FRENDY installation

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Contents

- Installation Ubuntu (Ubuntsu 20.04.1 LTS) on Windows Subsystem for Linux (WSL)

- Construction of development environment on Ubunt
  - Installation of development tools, *e.g.*, gcc
  - Compilation of FRENDY

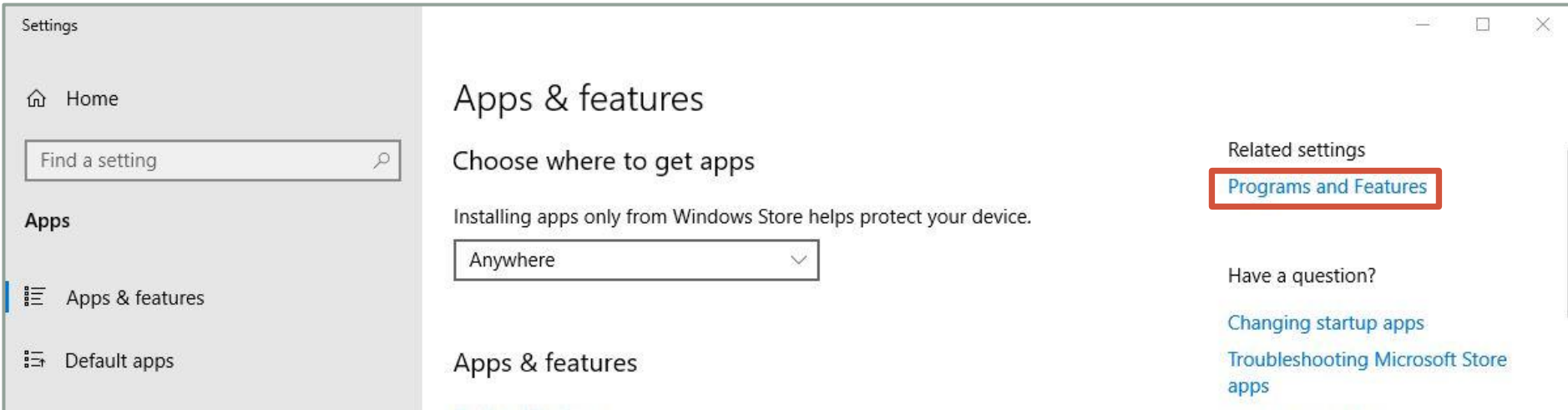# Introduction of Windows Subsystem for Linux (WSL)

Activation of WSL (1/4)

• Right click the Windows icon.

• Launch up "Apps and Features".

Activation of WSL (2/4)

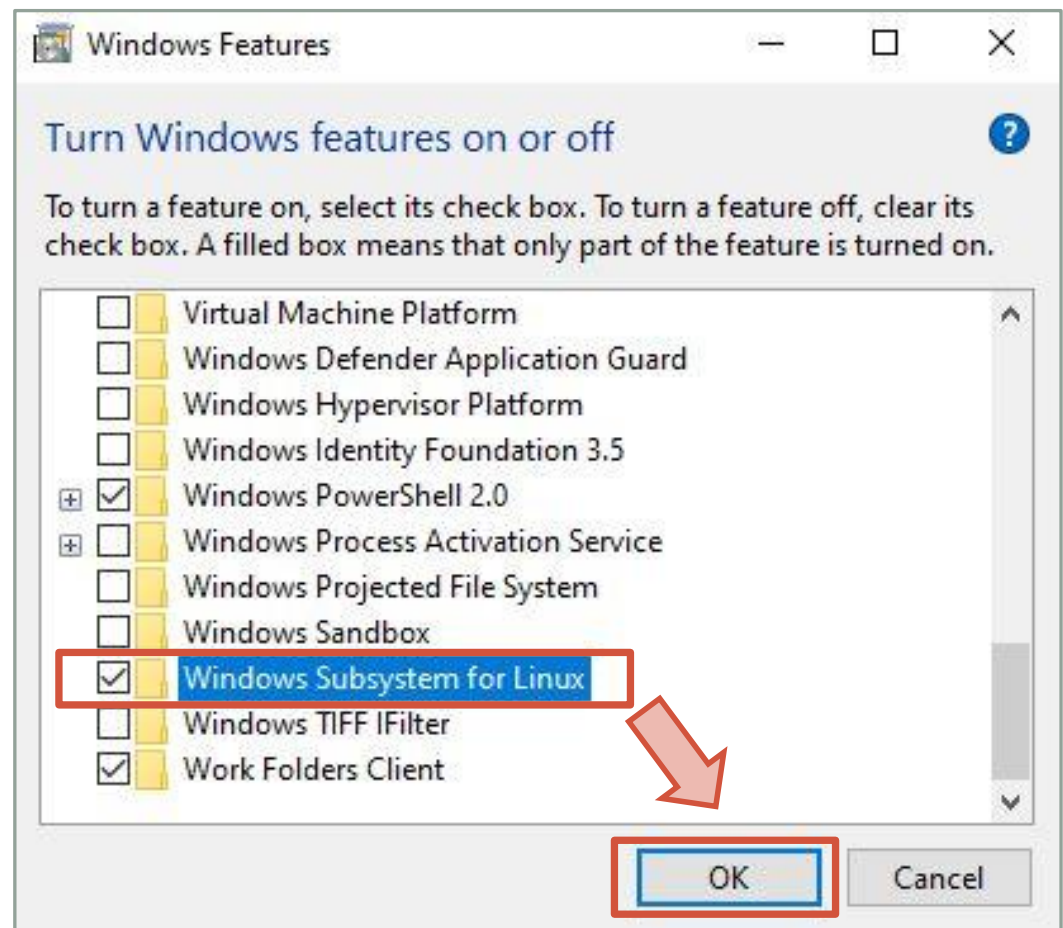• Click "Program and Features" on Related settings.

