Hands-On conda Tutorial

This short tutorial is intended to give you a basic introduction of how to use conda from both the command-line and from the Anaconda Navigator graphical user interface (GUI).

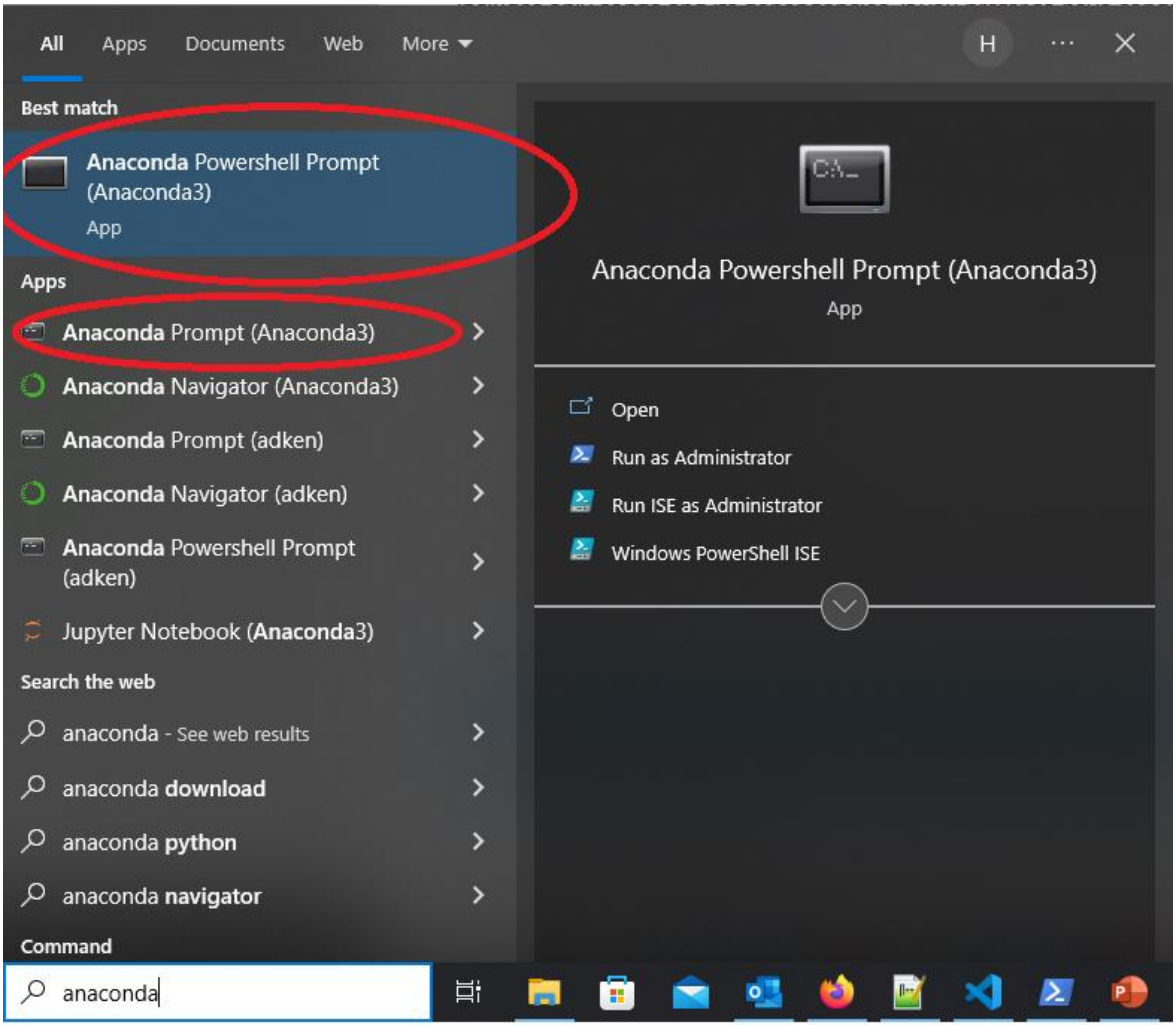
This tutorial is structured in a way that installs the Anaconda Navigator in the environment created via the commandline so that you can work with the Anaconda Navigator even if it may not be installed already where you are working.

