Software Environment Setup

Workshop on Delta Flow-Salinity Modeling Using Machine Learning
Pre-Workshop Setup Meeting, January 25, 2023

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CALIFORNIA DEPARTMENT OF WATER RESOURCES
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Part A: Local Computer

Prerequisites

- Laptop or Desktop with Windows*
- Administrative privileges

* The ML code will also run on Mac OS, Linux, and Google Colab

Overview

- Install Miniconda[1]
- Create a conda environment[2]
- Download ANN code and input data files
- Run the Jupyter Notebook[3] ANN code

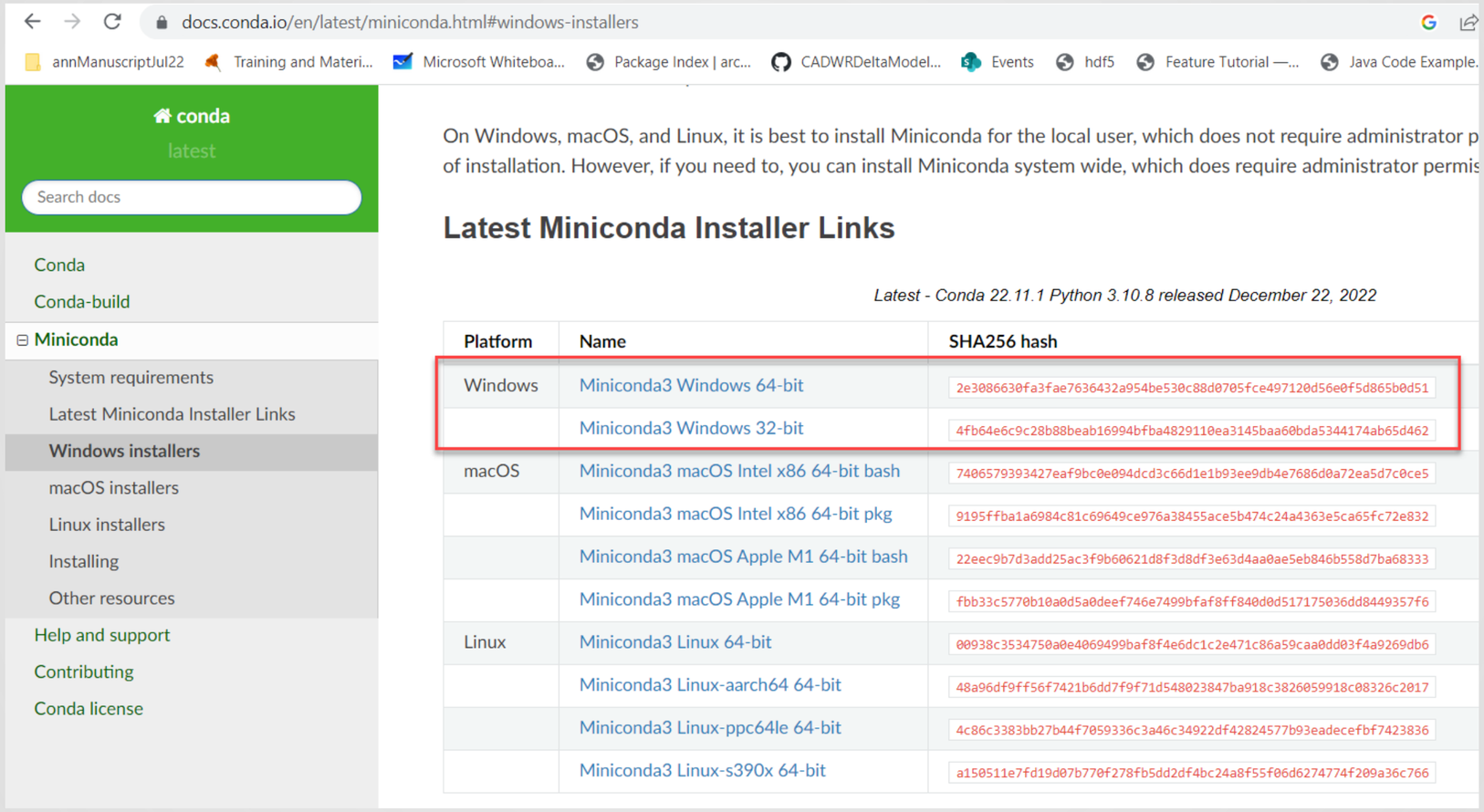
1. Anaconda is a free, open-source platform that allows you to write and execute code in the Python programming language. Miniconda is a lightweight version of Anaconda. We recommend Miniconda because installation and setup take less time.
2. A conda environment is a folder containing a version of Python, and a specific set of python packages
3. Jupyter Notebook is a web application for creating and sharing computational documents

