

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

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).

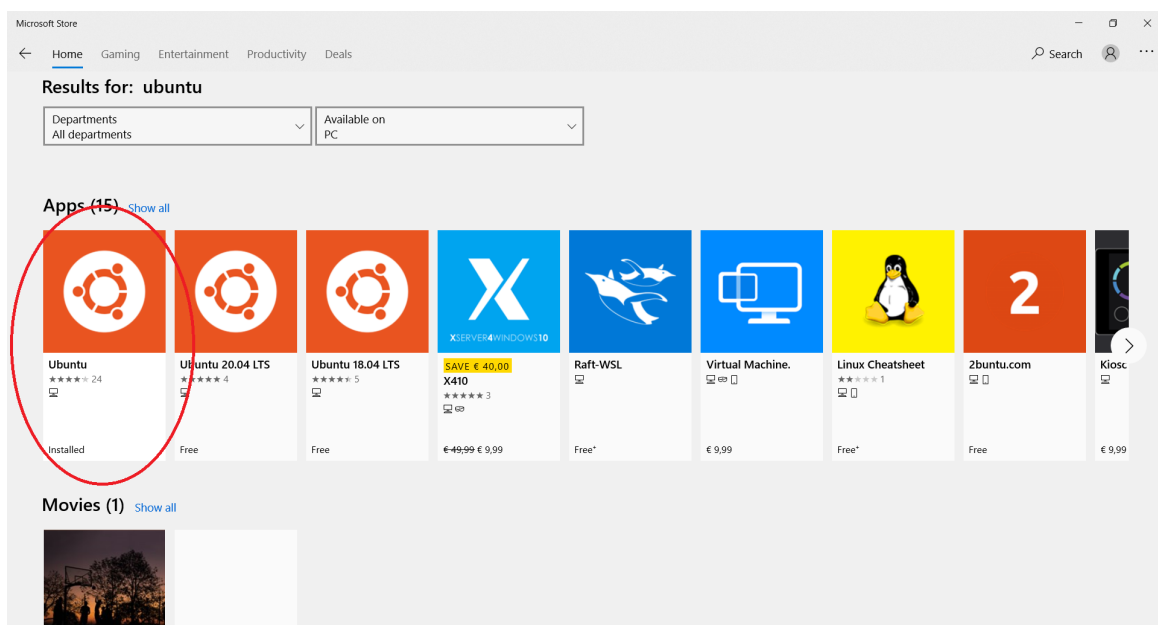


Figure 1.1: Ubuntu in the Windows Store

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.

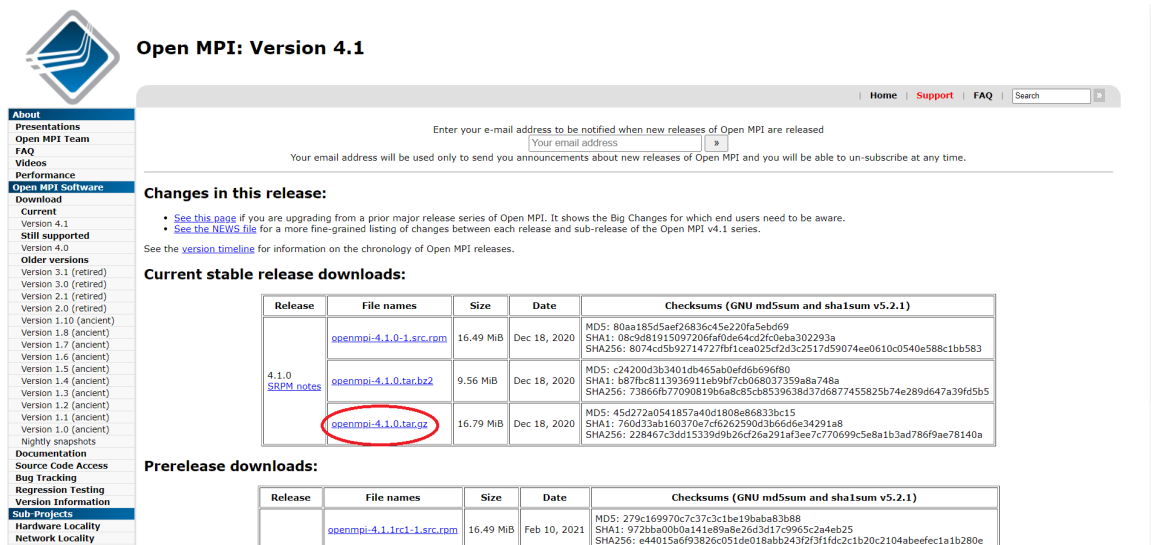
```
$ sudo apt-get install mercurial
```

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.



Open MPI: Version 4.1

Home | Support | FAQ | Search

Enter your e-mail address to be notified when new releases of Open MPI are released

Your email address will be used only to send you announcements about new releases of Open MPI and you will be able to un-subscribe at any time.

Changes in this release:

- See this page if you are upgrading from a prior major release series of Open MPI. It shows the Big Changes for which end users need to be aware.
- See the NEWS file for a more fine-grained listing of changes between each release and sub-release of the Open MPI v4.1 series.

See the version timeline for information on the chronology of Open MPI releases.