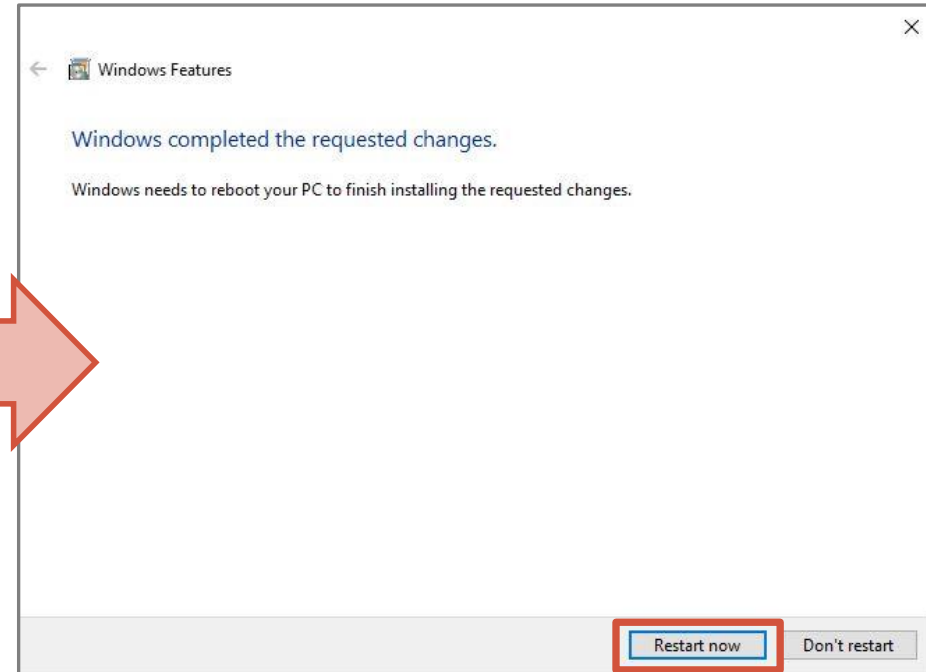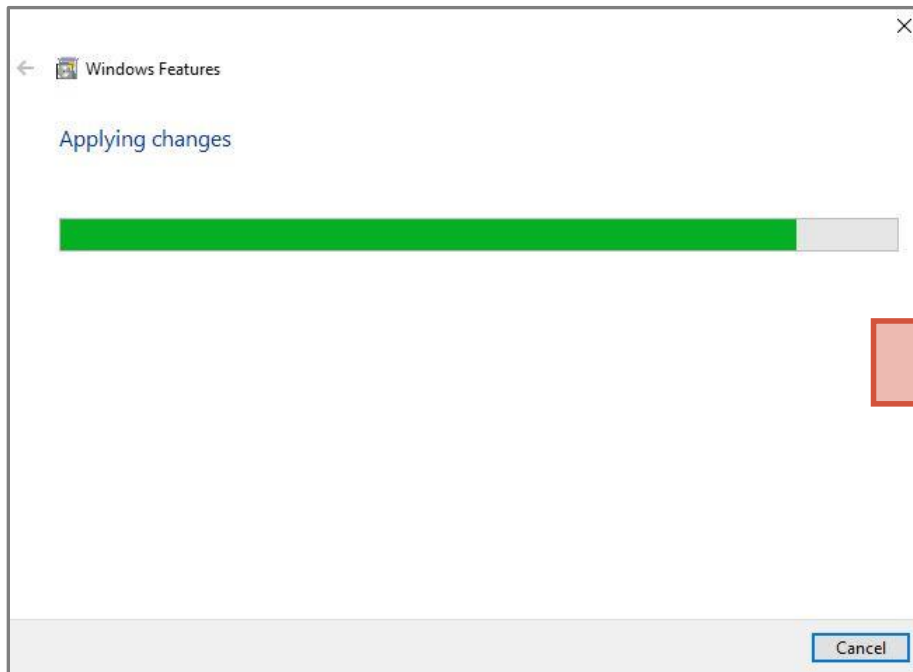
• Click "Turn Windows features on or off".