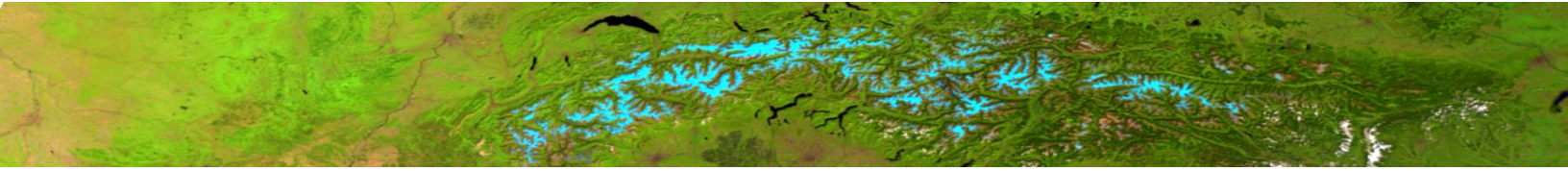
First, make sure that conda of some variety is installed on the machine you are working on. If you are working on a machine that has ArcGIS Pro installed, it is already available to you. This tutorial assumes that you have ArcGIS Pro installed, but if not, refer to the installation guide here and install Miniconda:

https://conda.io/projects/conda/en/latest/user-guide/install/index.html

Commandline

Open the Anaconda prompt. If you are on Windows, there likely will be both a PowerShell version and another prompt. These both might take slightly different commands but work similarly:





Now that you have the prompt open, you may find some related information already on the commandline. If you are using the anaconda prompt that was installed with ArcGIS Pro, you should see that the ArcGIS conda environment is already activated by seeing `(arcgispro-py3)` at the beginning of the line. Otherwise, you will likely see `(base)` at the beginning, indicating that the initial conda environment is activated. Any other text in those parenthesis refers to a different activated environment, and if nothing is there, then you may need to make sure that conda is properly installed. Refer to the conda installation documentation referenced above for this.

Now, you will create an environment called "softdev_navigator" that only specifies the anaconda navigator to be installed. Documentation on how to create environments can be found here:

https://conda.io/projects/conda/en/latest/user-guide/tasks/manage-environments.html#creating-an-environment-with-commands

In this case, this command will look like this as text:

```
conda create –name softdev_navigator anaconda-navigator
```

Or like this as a screenshot from a prompt that has ArcGIS's environment activated already:

```
(arcgispro-py3) C:\Program Files\ArcGIS\Pro\bin\Python\envs\arcgispro-py3>conda create --name softdev_navigator anaconda-navigator
```

Once you hit enter, conda will search the repos available for information about the packages you identified (in this case, Anaconda Navigator), and any dependencies. It may look like this:

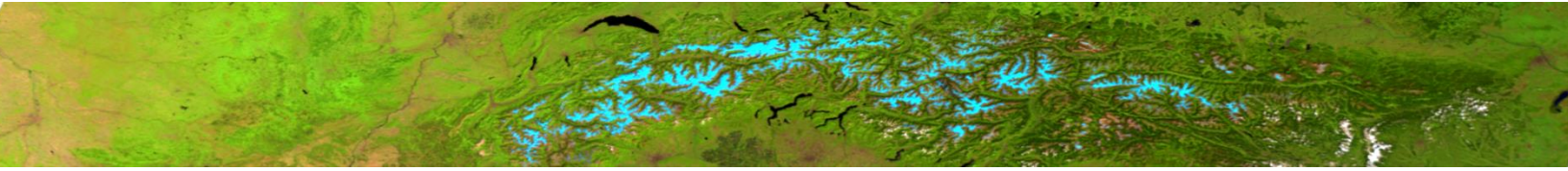
```
Collecting package metadata (current_repodata.json): done
Solving environment: failed with repodata from current_repodata.json, will retry with next repodata source.
Collecting package metadata (repodata.json): done
Solving environment: done
```

In the example above, it had to check a few different sources, but as long as the environment is solved (see the last line above as done), you are good to go.

