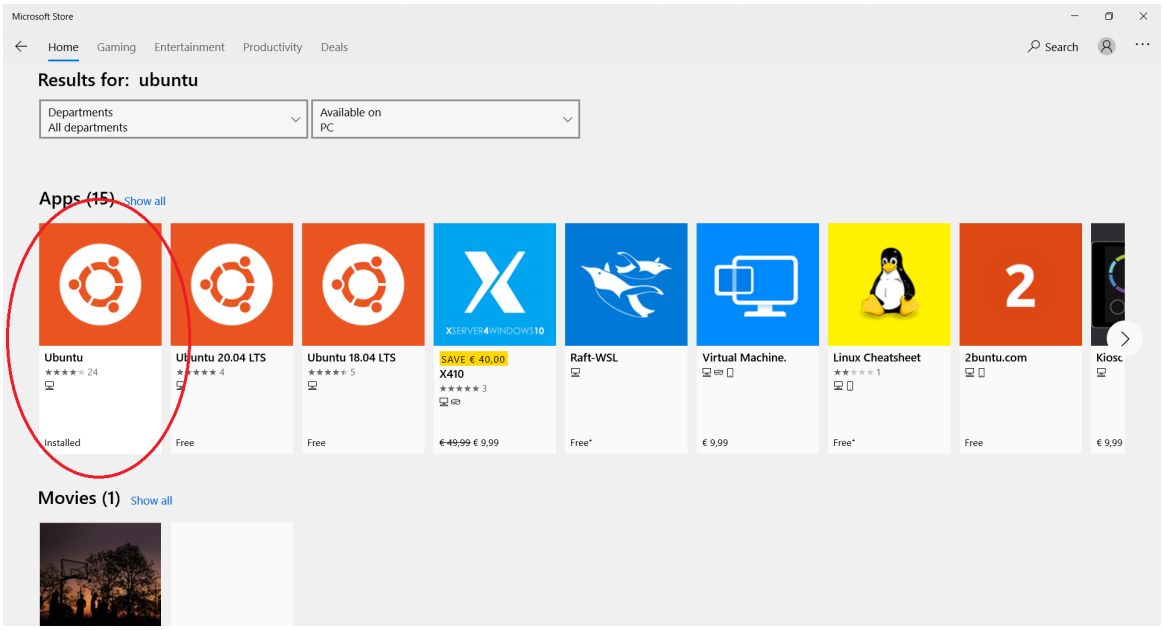

Figure 1.1: Ubuntu in the Windows Store

2. Install Mercury. Mercurial is a source control management tool, which is used to clone the latest version of Musubi directly from the source. Run the following command in Ubuntu:

```
$ apt-get install mercurial
```

Note that the $ denotes a bash command, which is followed by the command that is actually put in Ubuntu. If you do not have the permission to run this command, you should run it with *sudo*. This means you will run the command as a super user, which is often required for installing software.

```
$ sudo apt-get install mercurial
```

3. Clone Musubi using the following command:

```
$ hg clone https://hg.osdn.net/view/apes/musubi
```

This makes a directory in your active directory called *Musubi* which contains the source. Note that this does not install Musubi!

4. Install OpenMPI. This is the tricky part of the installation, since OpenMPI cannot be installed directly on the Linux subsystem and problems often occur in the installation. Download the latest version from `https://www.open-mpi.org/` with the .tar.gz extension. The files can be extracted using for example WinRar or WinZip.

