MUSICA Tutorial:
Getting started with JupyterHub

MUSICA: MUlti-Scale Infrastructure for Chemistry and Aerosols

NCAR

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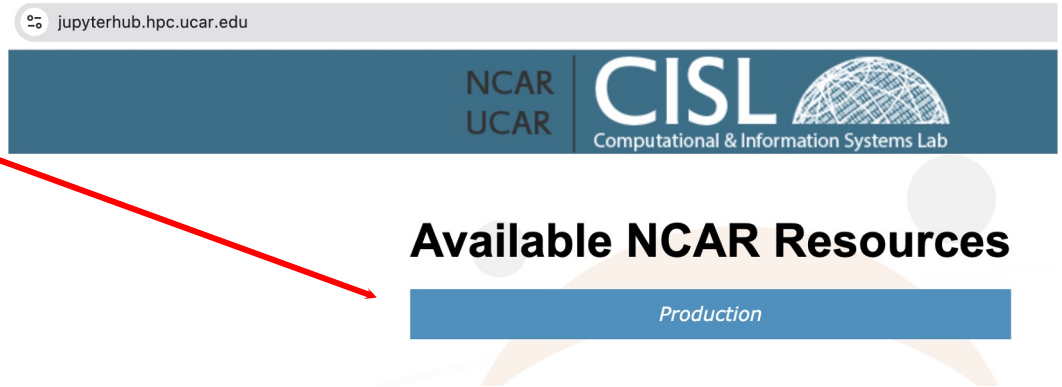
JupyterHub on cheyenne or casper at NCAR

See documentation on NCAR's Jupyterhub at: https://ncar-hpc-docs.readthedocs.io/en/latest/compute-systems/jupyterhub/

To start a session, go to:
https://jupyterhub.hpc.ucar.edu/

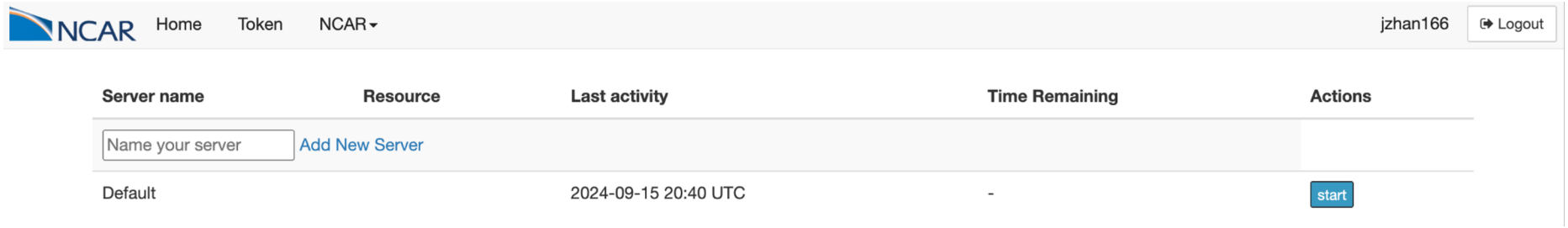
You will need a login on NCAR HPC (derecho, casper) to use this