However, if there are some issues, the environment creation will fail. Just so you know, if it fails, it may look like this:

```
(arcgispro-py3) C:\Program Files\ArcGIS\Pro\bin\Python\envs\arcgispro-py3>conda create --name softdev_navigator anaconda-navigator python=3.11
Collecting package metadata (current_repodata.json): done
Solving environment: failed with repodata from current_repodata.json, will retry with next repodata source.
Collecting package metadata (repodata.json): done
Solving environment: -
Found conflicts! Looking for incompatible packages.
This can take several minutes.  Press CTRL-C to abort.

failed

UnsatisfiableError: The following specifications were found to be incompatible with each other:

Output in format: Requested package -> Available versions

Package python conflicts for:
anaconda-navigator -> anaconda-client[version='>=1.6.14'] -> python[version='>=2.7|>=3.11,<3.12.0a0|>=3.4,<3.5.0a0|>=3.6']
python=3.11
anaconda-navigator -> python[version='>=2.7,<2.8.0a0|>=3.10,<3.11.0a0|>=3.7,<3.8.0a0|>=3.9,<3.10.0a0|>=3.8,<3.9.0a0|>=3.6,<3.7.0a0|>=3.5,<3.6.0a0']
```

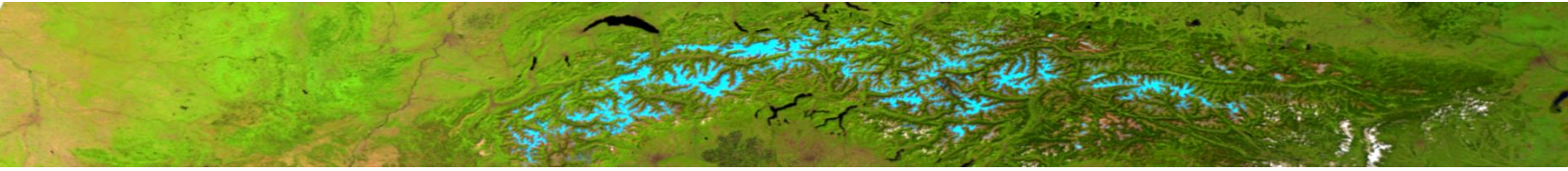
This example failed because the creation command also specified a specific version of python, namely 3.11, and anaconda navigator at the time of testing was not yet ready for python 3.11, only lower versions.