Activation of WSL (3/4)

- Put a check mark on "Windows Subsystem for Linux".
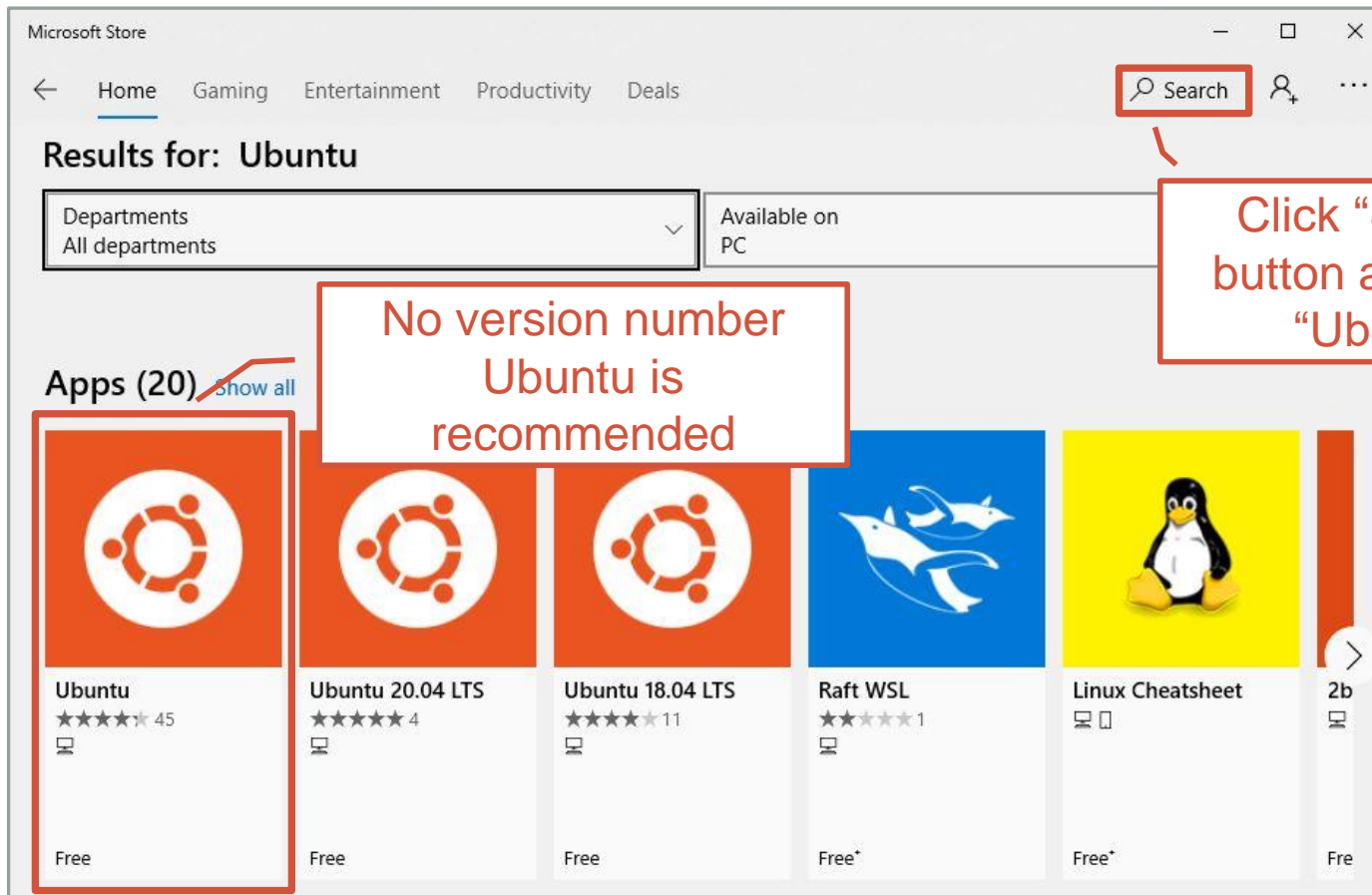- Click "OK" button.

Activation of WSL (4/4)