1. **Select Production**

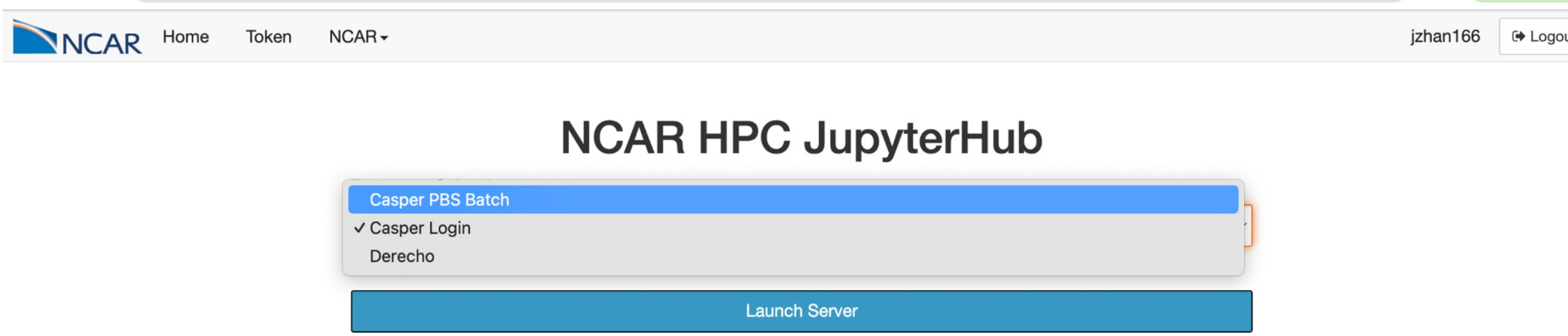


2. Use your username, password and DUO push to login

3. Select start

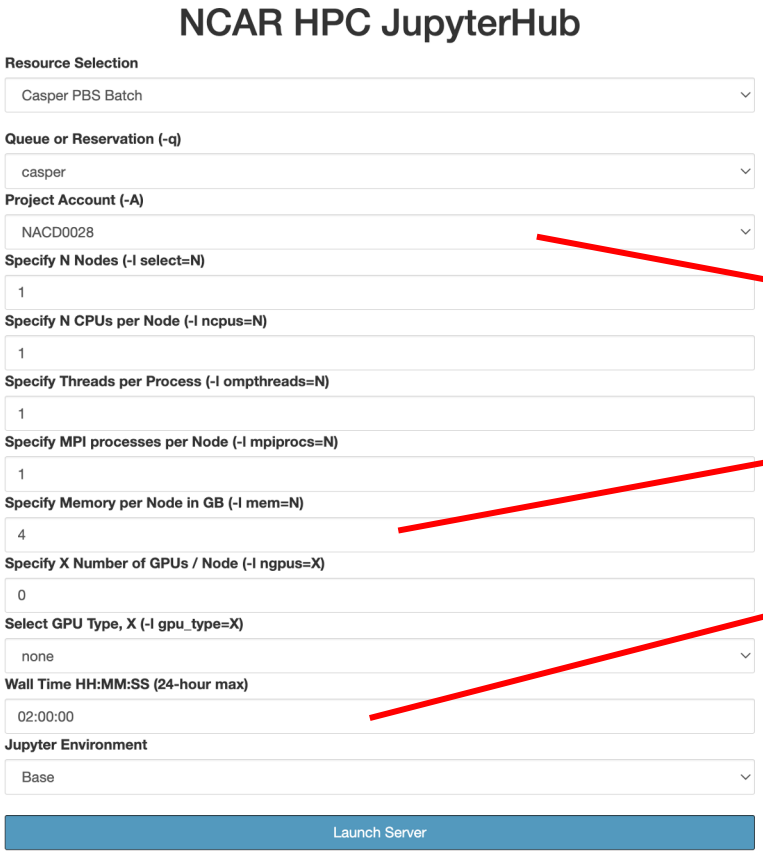


4. Select Casper PBS Batch



Click ‘Start My Server’

5. change your settings



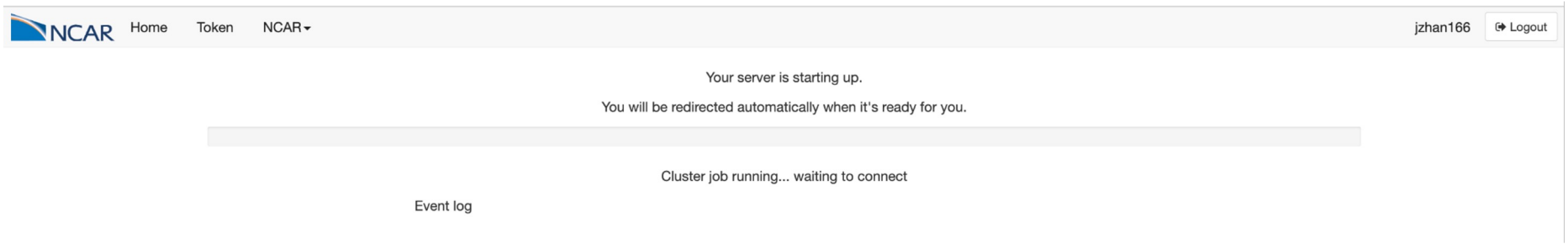
Select your project number (NACD0028)