Install Miniconda/Anaconda

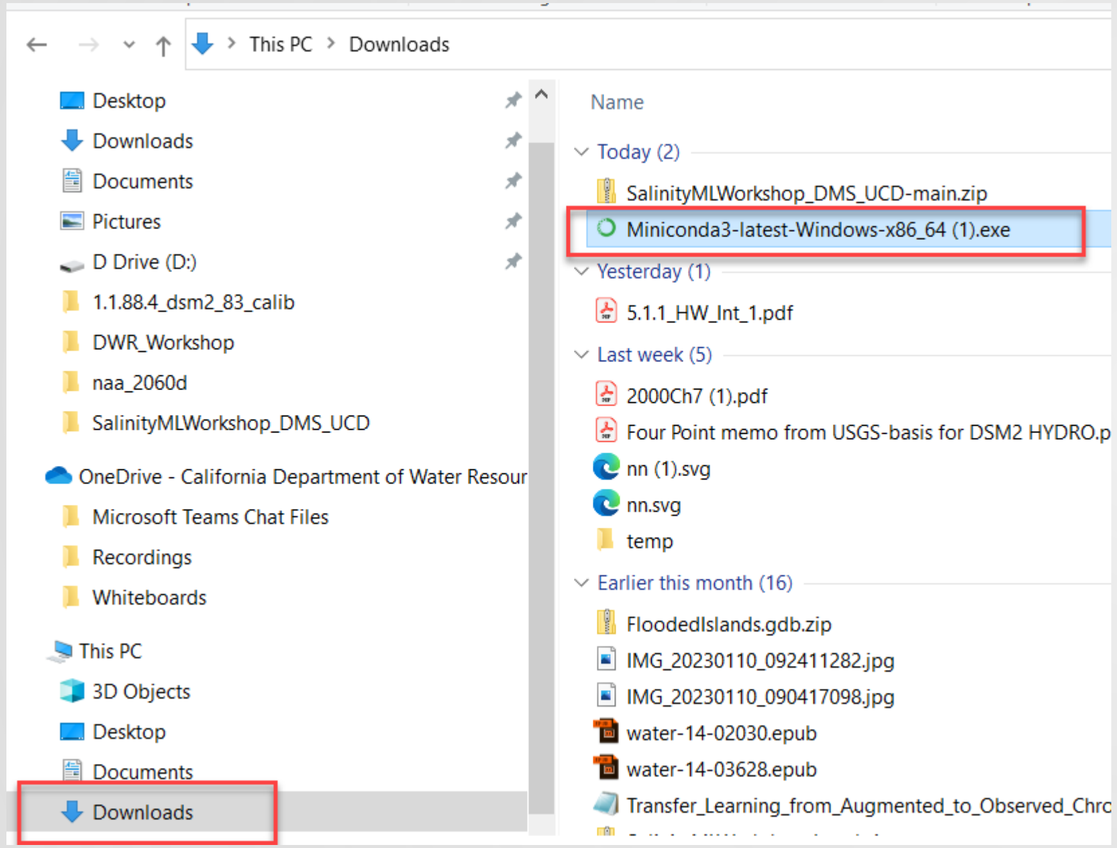
- Miniconda: https://docs.conda.io/en/latest/miniconda.html

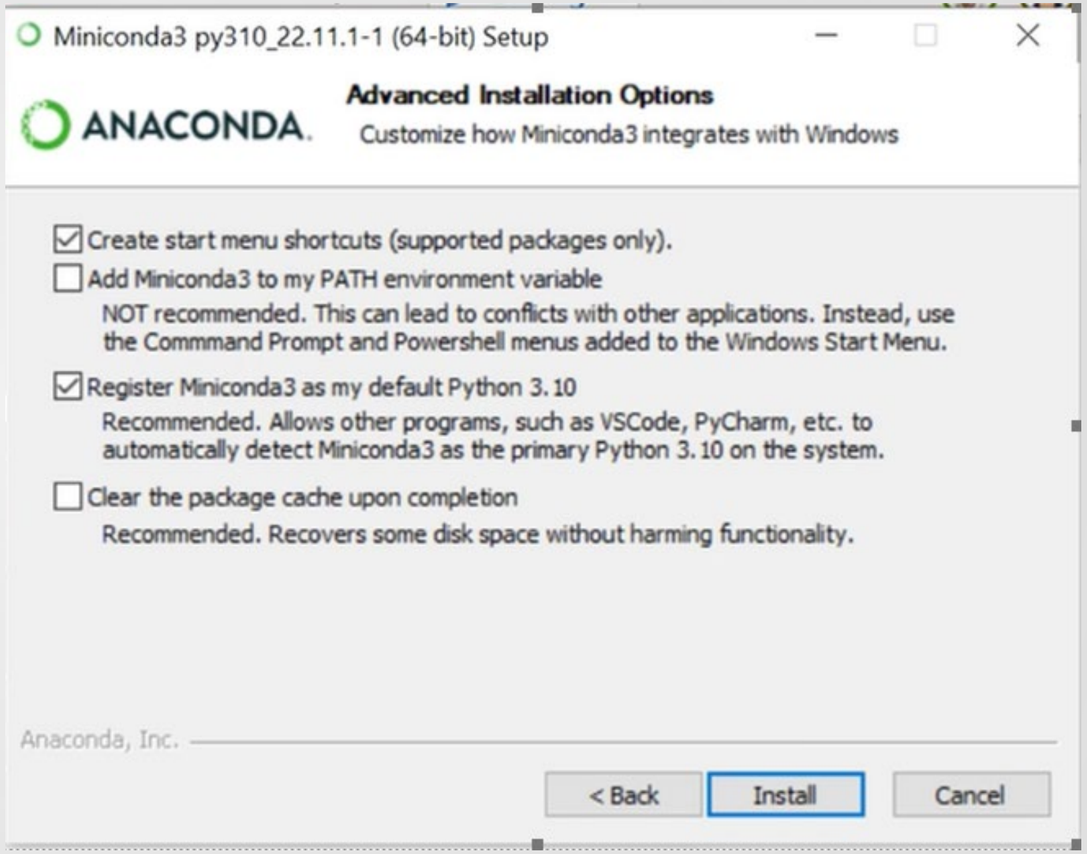
- Anaconda: https://www.anaconda.com/products/distribution

