

# Requirements for the RISDA 2018 hands-on sessions

To join the three hands-on sessions in the RISDA 2018, we ask you to bring your laptop and complete installing the required software environments in advance, so that everyone can run the program code on their own laptop during the hands-on sessions. This document explains the software packages required for the hands-on sessions and how to obtain and install them. We also provide a test code to verify your installation. Please make sure you can successfully run our test code on your laptop before coming to the RISDA 2018.

## The required operating system and software packages:

- 1) Linux, or other Unix-based operating systems (e.g., MacOS)
- 2) Anaconda 3 for Python environment
- 3) GFortran compiler

## Prepare these software environments:

### 1) Operating system

If you have a Linux or MacOS operating system on your laptop, it should be fine. Skip the following steps and proceed to 2).

For Windows users, we recommend you install a virtual machine and run Linux system within the virtual machine.

\* The virtual machine may require ~10 GB disk space, please make sure you have enough disk space on your laptop. Besides,  $\geq 4$  GB memory is recommended.

VirtualBox is a free virtual machine software:

<https://www.virtualbox.org/>

On the Download page, please select the one for “Windows hosts.” Download and install VirtualBox on your Windows laptop.

After installing VirtualBox, install any Linux operating system within a virtual machine using VirtualBox. First, get an ISO image of a Linux operating system. There are many Linux distributions. Popular Linux distributions include:

Ubuntu:

<https://www.ubuntu.com/download>

Linux Mint:

<https://linuxmint.com/download.php>

Fedora:

<https://getfedora.org/>

For older laptops with smaller disk and memory space, you may like to install some light-weighted systems such as

Linux Lite:

<https://www.linuxliteos.com/download.php>

Second, install the Linux virtual machine from the ISO image using VirtualBox. You may refer to some tutorial articles on the Internet for this step; e.g.,

<https://www.lifewire.com/run-ubuntu-within-windows-virtualbox-2202098>

<https://linus.nci.nih.gov/bdgc/installUbuntu.html>

After installing the Linux virtual machine, continue the following steps inside the virtual machine.

## 2) Install Anaconda 3

Download Anaconda from its download page:

<https://www.anaconda.com/download>

Select “Python 3.6 version” for Linux or MacOS depending on your operating system.

## 3) Install an additional package, “plotly”, in Anaconda 3

After installing the Anaconda 3, install an additional package, “plotly”, in Anaconda 3 by running this command in the terminal:

```
$ conda install -c plotly plotly
```

You may need to include your Anaconda 3’s installation path in your \$PATH environmental variable before running the above “conda” command:

```
$ export PATH="<your-anaconda3-installation-path>/bin:$PATH"
```

## 4) Install GFortran

You can download and install GFortran compiler from its official website:

<https://gcc.gnu.org/wiki/GFortranBinaries>

For MacOS systems, select the MacOS dmg installer.

For Linux systems, however, it is much easier to install GFortran through their own package managers. For example, on Ubuntu-based systems, open the “Software Center” or “Synaptic Package Manager”, search “gfortran” and check it for install. Then you should be able to use GFortran.

## Verify the software environments:

After preparing the required software environments, please verify if the following test code can run correctly on your computer:

[http://www.data-assimilation.riken.jp/risda2018/data/RISDA\\_2018\\_test.tar.gz](http://www.data-assimilation.riken.jp/risda2018/data/RISDA_2018_test.tar.gz)

The test code was kindly provided by one of our lecturers, Juan Ruiz.

Steps to run the test code:

### 1) Unarchive the files:

```
$ tar xzvf RISDA_2018_test.tar.gz
```

### 2) Compile the code:

```
$ cd RISDA_2018_test
$ ./compile_code.sh
```

### 3) Test the model free run:

```
$ cd experiments
$ python3 nature_run.py
```

(You may need to set up a correct \$PATH environmental variable to use Anaconda's Python3 instead of the operating system's one, if you have not done this before.)

This should create the folder:

```
RISDA_2018_test/experiments/data/ConstantParameter/
```

and within this folder an npz file containing the true state evolution and the observations.

This script also produce 9 figures in

```
RISDA_2018_test/experiments/figs/ConstantParameter/
```

### 4) Test the assimilation cycle run:

```
$ python3 letkf_run_PerfectModel.py
```

This runs several DA cycles and produces an npz file in

```
RISDA_2018_test/experiments/data/LETKF_perfect_model
```

and 4 figures in

```
RISDA_2018_test/experiments/figs/LETKF_perfect_model
```

If you see all the data files and figures correctly generated, your laptop should be ready for the RISDA 2018's hands-on sessions.