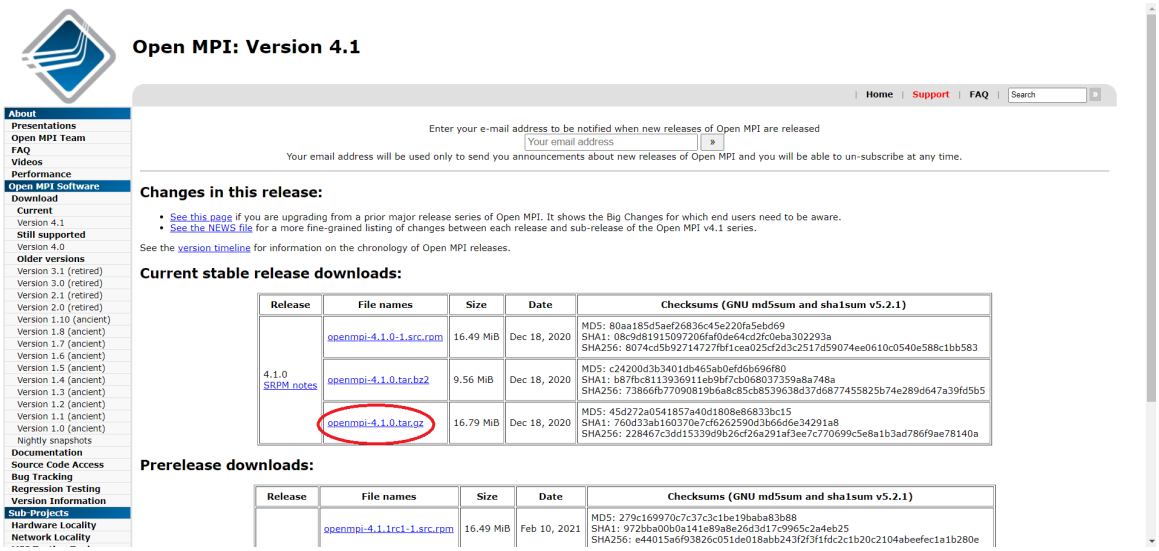

Figure 1.2: OpenMPI latest version with .tar.gz extension

Now, you should have a directory called *openmpi-4.1.0*. Move this directory to your Linux subsystem. This can be done by using the following command. The '.' at the end of the command is essential, since it means that the files are moved to the current location, which should be the main working directory.

```
$ mv \mnt\c\Users\'User'\Downloads\openmpi-4.1.0 .
```

In the command, you should substitute the user of your Windows system for *'User'*. To test this, look at figure 1.3. When you press *tab*, it shows you which options you have, which can be used to find out your username.

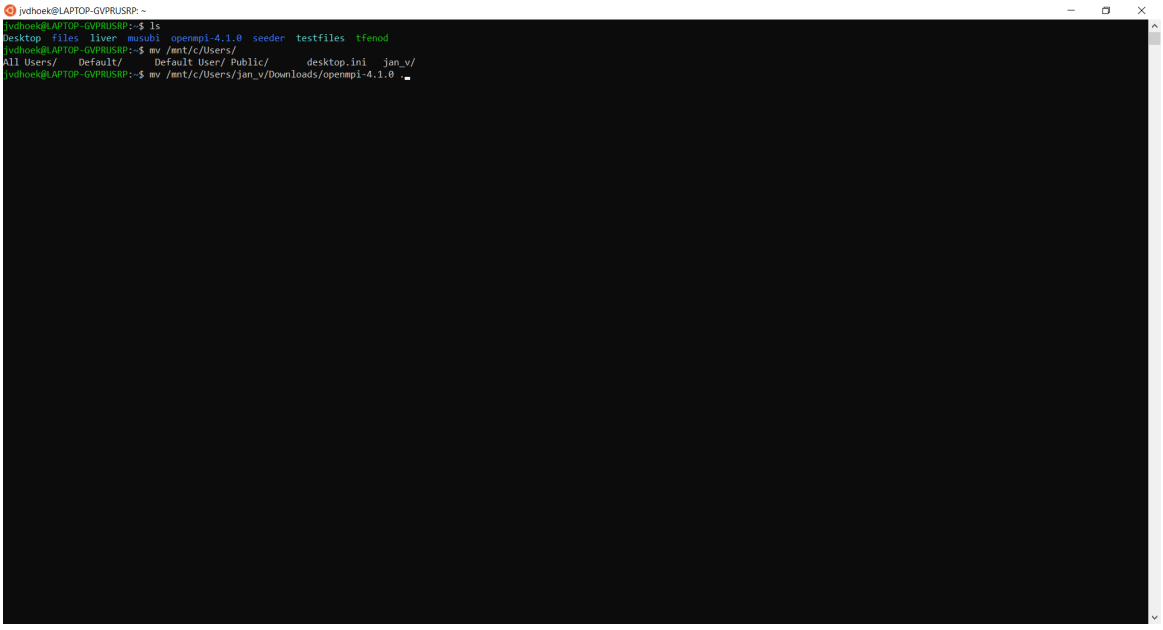

Figure 1.3: Moving OpenMPI to your Linux subsystem

5. Install openmpi. Do this by using the commands below. Move to your new directory:

```
$ cd openmpi-4.1.0
```

Edit the configuration file. It is recommended to install the files in the */usr/bin* directory, since this directory is on the active path, meaning that these files are found without specifying this path.

```
$ ./configure --prefix=/usr/bin
```