Downloading the Miniconda Installer



Install Miniconda

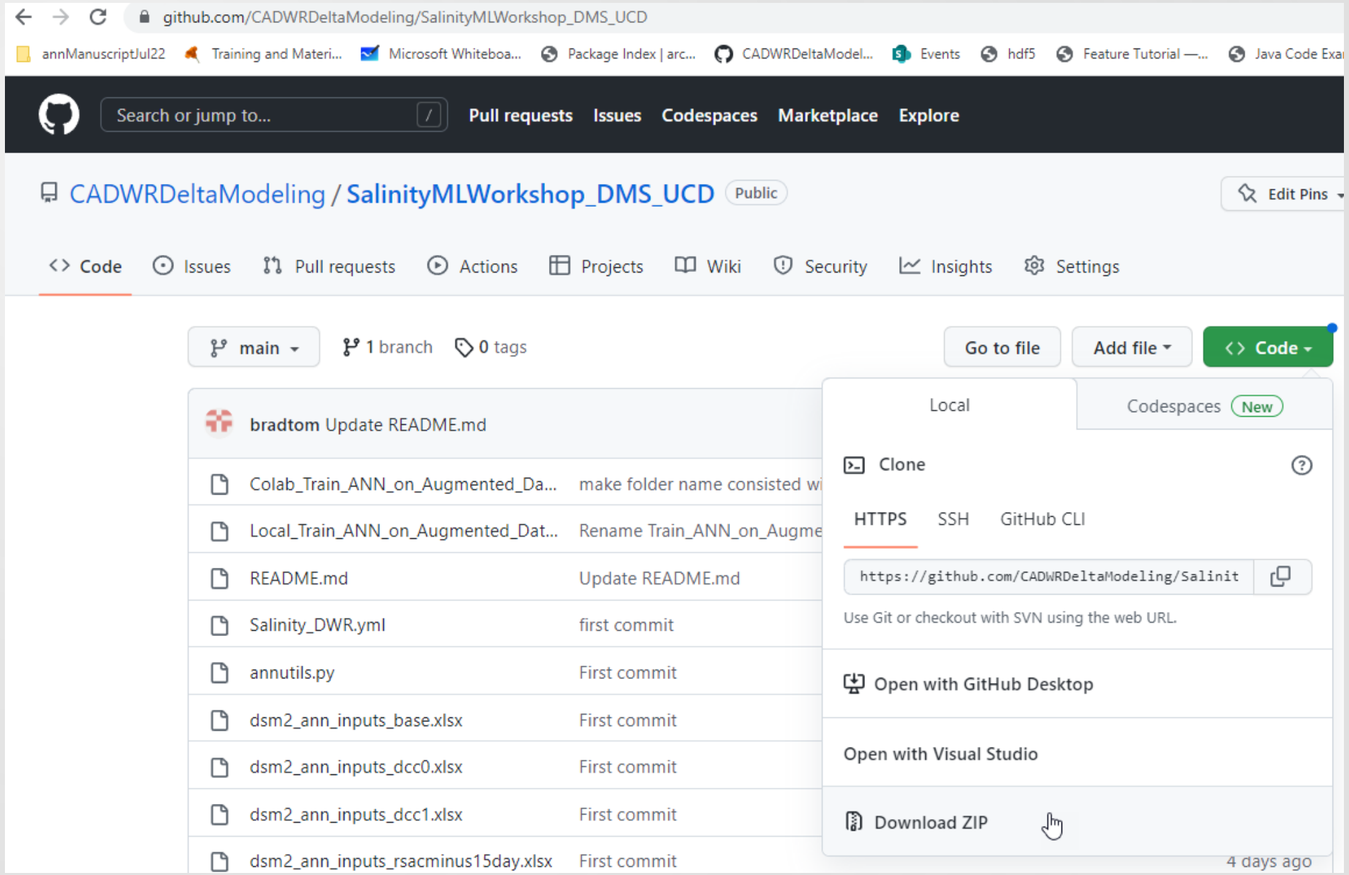




Download ML Code/Data

a) If you don't have Git* installed

- https://github.com/CADWRDeltaModeling/SalinityMLWorkshop_DMS_UCD



Git* is a free and open source distributed version control system

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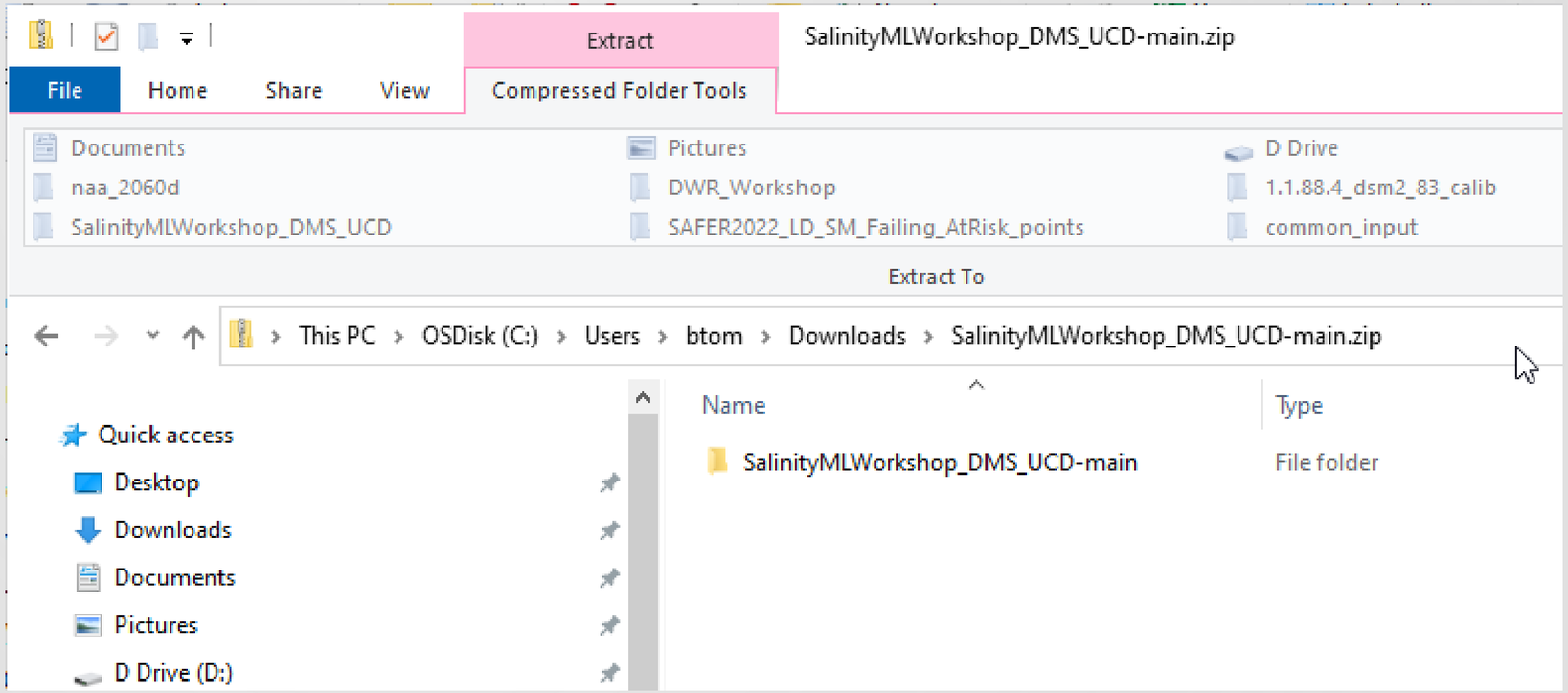
Download ML Code/Data