However, let's assume that the environment was solved successfully. In that case, you will get a bunch of information like this that explains which packages will be downloaded to create the environment and where they will be located. It will look something like this, but even longer:

```
## Package Plan ##

  environment location: C:\Users\s1036347\AppData\Local\ESRI\conda\envs\softdev_navigator

  added / updated specs:
    - anaconda-navigator


The following packages will be downloaded:

    package                    |            build
    ---------------------------|-----------------
    anaconda-client-1.11.1     |   py39haa95532_0         154 KB
    anaconda-navigator-2.4.0   |   py39haa95532_0         5.5 MB
    attrs-22.1.0               |   py39haa95532_0          84 KB
    boltons-23.0.0             |   py39haa95532_0         421 KB
    brotlipy-0.7.0             |py39h2bbff1b_1003         411 KB
    certifi-2022.12.7          |   py39haa95532_0         149 KB
    cffi-1.15.1                |   py39h2bbff1b_3         238 KB
    chardet-4.0.0              |py39haa95532_1003         212 KB
    charset-normalizer-2.0.4   |     pyhd3eb1b0_0          35 KB
    clyent-1.2.2               |   py39haa95532_1          21 KB
    colorama-0.4.6             |   py39haa95532_0          32 KB
    conda-23.3.1               |   py39haa95532_0         972 KB
    conda-content-trust-0.1.3  |   py39haa95532_0          86 KB
    conda-package-handling-2.0.2|   py39haa95532_0         286 KB
    conda-package-streaming-0.7.0|   py39haa95532_0          27 KB
    conda-repo-cli-1.0.41      |   py39haa95532_0         142 KB
    conda-token-0.4.0          |     pyhd3eb1b0_0          13 KB
    cryptography-38.0.4        |           py39_0         2.6 MB  esri
    defusedxml-0.7.1           |     pyhd3eb1b0_0          23 KB
    freetype-2.10.4            |           vc14_3         575 KB  esri
    icu-58.2                   |       ha925a31_3         9.4 MB
    idna-3.4                   |   py39haa95532_0          93 KB
    importlib-metadata-6.0.0   |   py39haa95532_0          39 KB
    jpeg-9e                    |                 0         359 KB  esri
    jsonpatch-1.32             |     pyhd3eb1b0_0          15 KB
    jsonpointer-2.1            |     pyhd3eb1b0_0           9 KB
    jsonschema-4.17.3          |   py39haa95532_0         156 KB
    jupyter_core-4.11.2        |           py39_0         103 KB  esri
    libdeflate-1.8             |       h2bbff1b_5          46 KB
    libpng-1.6.39              |       h8cc25b3_0         369 KB
    libtiff-4.3.0              |                 1         1.1 MB  esri
    lz4-c-1.9.4                |       h2bbff1b_0         143 KB
    menuinst-1.4.19            |   py39h59b6b97_0          94 KB
    navigator-updater-0.3.0    |   py39haa95532_0         2.2 MB
    nbformat-5.6.1             |             py_0          44 KB  esri
    openssl-1.1.1n             |                 0         2.2 MB  esri
    packaging-23.0             |   py39haa95532_0          69 KB
    pathlib-1.0.1              |     pyhd3eb1b0_1          17 KB
```

[….and after the long list to be downloaded it will also tell you which new packages will be installed]



```
The following NEW packages will be INSTALLED:

  anaconda-client    pkgs/main/win-64::anaconda-client-1.11.1-py39haa95532_0
  anaconda-navigator pkgs/main/win-64::anaconda-navigator-2.4.0-py39haa95532_0
  attrs              pkgs/main/win-64::attrs-22.1.0-py39haa95532_0
  boltons            pkgs/main/win-64::boltons-23.0.0-py39haa95532_0
  brotlipy           pkgs/main/win-64::brotlipy-0.7.0-py39h2bbff1b_1003
  certifi            pkgs/main/win-64::certifi-2022.12.7-py39haa95532_0
  cffi               pkgs/main/win-64::cffi-1.15.1-py39h2bbff1b_3
  chardet            pkgs/main/win-64::chardet-4.0.0-py39haa95532_1003
  charset-normalizer pkgs/main/noarch::charset-normalizer-2.0.4-pyhd3eb1b0_0
  clyent             pkgs/main/win-64::clyent-1.2.2-py39haa95532_1
  colorama           pkgs/main/win-64::colorama-0.4.6-py39haa95532_0
  conda              pkgs/main/win-64::conda-23.3.1-py39haa95532_0
  conda-content-tru~ pkgs/main/win-64::conda-content-trust-0.1.3-py39haa95532_0
  conda-package-han~ pkgs/main/win-64::conda-package-handling-2.0.2-py39haa95532_0
  conda-package-str~ pkgs/main/win-64::conda-package-streaming-0.7.0-py39haa95532_0
  conda-repo-cli     pkgs/main/win-64::conda-repo-cli-1.0.41-py39haa95532_0
  conda-token        pkgs/main/noarch::conda-token-0.4.0-pyhd3eb1b0_0
  cryptography       esri/win-64::cryptography-38.0.4-py39_0
  defusedxml         pkgs/main/noarch::defusedxml-0.7.1-pyhd3eb1b0_0
  freetype           esri/win-64::freetype-2.10.4-vc14_3
  icu                pkgs/main/win-64::icu-58.2-ha925a31_3
  idna               pkgs/main/win-64::idna-3.4-py39haa95532_0
  importlib-metadata pkgs/main/win-64::importlib-metadata-6.0.0-py39haa95532_0
  jpeg               esri/win-64::jpeg-9e-0
  jsonpatch          pkgs/main/noarch::jsonpatch-1.32-pyhd3eb1b0_0
  jsonpointer        pkgs/main/noarch::jsonpointer-2.1-pyhd3eb1b0_0
  jsonschema         pkgs/main/win-64::jsonschema-4.17.3-py39haa95532_0
  jupyter_core       esri/win-64::jupyter_core-4.11.2-py39_0
  libdeflate         pkgs/main/win-64::libdeflate-1.8-h2bbff1b_5
  libpng             pkgs/main/win-64::libpng-1.6.39-h8cc25b3_0
```