- Wait a few minutes
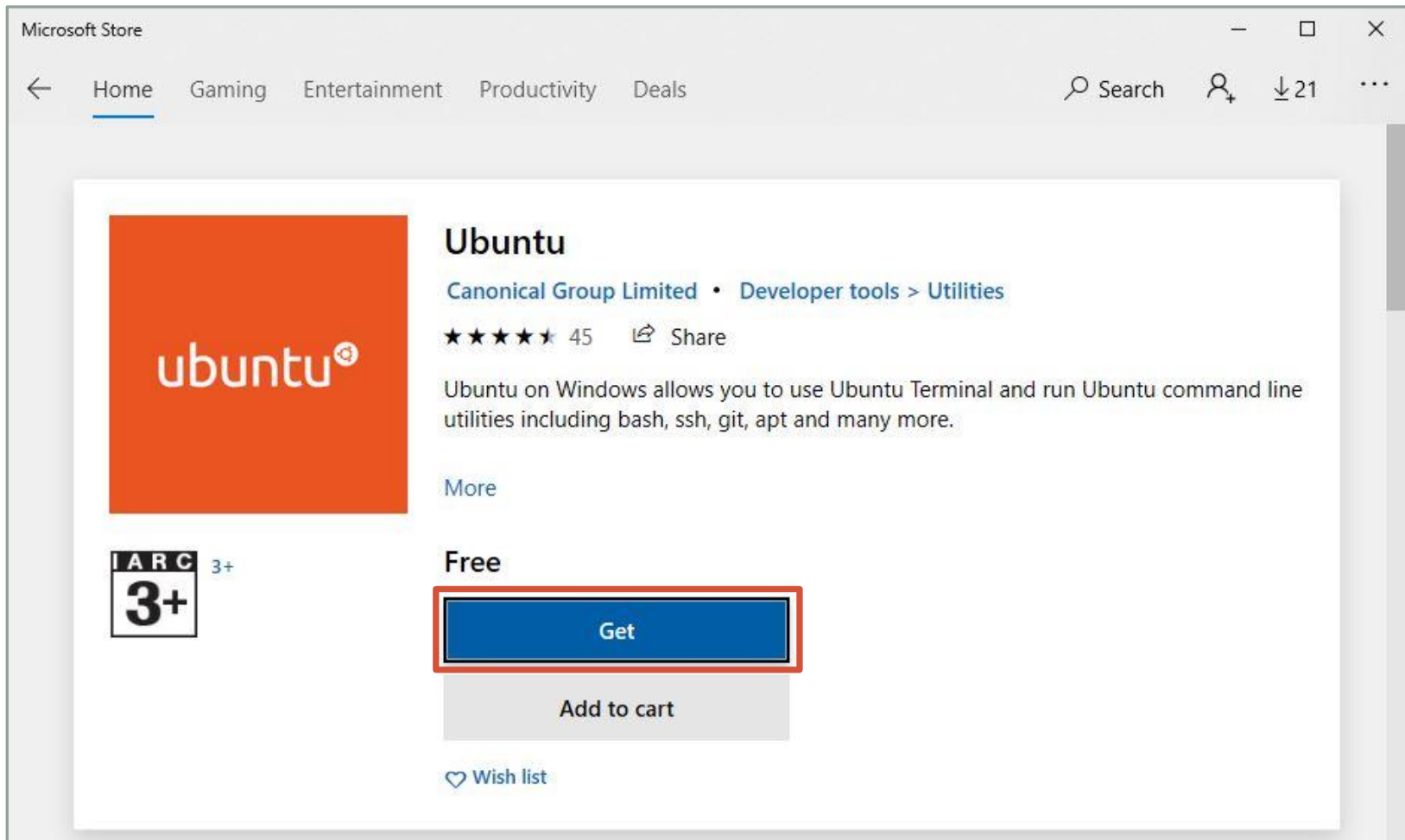- Restart Windows when Windows completed the requested changes

Installation of Ubuntu (1/7)

- Go to Microsoft Store and search "Ubuntu".
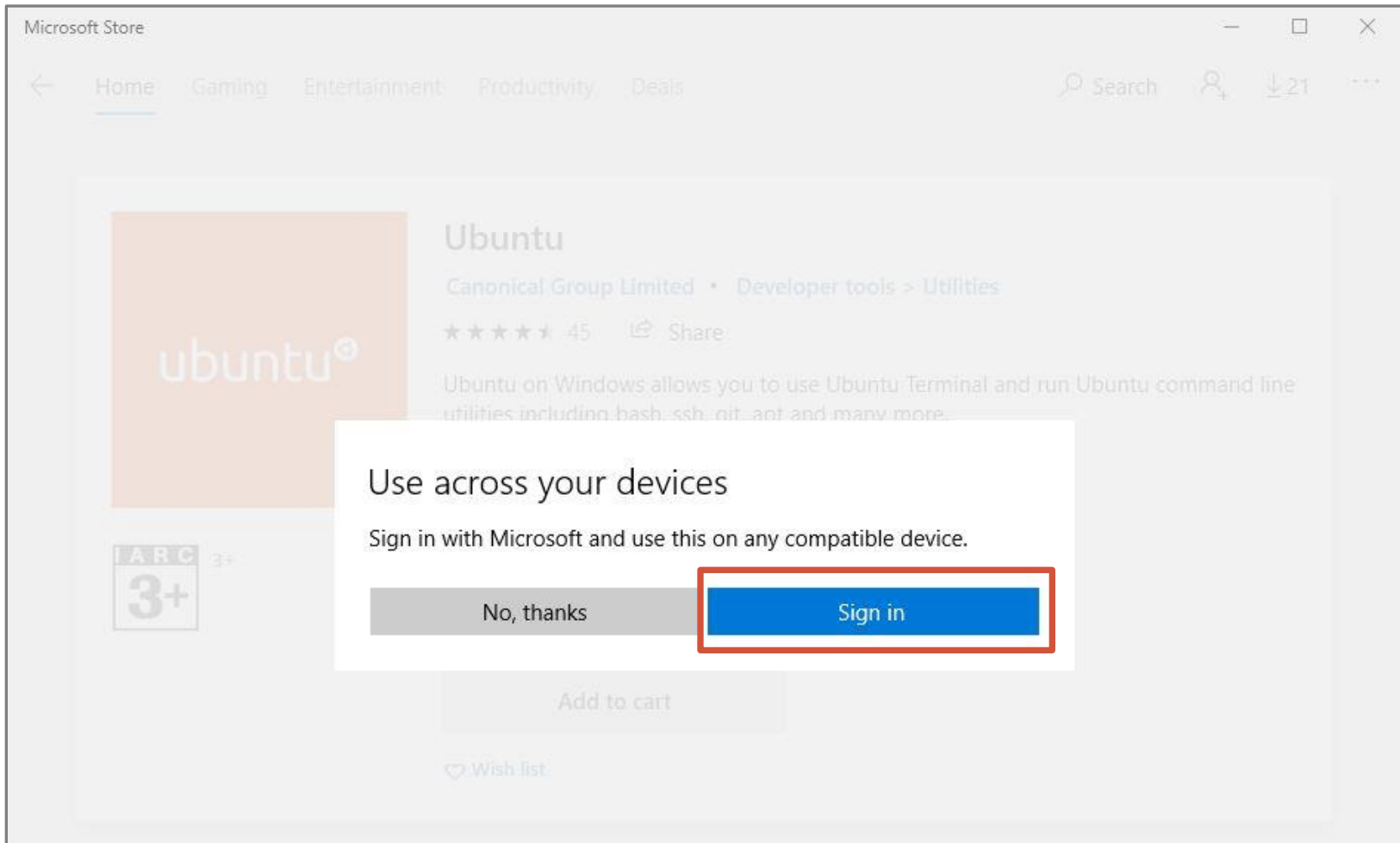- Select Linux OS and click icon.