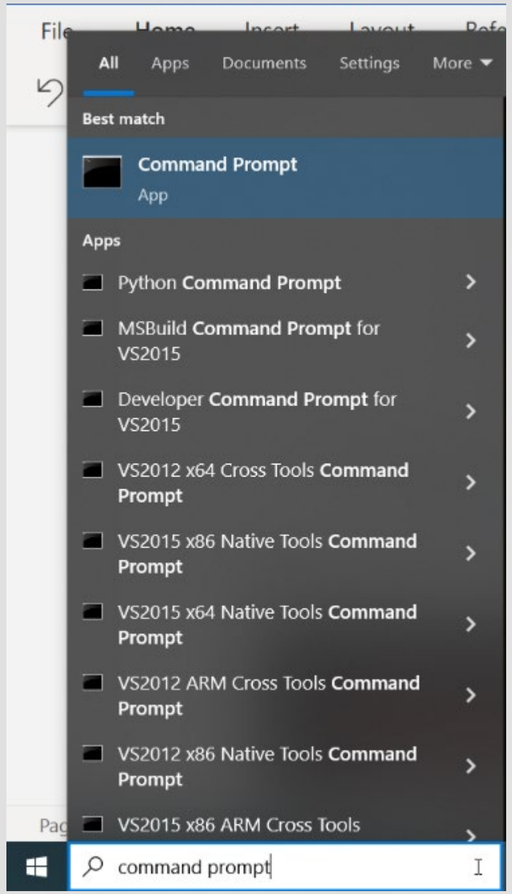
a) If you don't have Git installed (cont)