[…again, it is long … longer than what is pictured here]

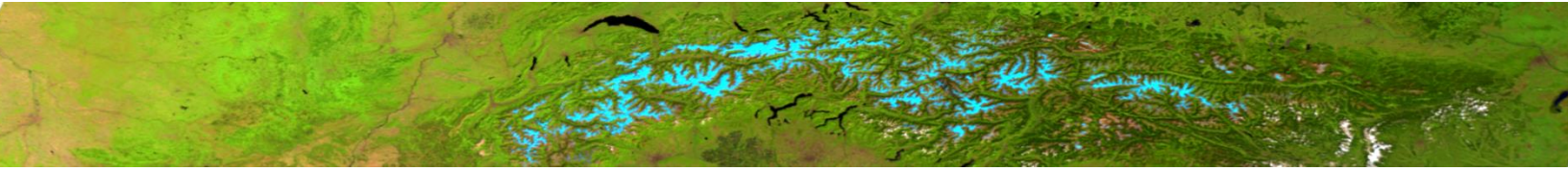
Then it will ask if you want to proceed. You can say no by typing `n` and hitting enter. However, in this case, you would like to create the environment so enter `y` like this:

```
Proceed ([y]/n)? y
```

Then you will get dialogue like this keeping you up to date with the download process

```
Downloading and Extracting Packages
jupyter_core-4.11.2  | 103 KB    | ############################
chardet-4.0.0        | 212 KB    | ############################
pyqt-5.9.2           | 3.3 MB    | ############################
openssl-1.1.1n       | 2.2 MB    |
```

[….which is also very long … longer than pictured here]



And when the downloading is done, it will also tell you. In the case of the test I did on a lab computer with ArcGIS installed, it threw an error (see below) but still worked, so don't panic. It will then also tell you how to activate and deactivate the environment. Depending on the type of prompt and operating system you used, these activate commands may look slightly different:

```
Preparing transaction: done
Verifying transaction: done
Executing transaction: - menuinst Exception
Traceback (most recent call last):
  File "conda\gateways\disk\create.py", line 246, in make_menu
  File "menuinst\__init__.py", line 67, in install
  File "menuinst\win_elevate.py", line 43, in runAsAdmin
ModuleNotFoundError: No module named 'win32codone
#
# To activate this environment, use
#
#     $ activate softdev_navigator
#
# To deactivate an active environment, use
#
#     $ deactivate
```

Now, activate the environment as you were told. In this case, that looked like this:

```
(arcgispro-py3) C:\Program Files\ArcGIS\Pro\bin\Python\envs\arcgispro-py3>activate softdev_navigator
Current directory is another environment, changing directory to active environment.

(softdev_navigator) C:\Users\s1036347\AppData\Local\ESRI\conda\envs\softdev_navigator>
```