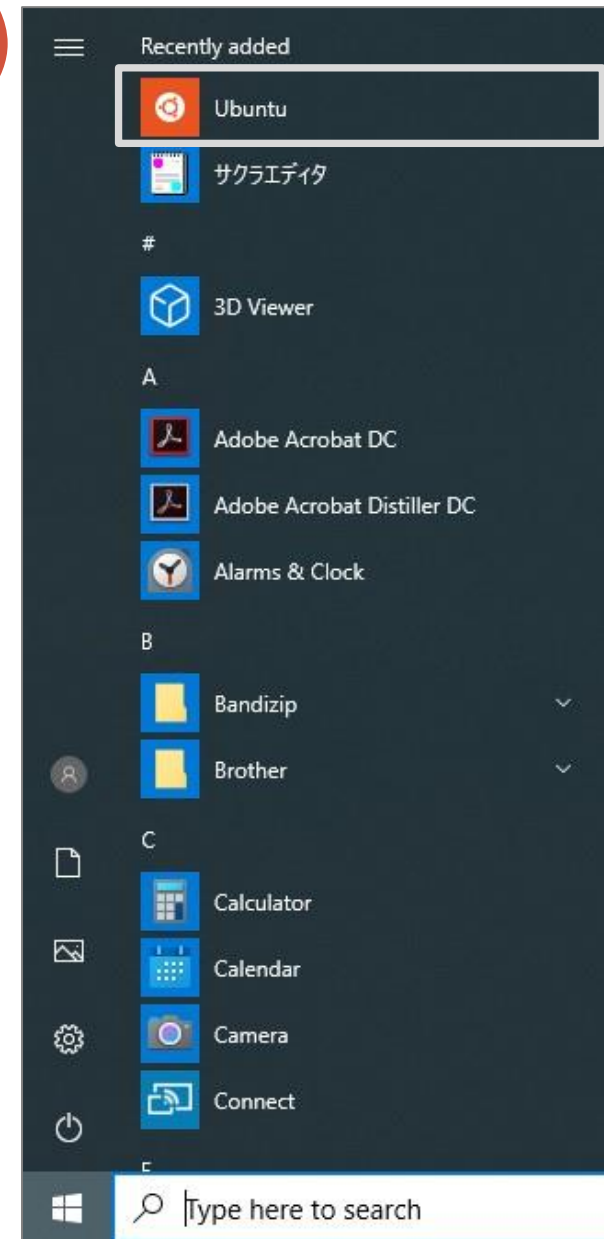# Installation of Ubuntu (2/7)

• Click "Get" button

Installation of Ubuntu (3/7)

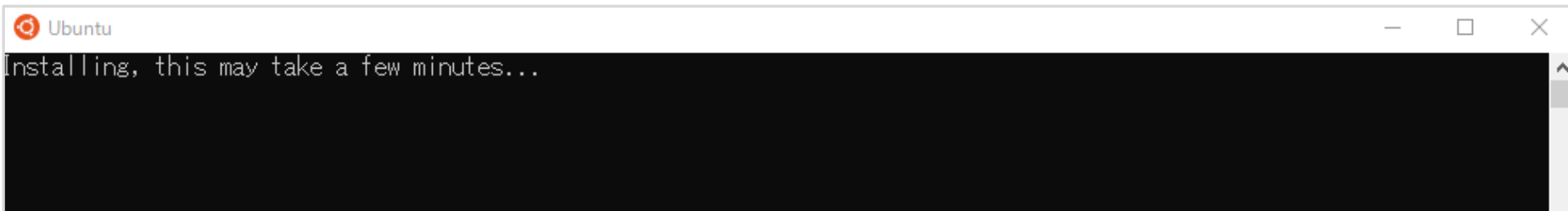• Sign in Microsoft account if you needed

Installation of Ubuntu (4/7)