Double click the zip file

Copy and paste the folder inside to another location



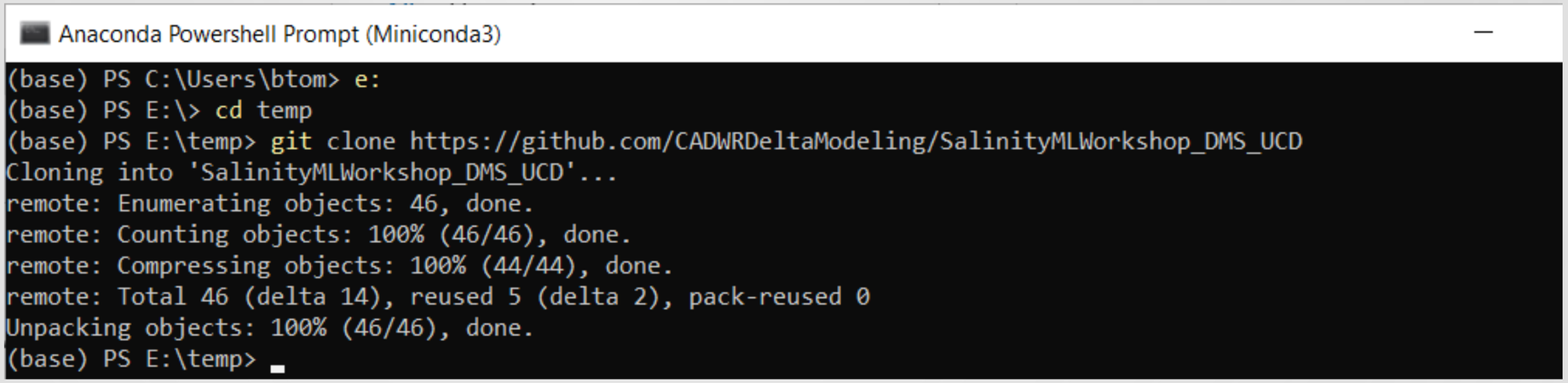
Download ML Code/Data



b) If you have Git installed

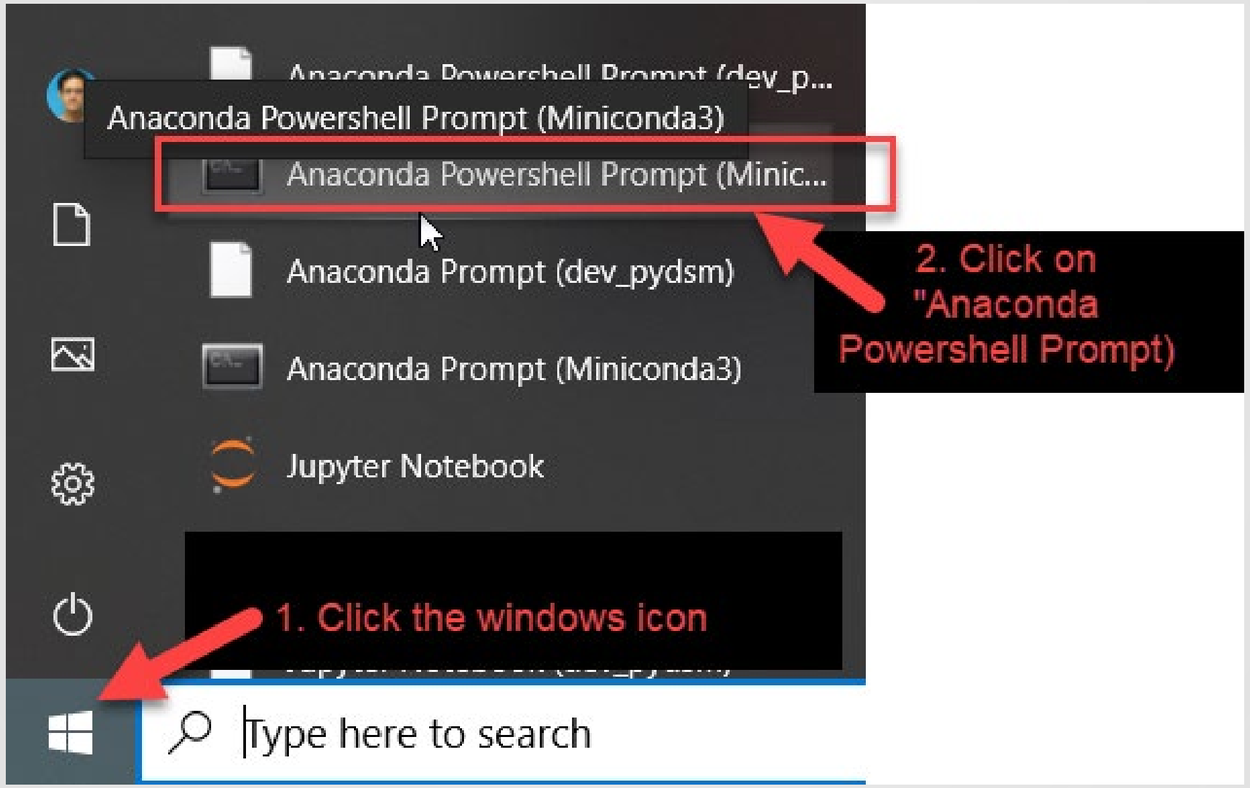
Open a command prompt window

Navigate to the location where you want to save files



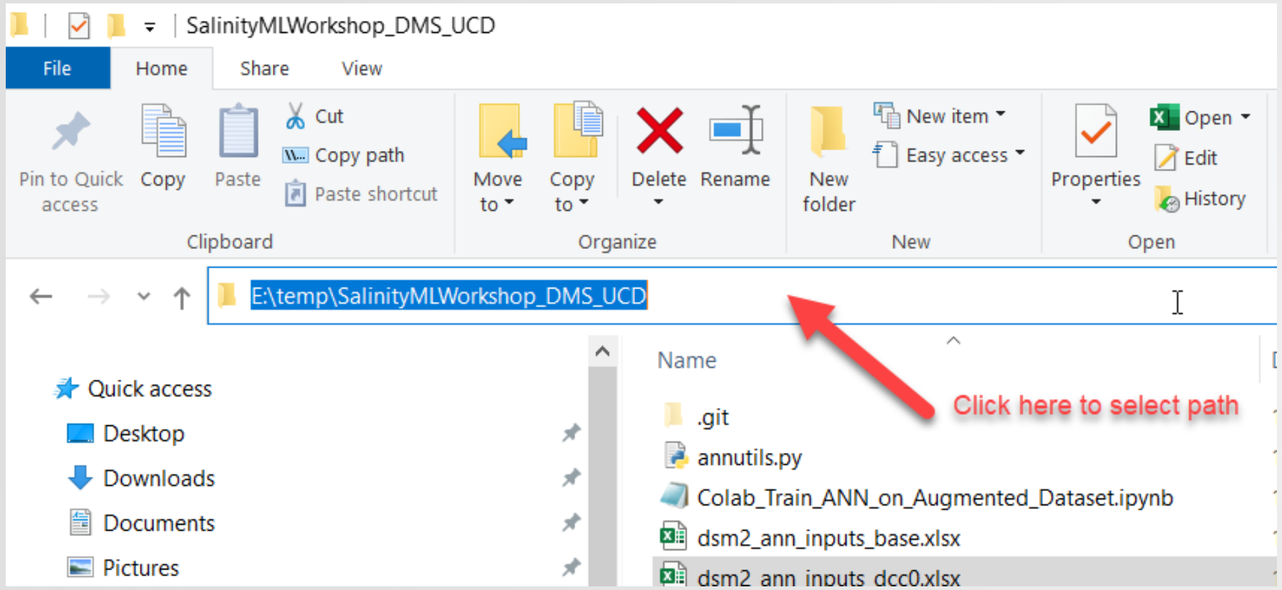
git clone https://github.com/CADWRDeltaModeling/SalinityMLWorkshop_DMS_UCD

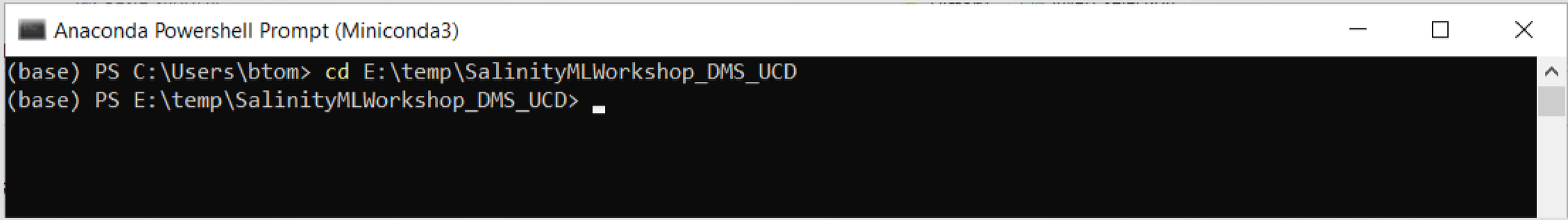
Open an Anaconda Powershell prompt



Create a conda environment

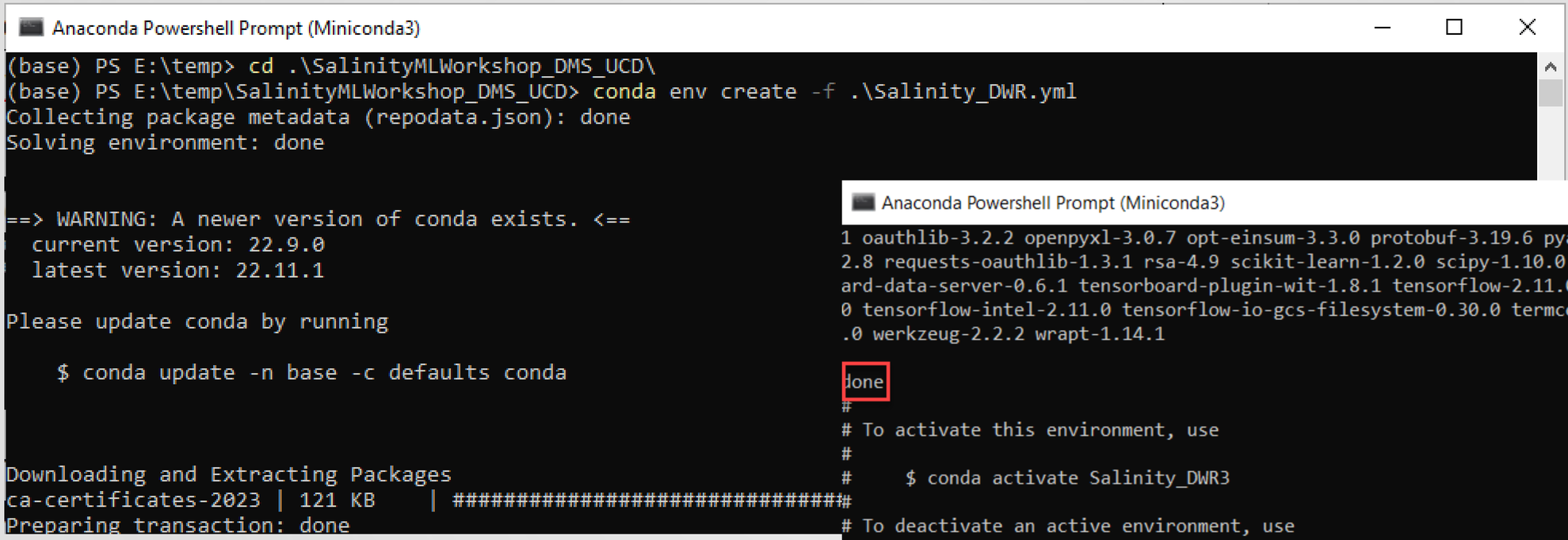
- Use the “cd” command to navigate to the folder containing your code/data