Once the environment is activated you should see the name of the new environment at the beginning of the command line. In this case, `(softdev_navigator)`

The cool thing now, is that you for sure now have the navigator installed and can test it out inside the environment you created. However, you will need to start the navigator software from the command line. To do this, you simply type `anaconda-navigator` and hit enter. 😊

Just like this:

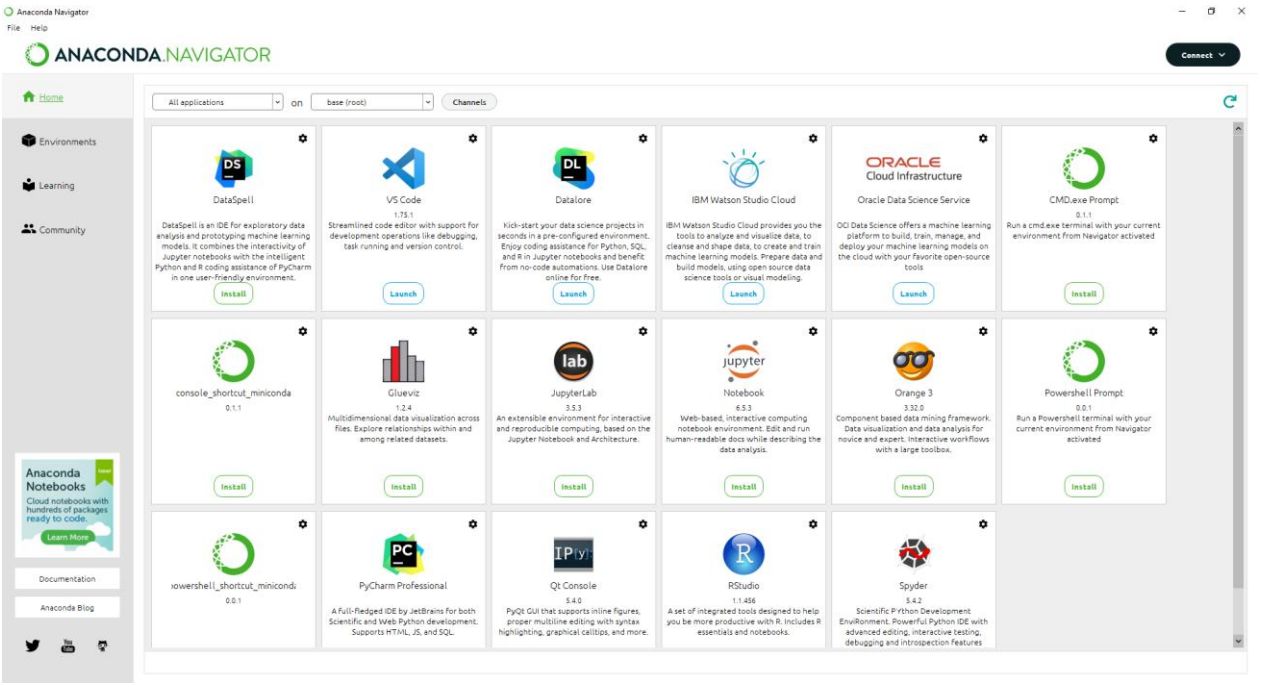
```
(softdev_navigator) C:\Users\s1036347\AppData\Local\ESRI\conda\envs\softdev_navigator>anaconda-navigator
```

Navigator

If you have a different setup/installation, you can learn how to start the navigator here:

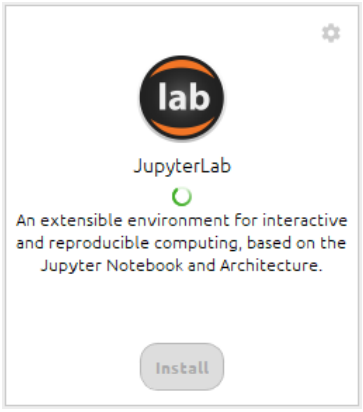
https://docs.anaconda.com/navigator/getting-started/#starting-navigator