- Launch up "Ubuntu" in the program list
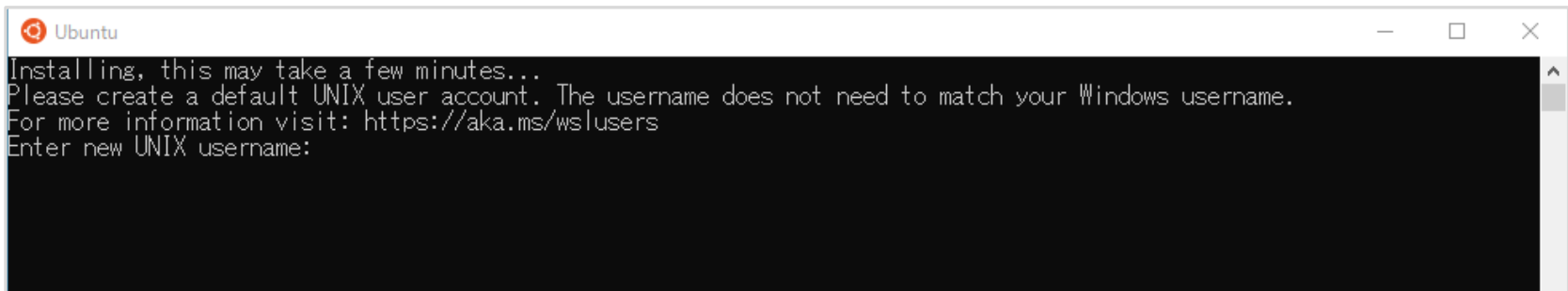
Installation of Ubuntu (5/7)

- Open Ubuntu terminal
- Start remaining installation work when you launch up Ubuntu.
  - Wait about 10 minutes.

Installation of Ubuntu (6/7)

- After installation, Ubuntu requires user name and password.
  - This user name and password are not related to the Windows account.
  - Password is required for sudo command.
  - User name of this example is "tada".

Installation of Ubuntu (7/7)

- Installation procedure is completed when you enter user name and password.

How to access Ubuntu directory?

- Absolute path of Ubuntu directory
  - ¥¥wsl$¥Ubuntu
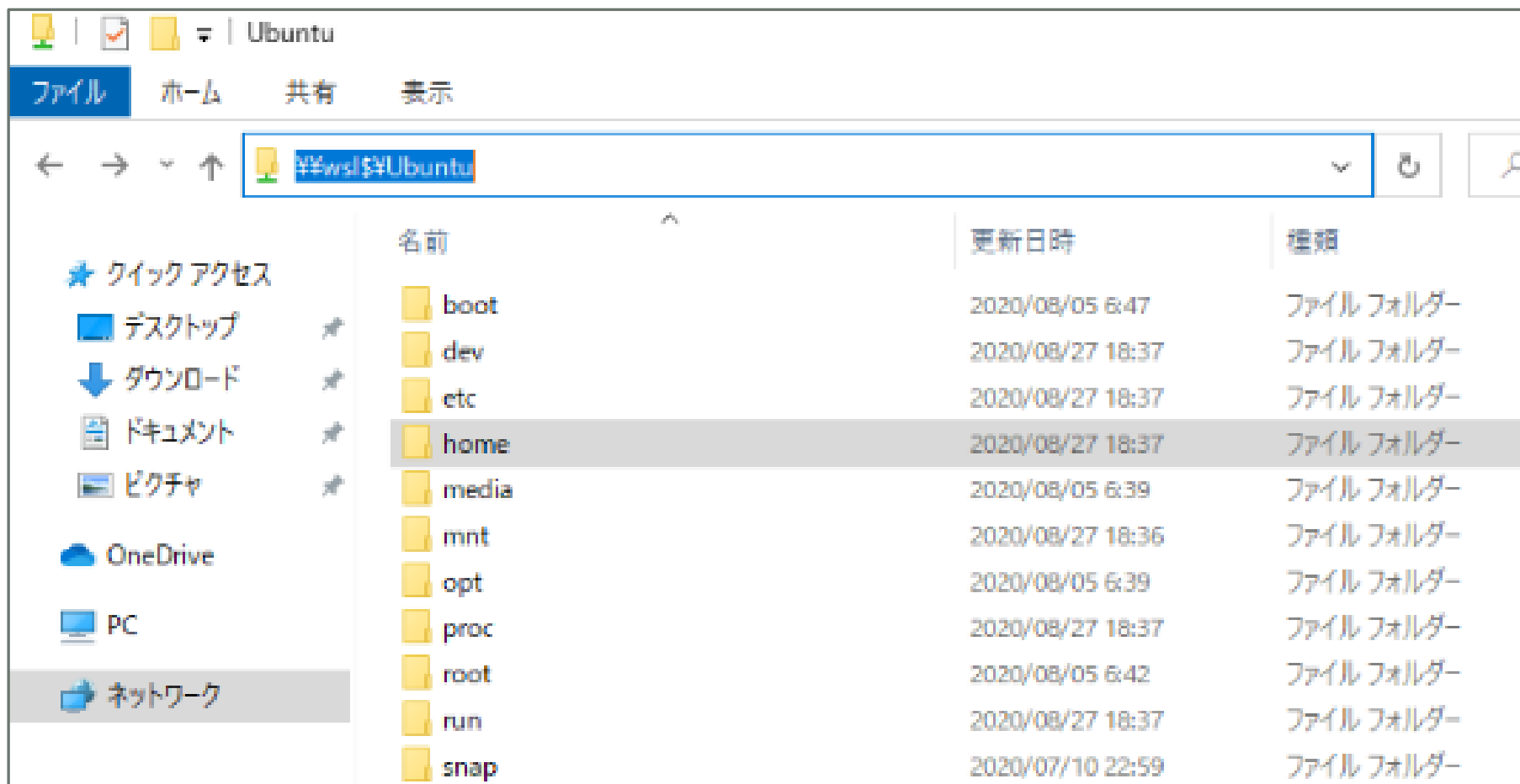
Efficient use of Ubuntu on WSL

- Setting up a link to the desktop directory of Windows
  - ln –s /mnt/c/Users/*UserName*/Desktop/*DirectoryName* ./
  - User can easily exchange data from Windows to Ubuntu.