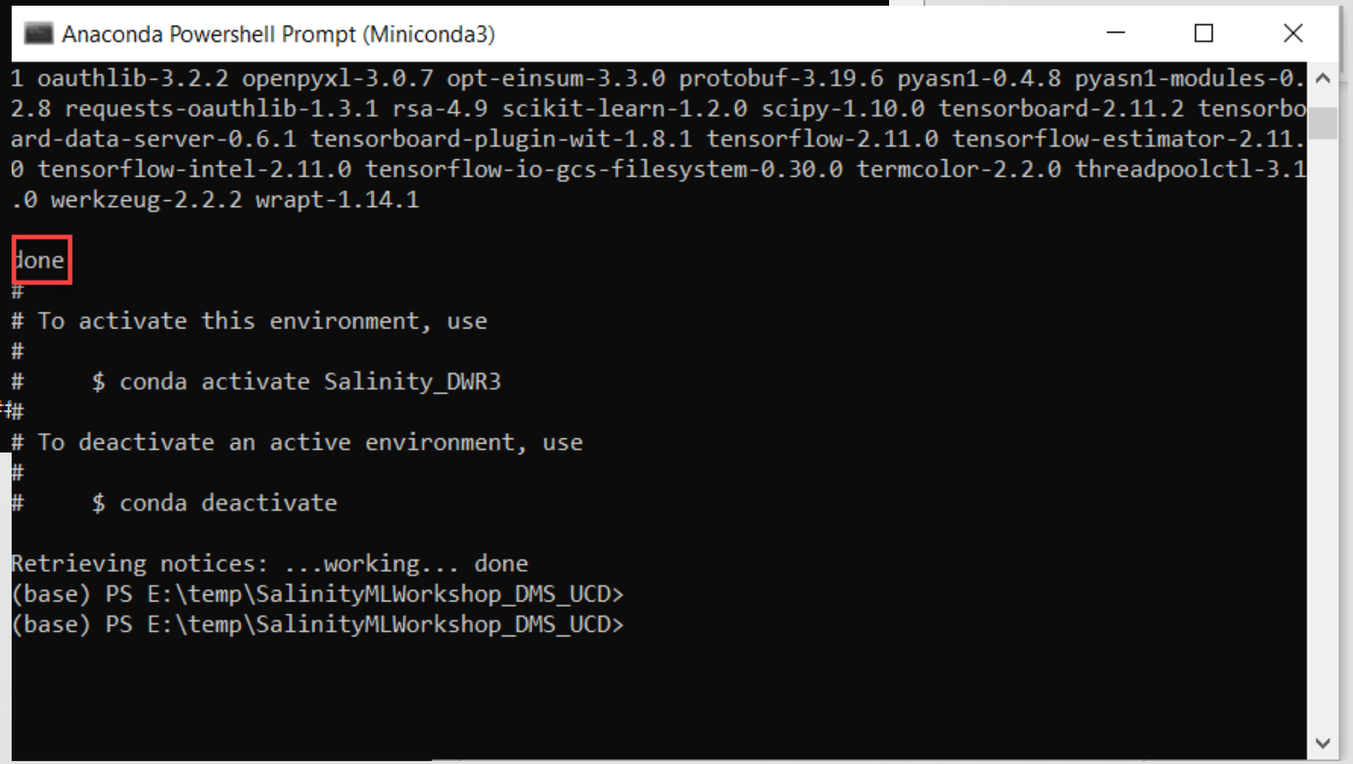




Create a conda environment

- conda env create -f Salinity_DWR.yml





Install nb_conda_kernels

- To have access to the new conda environment in a Jupyter Notebook, you need to install “nb_conda_kernels” into the base environment:
- `conda install -y -n base nb_conda_kernels`

Anaconda Powershell Prompt (Miniconda3)

```
(base) PS E:\temp\SalinityMLWorkshop_DMS_UCD> conda install -y -n base nb_conda_
Collecting package metadata (current_repodata.json): done
Solving environment: done

## Package Plan ##

  environment location: C:\Users\btom\Miniconda3

  added / updated specs:
    - nb_conda_kernels


The following packages will be downloaded:

    package                    |            build
    ---------------------------|-----------------
    certifi-2022.12.7          |   py39haa95532_0         149 KB
    conda-22.11.1              |   py39haa95532_4         892 KB
    pluggy-1.0.0               |   py39haa95532_1          29 KB
    ruamel.yaml-0.17.21        |   py39h2bbff1b_0         174 KB
    ruamel.yaml.clib-0.2.6     |   py39h2bbff1b_1         101 KB
    ------------------------------------------------------------
                                           Total:         1.3 MB
```

Anaconda Powershell Prompt (Miniconda3)

```
  ruamel.yaml.clib   pkgs/main/win-64::ruamel.yaml.clib-0.2.6-py39h2bbff1b_1 None

The following packages will be UPDATED:

  ca-certificates                    2022.07.19-haa95532_0 --> 2023.01.10-haa95532_0 None
  certifi                         2022.9.24-py39haa95532_0 --> 2022.12.7-py39haa95532_0 None
  conda                              22.9.0-py39haa95532_0 --> 22.11.1-py39haa95532_4 None
  openssl                                1.1.1q-h2bbff1b_0 --> 1.1.1s-h2bbff1b_0 None



Downloading and Extracting Packages
certifi-2022.12.7    | 149 KB    | ############################################### | 100%
pluggy-1.0.0         | 29 KB     | ############################################### | 100%
ruamel.yaml-0.17.21  | 174 KB    | ############################################### | 100%
conda-22.11.1        | 892 KB    | ############################################### | 100%
ruamel.yaml.clib-0.2 | 101 KB    | ############################################### | 100%
Preparing transaction: done
Verifying transaction: done
Executing transaction: done
Retrieving notices: ...working... done
(base) PS E:\temp\SalinityMLWorkshop_DMS_UCD>
```