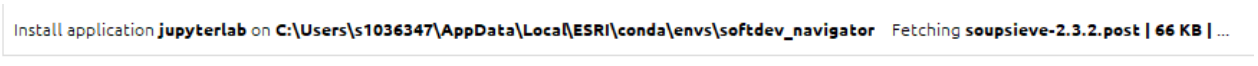
Once you have the navigator successfully started, it will look something like this:



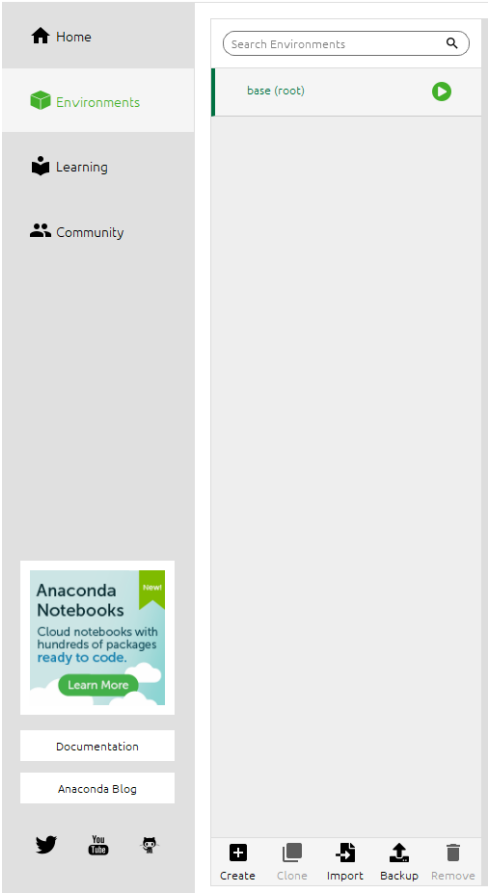
And you should also see the Navigator logo as a green circle in your task bar. Here is what it looks like in windows:

If you want to extend your current environment with additional packages offered by default from the Navigator, you can also install them now via the navigator without having to use the commandline. Here, I installed Jupyterlab from the navigator and it is available after installation to look like this:





Now, on the lefthand side of the Navigator, you will see a menu as a list. Click on “environments” and you will see the environments that are currently available. If you installed and started the navigator in a clean environment, it should only show a base environment like this:

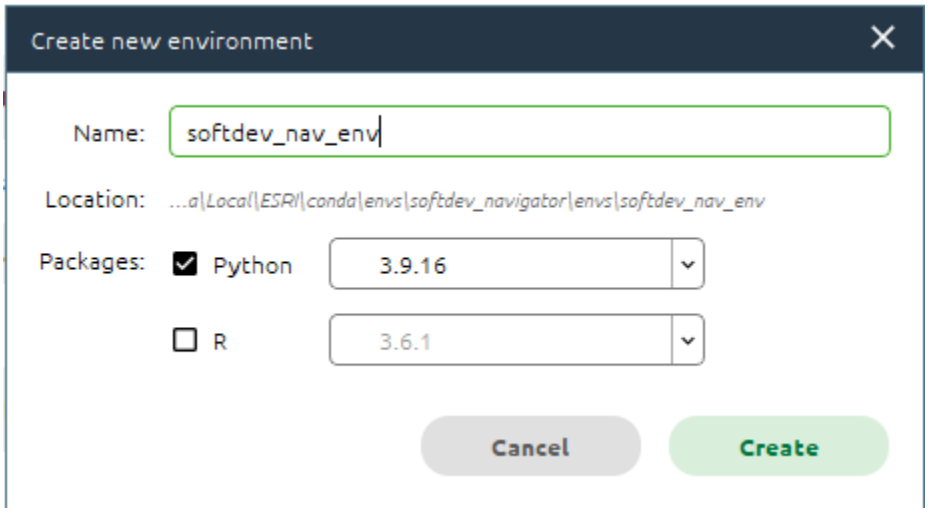


Even though you may have other environments available on your machine (e.g. ArcGIS Pro’s environment), the navigator in this example only knows about what is in the environment you created. It is separate from the rest of your computer! That is what makes environments great!