You may need to increase memory, e.g. 5 GB

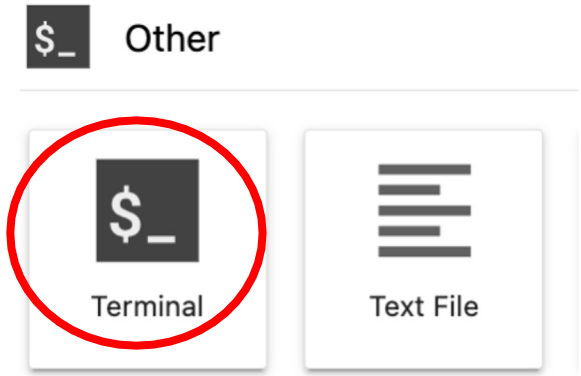
Increase walltime only if needed

To reduce waiting time for Hub to start, using smallest memory and walltime possible

If the computer is busy you may need to wait for the server to connect….



6. open terminal (under Other) This will open a terminal window on Casper.



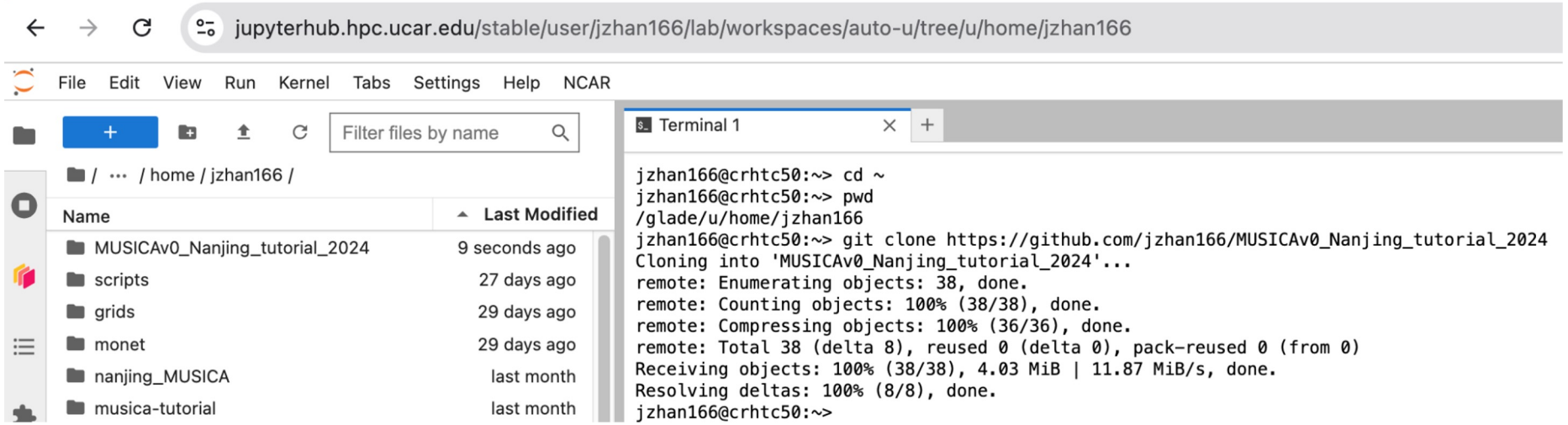
In the terminal window

Type:

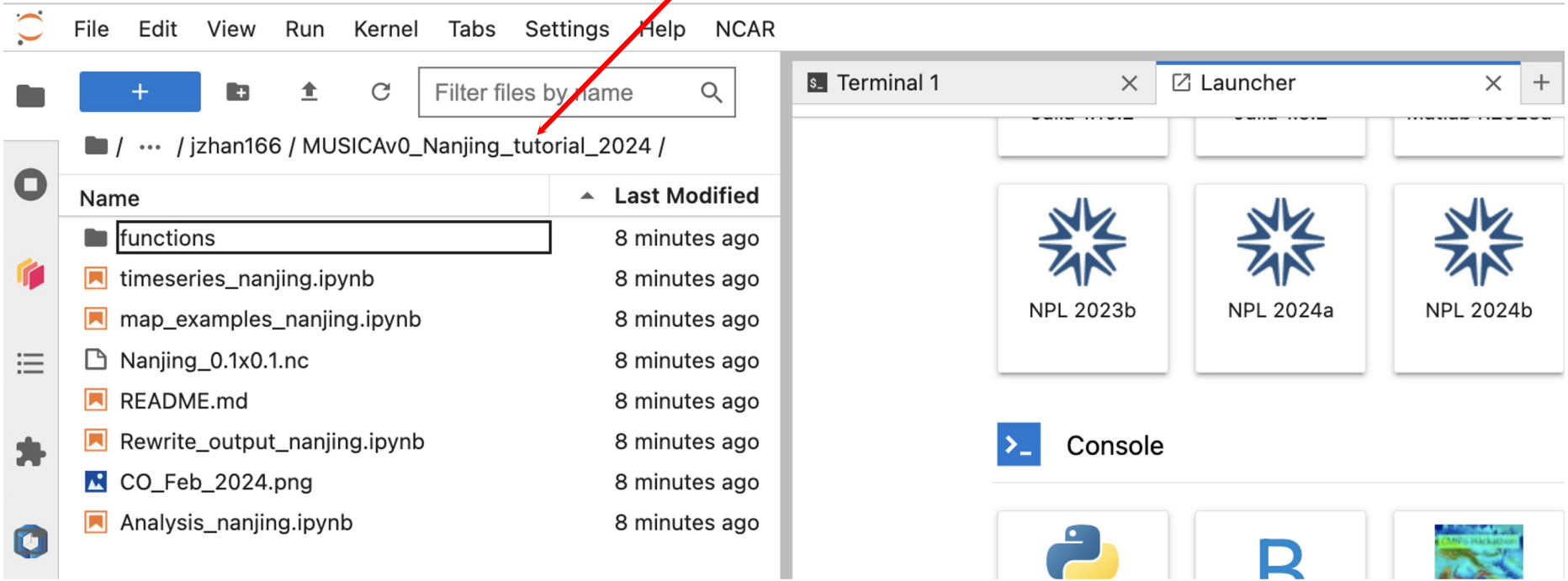
cd ~

then type:

git clone https://github.com/jzhan166/MUSICAv0_Nanjing_tutorial_2024

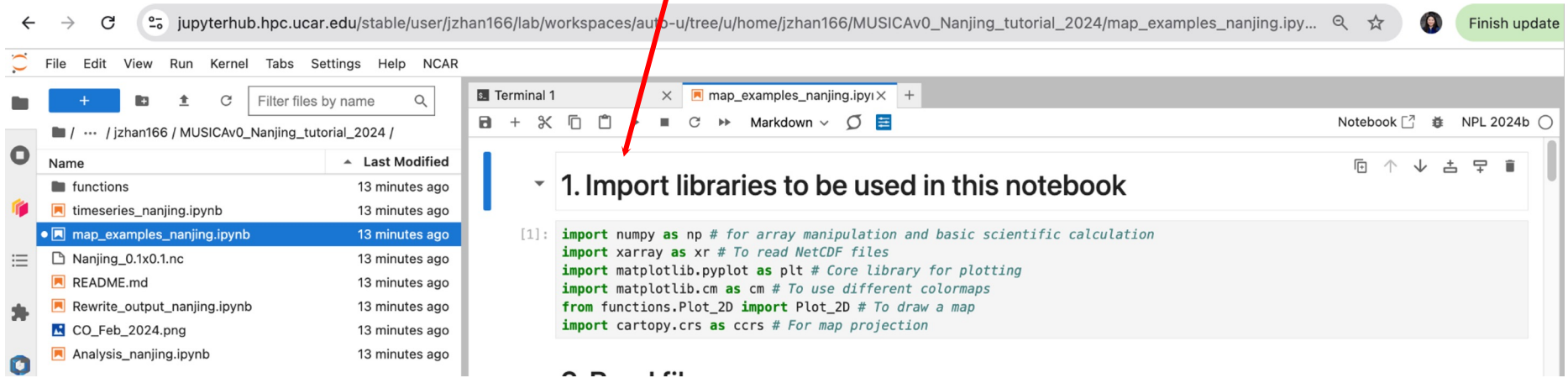


7. Navigate on the left panel to the new *MUSICAv0_Nanjing_tutorial_2024* directory to find the sample notebooks.

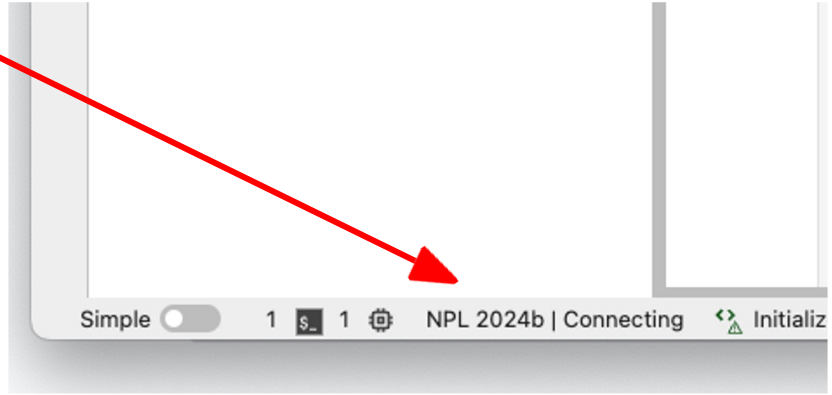


In the jupyter interface on the left side of the window navigate into this folder.

Open map_examples_nanjing.ipynb
Click the play button to run each step of the notebook. Wait until [*] at left of command switches to a number before going on to next section. Creating plots may take a few seconds.



When you open or create a new jupyter notebook file, you can select which kernel is used (lower left corner). We recommend using **NPL 2024a or 2024b**.



When you are finished using JupyterHub, go to ‘Hub Control Panel’, under ‘File’ - this opens a new browser window. Click ‘Stop My Server’. Then go back to original window and Log Out.

The map_examples notebook uses some standard python libraries, and the Plot_2D function (written by **Duseong Jo**, in your musica_tutorial/functions/ directory):
https://github.com/NCAR/CAM-chem/blob/main/docs_sphinx/examples/functions/Plot_2D.py

See more explanations of Plot_2D at:
https://wiki.ucar.edu/display/MUSICA/Plot+output+with+Python

Model output:

/glade/campaign/acom/acom-weather/emmons/tutorial_nanjing/f.e3beta01.FCnudged.Nanjing_ne30x8.02/atm/hist/

You can find out details of the content of these files by using 'ncdump' in the Terminal window in JupyterHub, e.g.:

```
cd /glade/campaign/acom/acom-weather/emmons/tutorial_nanjing/f.e3beta01.FCnudged.Nanjing_ne30x8.02/atm/hist/

ncdump -h f.e3beta01.FCnudged.Nanjing_ne30x8.02.cam.h0a.2024-01.nc
ncdump -h f.e3beta01.FCnudged.Nanjing_ne30x8.02.cam.h0a.2024-01.nc | grep O3
```

More Tips:

- If you start reaching your memory limit (shown at the bottom of the Hub window), try restarting the kernel (find under the Kernel menu, or the circle with arrow symbol in the toolbar.
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