Open Jupyter Notebook

jupyter notebook

If the above command fails, try these two commands:

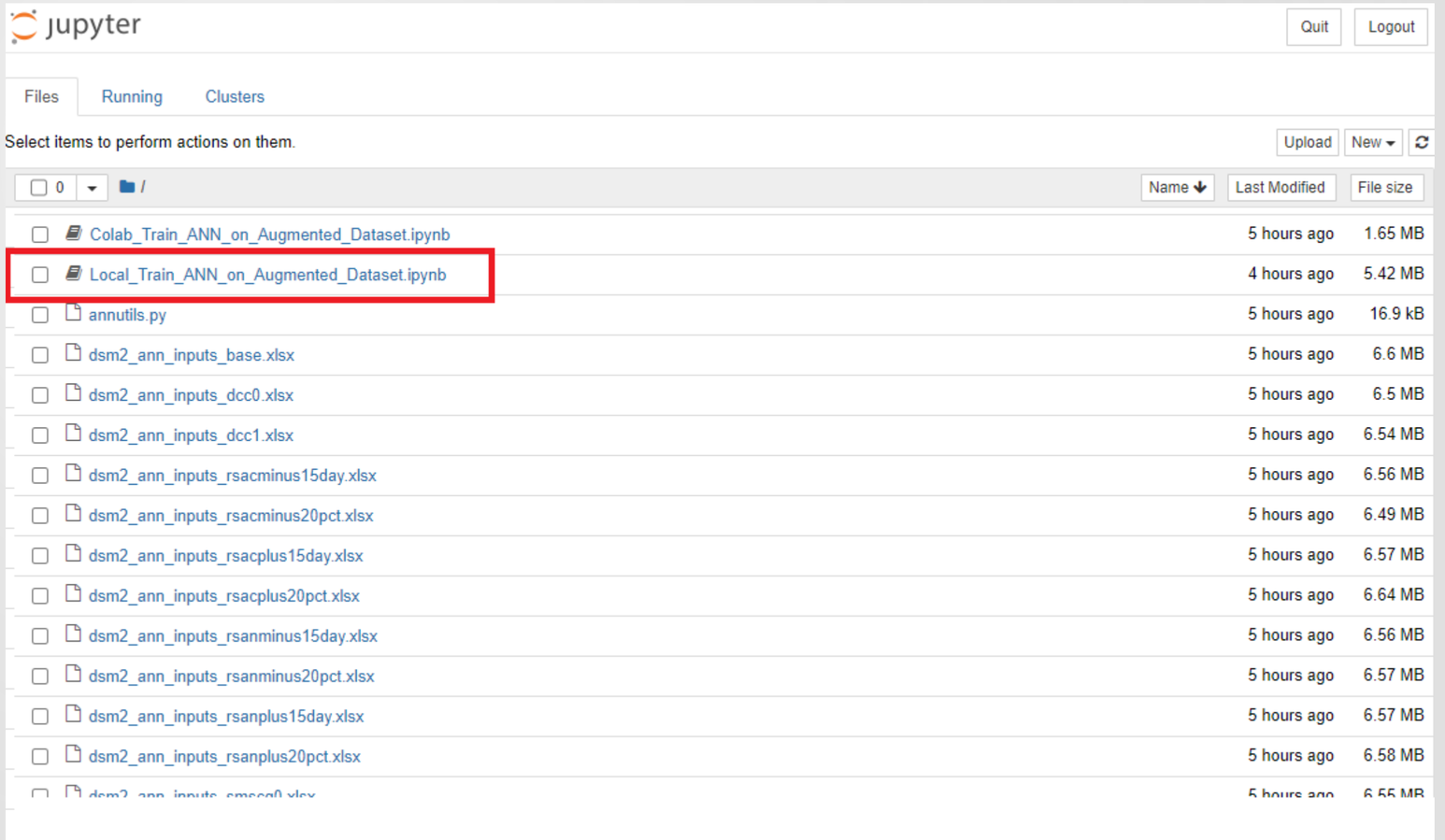
call conda activate jupyter

start jupyter notebook

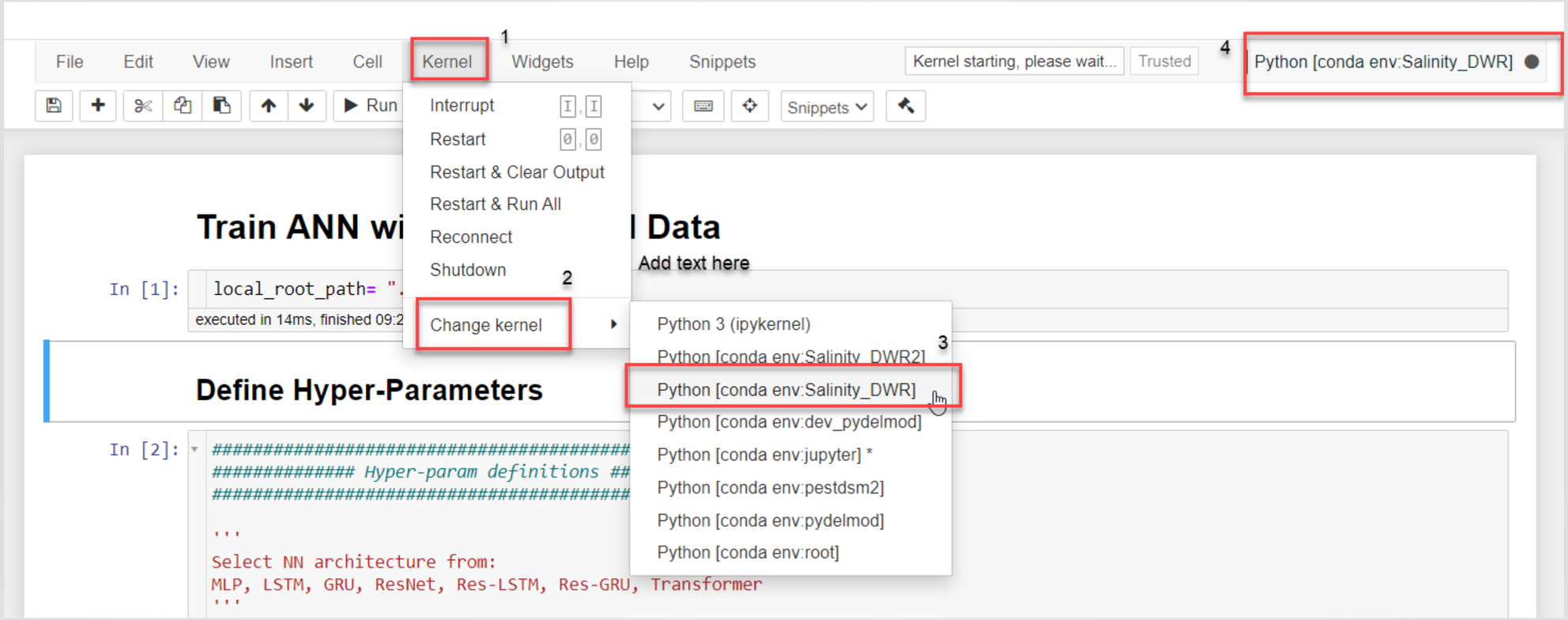
Open the ANN Jupyter Notebook

click on

Local_Train_ANN_on_Augmented_Dataset.ipynb



Select notebook kernel



A notebook kernel is **a** “computational engine” that executes the code contained in a Notebook document.

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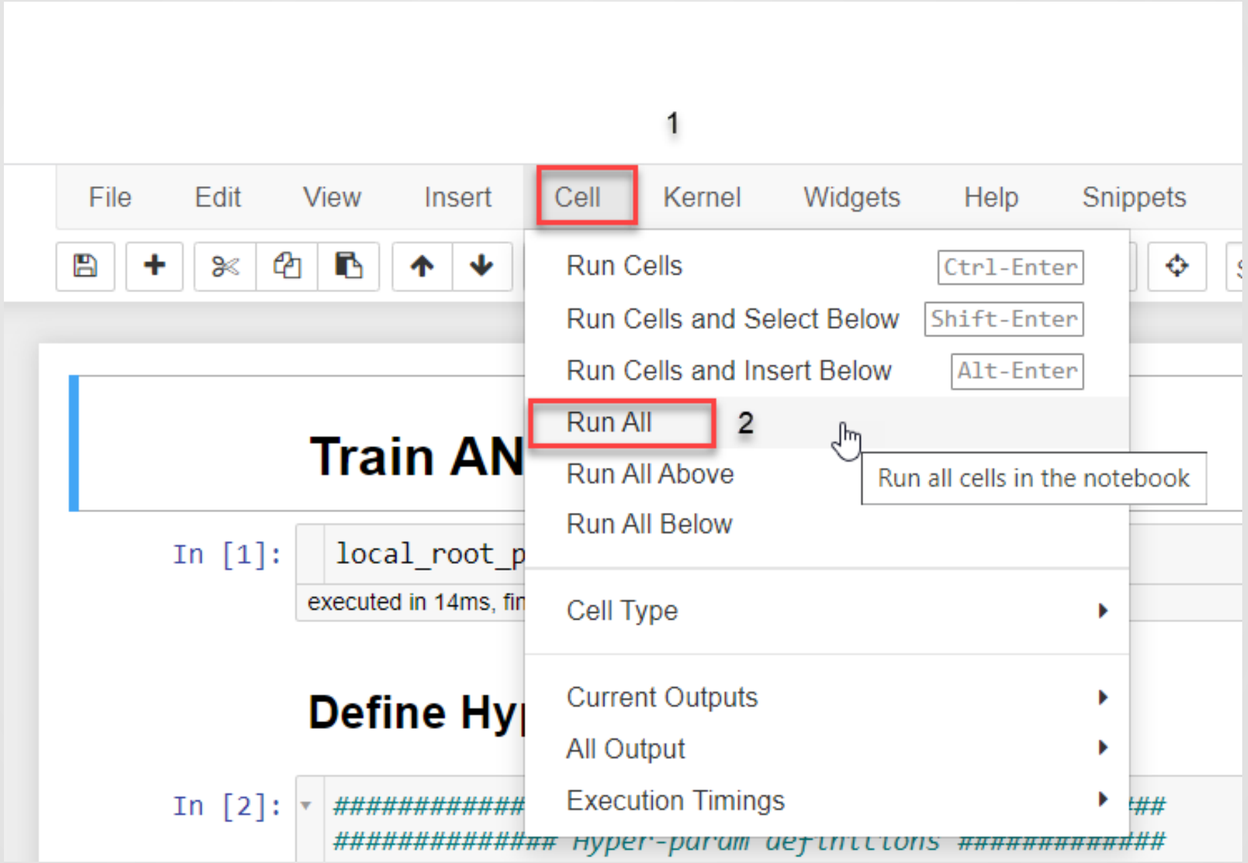
Run the notebook code



Completed cell vs running cell

Install Packages

In [3]:

```
import os
import sys
from sklearn.metrics import r2_score
import matplotlib.pyplot as plt
import pickle
import time

import numpy as np
import pandas as pd
import tensorflow as tf
from tensorflow import keras
from tensorflow.keras.layers.experimental.preprocessing import Normalization
from tensorflow.keras import layers
#import keras
from sklearn.preprocessing import MinMaxScaler
```

executed in 7.84s, finished 18:03:48 2023-01-23

Read Data

In [*]:

```
sys.path.append(local_root_path)
import annutils

observed_stations_ordered_by_median = ['RSMKL008', 'RSAN032', 'RSAN037', 'RSAC092', 'SLTRM004', 'ROLD024',
                                       'CHVCT000', 'RSAN018', 'CHSWP003', 'CHDMC006', 'SLDUT007', 'RSAN072',
                                       'OLD_MID', 'RSAN058', 'ROLD059', 'RSAN007', 'RSAC081', 'SLMZU025',
                                       'RSAC075', 'SLMZU011', 'SLSUS012', 'SLCBN002', 'RSAC064']

num_sheets = 9
```

Questions?

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