User name of Windows

Drive name (C drive)

Directory name

Launch up Ubuntu at desired directory

- Ubuntu can be launched from any directory
  - Open desired directory and enter "wsl" on address bar.

Address bar

Start Ubuntu from desktop directory

Launch up Ubuntu from command prompt

- Enter "wsl" on command prompt

Installation of development tools

Development tools

- Following development tools are required to compilation of FRENDY.
  - tcsh: Shell
  - gcc, make: Compiler
  - Boost, Lapack, Blas, Eigen: Library

- **Please ask to the administrator before installing above tools.**

Update and installation of tcsh

- Update Ubuntu OS
  - sudo apt-get update
  - sudo apt-get upgrade
- Installation of tcsh
  - sudo apt-get install tcsh
    - For CentOS: sudo yum install tcsh

```
tada@DESKTOP-8DR8GS0:|$ sudo apt-get install tcsh
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  tcsh
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 427 kB of archives.
After this operation, 1363 kB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu focal/universe amd64 tcsh amd64 6.21.00-1 [427 kB]
Fetched 427 kB in 2s (259 kB/s)
Selecting previously unselected package tcsh.
(Reading database ... 31871 files and directories currently installed.)
Preparing to unpack .../tcsh_6.21.00-1_amd64.deb ...
Unpacking tcsh (6.21.00-1) ...
Setting up tcsh (6.21.00-1) ...
update-alternatives: using /bin/tcsh to provide /bin/csh (csh) in auto mode
Processing triggers for man-db (2.9.1-1) ...
tada@DESKTOP-8DR8GS0:~$
```

Please enter green commands on Ubuntu terminal

Installation of compilers and libraries

- Installation of gcc and make
  - sudo apt-get install build-essential
  - Wait for a few minutes
    - For CentOS: sudo yum install gcc
- Installation of Boost library
  - sudo apt-get install libboost-all-dev
  - Wait about 10 minutes.
    - For CentOS: sudo yum install boost boost-devel
- Installation of Lapack and Blas
  - sudo apt-get install liblapack-dev libblas-dev
  - Wait about 10 minutes.
    - For CentOS: sudo yum install lapack-devel blas-devel

Installation of Eigen library

- Installation of Eigen library
  - Eigen library is not required for FRENDY
  - Eigen library is required for random sampling tool.
  - sudo apt-get install libeigen3-dev

- CentOS does not prepare the install package
  - User has to download Eigen manually.
  - ① Get Eigen3 from following website.
    - http://eigen.tuxfamily.org/index.php?title=Main_Page#Download
  - ② Decompress downloaded file.
  - ③ Setting up a link to "eigen-3.X.X/Eigen" at FRENDY directory, *e.g.*, "frendy_YYYYMMDD"

Compilation of FRENDY

Get FRENDY from JAEA website

- Everyone can download FRENDY from following web site:

  - https://rpg.jaea.go.jp/main/en/program_frendy/

Decompression of FRENDY

- Get FRENDY from JAEA web site.
  - File name: frendy_YYYYMMDD.tar.gz
  - "YYYYMMDD" means release date
- Decompression of FRENDY
  - tar -xvzf frendy_YYYYMMDD.tar.gz