Install OpenMPI:

```
$ make all install
```

6. Set the new OpenMPI compilers as the active compilers.

```
$ export CC=mpicc; export FC=mpif90
```

7. Install Musubi. Now it should be possible to install Musubi. Go to the Musubi directory:

```
$ cd ~/musubi
```

The ~ is linked to the main working directory, which is the directory where both the Musubi source files and the openmpi files should be located. Configure the files:

```
$ ./waf configure
```

And finally, install Musubi:

```
$ export CC=mpicc; export FC=mpif90
```

Now, it can be tested if the installation was successful:

```
$ ~/musubi/build/musubi
```

If the output in figure 1.4 is obtained, Musubi can be used to run simulations.

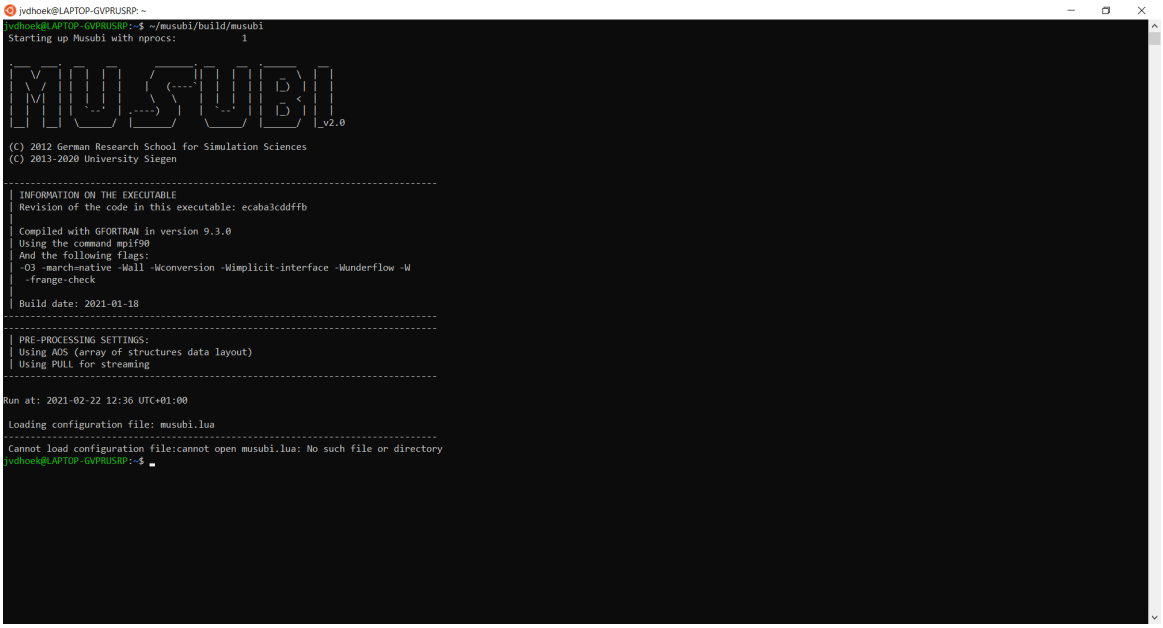

Figure 1.4: Musubi output for a working version

Warnings and errors are quite common in the installation of Musubi. If you follow all the steps in this document, a working version of Musubi should be the result. One known error that could occur even when you follow the steps is the compilation of Musubi, where the fortran compiler *gfortran* cannot be found. In this case, it could be possible that *gfortran* is installed with OpenMPI, but it is not linked correctly. To solve this problem, OpenMPI should be installed again by following the same steps. By reinstalling it, *gfortran* should now be recognized by OpenMPI and the link should be fixed. If this is not the case, gfortran should be installed separately, before installing OpenMPI again.

If any other errors occur in the compilation of Musubi, please send an email to *j.l.vanderhoek@student.utwente.nl*.