Current stable release downloads:

Release	File names	Size	Date	Checksums (GNU md5sum and sha1sum v5.2.1)
4.1.0 SHPM notes	openmpi-4.1.0-1.src.rpm	16.49 MiB	Dec 18, 2020	MD5: 80aa185d5aef26836c45e220fa5ebd69 SHA1: 08c9d81915097206fa0de64cd2c0eba302293a SHA256: 8074cd5b927147278f1ca025c2d3c2517d59074ee0610c0540e588c1bb583
	openmpi-4.1.0.tar.bz2	9.56 MiB	Dec 18, 2020	MD5: c24200d3b3401db465ab0f6d6e696f80 SHA1: b87bcb8113936911eb9b47cb068037359a8a748a SHA256: 73866fb77090819b6a8c85cb8539638d37d6877455825b74e289d647a39fd5b5
	openmpi-4.1.0.tar.gz	16.79 MiB	Dec 18, 2020	MD5: 45d272a0541857a40d1808e86833bc15 SHA1: 760d33ab160370e7cf6262590d3b66d6e34291a8 SHA256: 228467c3dd15339d9b26cd26a291af3ee7c70699c5e8a1b3ad786f9ae78140a

Prerelease downloads:

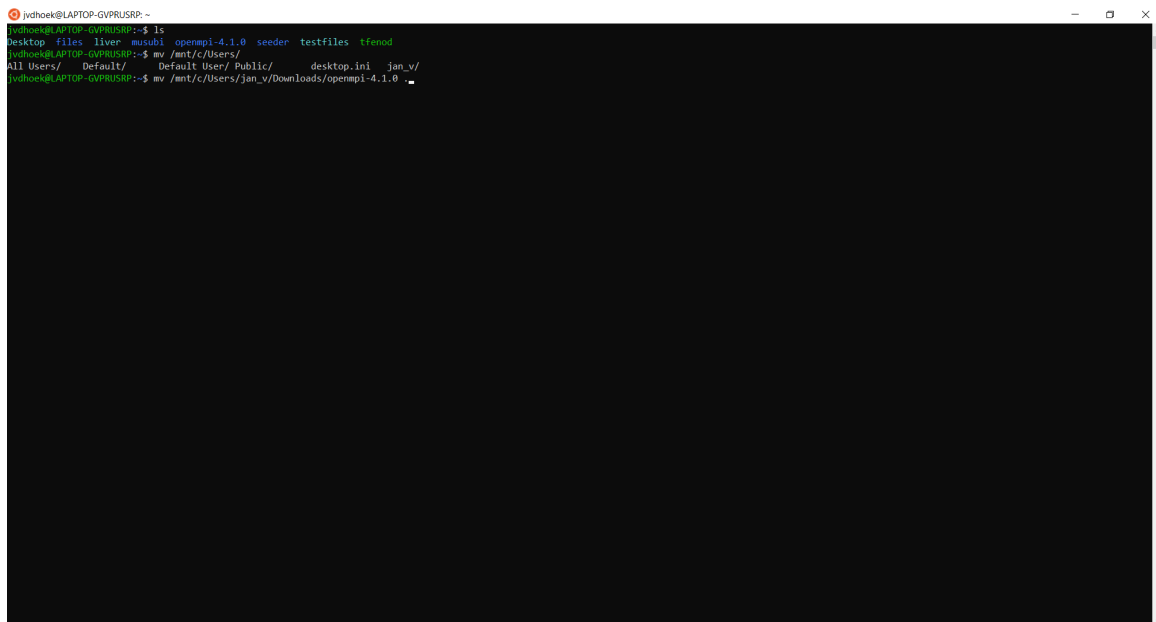
Release	File names	Size	Date	Checksums (GNU md5sum and sha1sum v5.2.1)
	openmpi-4.1.0rc1-1.src.rpm	16.49 MiB	Feb 10, 2021	MD5: 279c169970c7c37c3c1be19bab83b88 SHA1: 972bba00b0a141e89a8e26cd3d17c9965c2a4eb25 SHA256: e44015a6f93826c0516a018ab62432f2f1fd2c21b20c2104abeefec1a1b280e

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.



```
jvdhoek@LAPTOP-GVPRUSRP: ~
jvdhoek@LAPTOP-GVPRUSRP:~$ ls
Desktop files liver musubi openmpi-4.1.0 seeder testfiles tfenod
jvdhoek@LAPTOP-GVPRUSRP:~$ mv /mnt/c/Users/
All Users/ Default/ Default User/ Public/ desktop.ini jan_v/
jvdhoek@LAPTOP-GVPRUSRP:~$ mv /mnt/c/Users/jan_v/Downloads/openmpi-4.1.0 .
```

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.

```
judohek@LAPTOP-GVPRUSRP:~  
judohek@LAPTOP-GVPRUSRP:~$ ./musubi/build/musubi  
Starting up Musubi with nprocs:      1  
  
          V   U   S   U   D  
         / \  / \  / \  / \  
        /___\/_\_/_/_/_\  
       _v2.0_
```

```
(C) 2012 German Research School for Simulation Sciences  
(C) 2013-2020 University Siegen
```

```
-----  
| INFORMATION ON THE EXECUTABLE  
| Revision of the code in this executable: ecaba3cddffb  
|  
| Compiled with GFORTRAN in version 9.3.0  
| Using the command mpif90  
| And the following flags:  
| -O3 -march=native -Wall -Wconversion -Wimplicit-interface -Wunderflow -W  
| -frange-check  
|  
| Build date: 2021-01-18  
|  
|-----  
| PRE-PROCESSING SETTINGS:  
| Using ADS (array of structures data layout)  
| Using PULL for streaming  
|-----
```

```
Run at: 2021-02-22 12:36 UTC+01:00  
  
Loading configuration file: musubi.lua  
-----  
Cannot load configuration file:cannot open musubi.lua: No such file or directory  
judohek@LAPTOP-GVPRUSRP:~$
```

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.