Directory structure of FRENDY

```
frendy_
YYYYMMDD
├── frendy
│   ├── compile_all.csh ─── FRENDY compilation shell
│   └── main/frendy.exe ─── FRENDY executable file
├── tools
│   ├── make_perturbation_factor (random sampling tool) ─── Eigen ─── User has to modify link (See slide #30)
│   └── perturbation_ace_file (ACE file perturbation tool)
├── sample
├── tests ─── run_all_class.csh ─── Test calculation shell
├── README, README_jp
└── Updatelist.txt
```
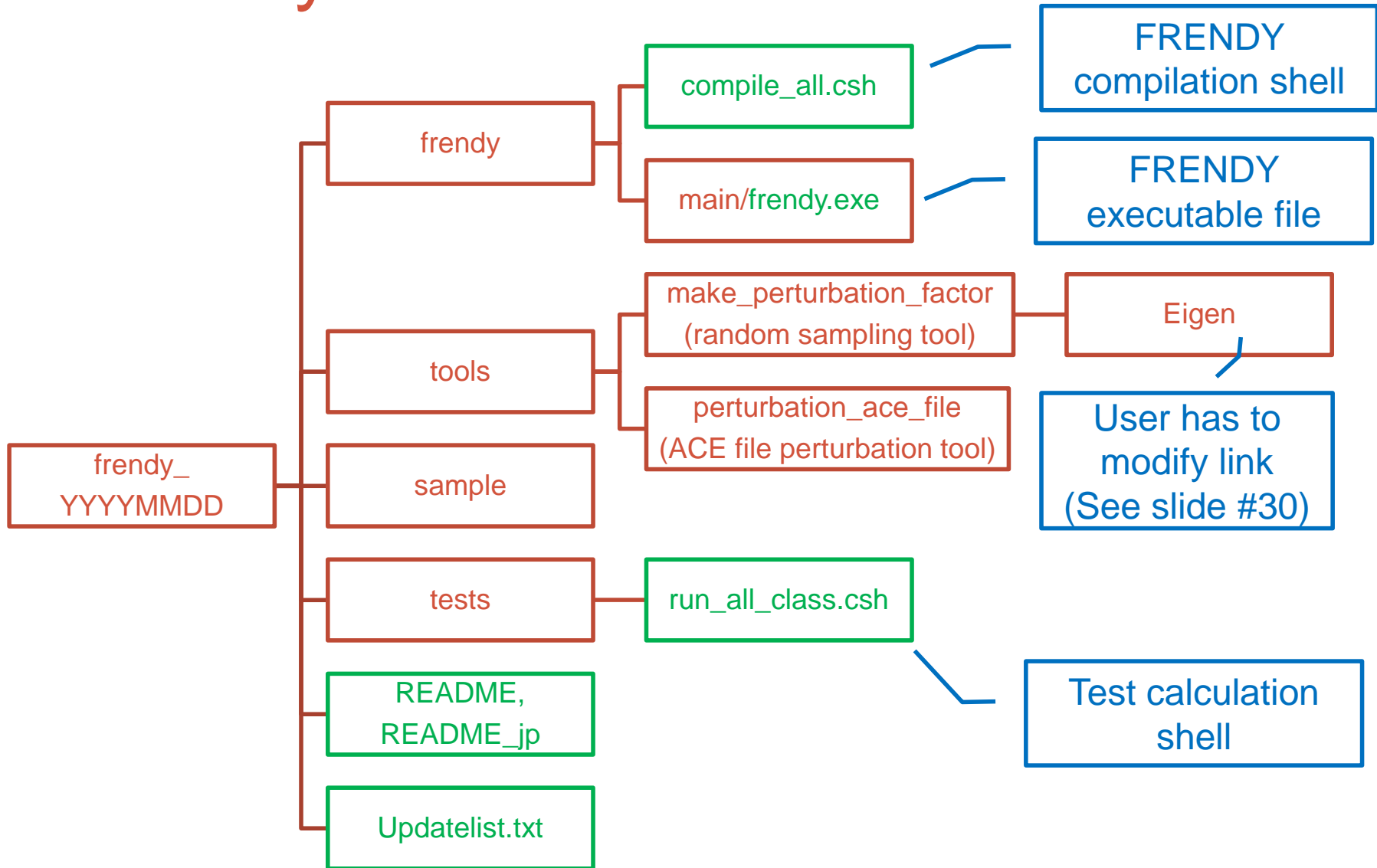
Compilation of FRENDY

- Go to "frendy_YYYYMMDD/frendy".
  - cd frendy_YYYYMMDD/frendy
- Run "compile_all.csh"
  - csh ./compile_all.csh
  - Wait about 10 minutes.
  - Warning message may be output on terminal.
    - Compilation will be OK if there is no fatal error message.
  - Compilation is completed when following message is displayed
    - "### Completed to make FRENDY ###"
  - Executable file (frendy/main/frendy.exe) is generated.

Running sample program of FRENDY

- Go to "frendy_YYYYMMDD/sample/run".
  - cd sample/run
- Running run_frendy.csh shell.
  - csh ./run_frendy.csh
- Several nuclides and materials are automatically processed and corresponding ACE files are generated.
  - H-001, C-000, O-016, Fe-056, Xe-135, Gd-155, U-235, U238, Pu-238, and Pu-239
  - HinH2O, para-H, ortho-H, and graphite
  - Wait about 20~30 minutes.
  - ACE file is generated in "col_data" directory
    - ACE file: j40a00fa for nuclides and f40a00ta for TSL data
    - XSDIR file : xsdir.j40a00f for nuclides and xsdir.j40a00t for TSL data

Compilation of random sampling tool

- User has to compile FRENDY before compilation of this tool.
- Go to "frendy_YYYYMMDD/tools/make_perturbation_factor".
  - cd tools/make_perturbation_factor
- Setting up a link to Eigen at "make_perturbation_factor" directory.
  - ln -s /usr/include/eigen3/Eigen/ ./
    - Please remove existing Eigen file
- Compilation of random sampling tool.
  - make
- Running sample calculation.
  - cd sample
  - csh ./run_make_perturbation_factor.csh
  - Compilation of random sampling tool is successfully completed if there is no warning and 100 files are generated in "output/1001" directory.
    - File name of output files: "1001_0001" ~ "1001_0100"

Compilation of ACE file perturbation tool

- User has to compile FRENDY before compilation of this tool.
- Go to "frendy_YYYYMMDD/tools/perturbation_ace_file"
  - cd tools/perturbation_ace_file
- Compilation of ACE file perturbation tool
  - make
- Running sample calculation.
  - User has to run sample of random sampling tool.
  - cd sample
  - csh ./run_perturbation_ace_file.csh
  - Compilation of random sampling tool is successfully completed if there is no warning and 100 directories are generated in "output" directory.
    - Directory name: "0001" ~ "0100"