Usually, you wouldn’t want to create another environment inside an environment, but we will do just that for the case of demonstration here.

To create a new environment from the navigator, click on the + or create icon on the bottom of the Environments panel (as seen in the image above).

That should open a popup window to create a new environment. In this case, name the environment "softdev_nav_env". When you create an environment this way, it will only allow you define the version of the language you want it to have and then you will use the GUI to install any packages later.

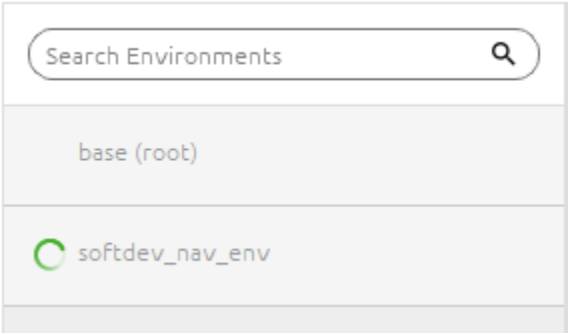


You will see where the environment will be created. In this example, I created the environment with the navigator using the conda that was installed with ArcGIS Pro. You can see this in the location path shown in the popup window:

...\Local\ESRI\conda\envs\softdev_navigator\envs\softdev_nav_env

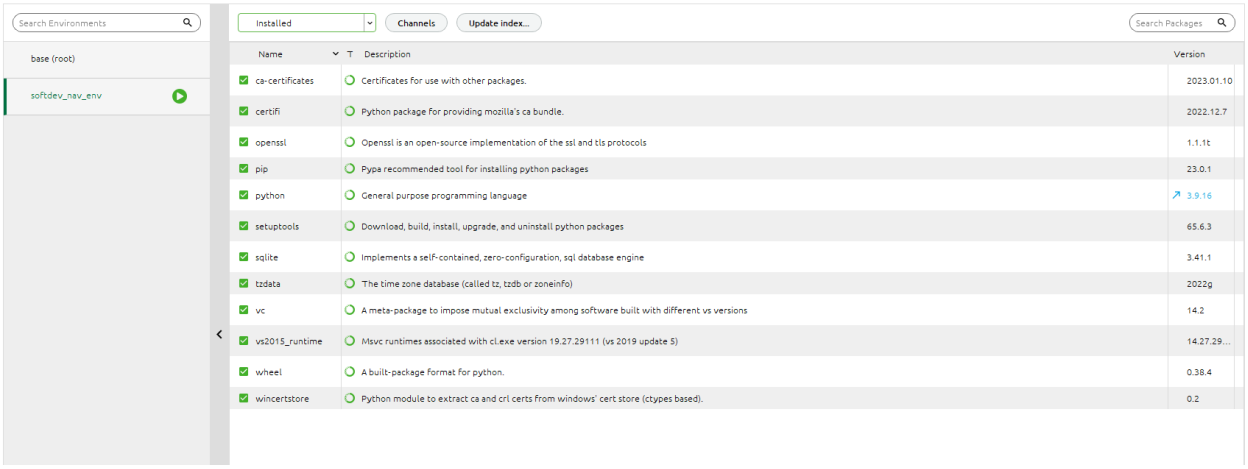
The yellow part of the path above indicates that the conda in use is in the locally installed ESRI stuff. The first directory after the first "envs" (i.e. environments) indicates the name of the environment we created in the first part of this tutorial (blue). The "envs" in this part is another separator for new environments WITHIN this environment. Finally, the green part is whatever you put as the name in the navigator popup window, in this case, "softdev_nav_env".

So, now click on create, and it will show you something like this while it is creating the environment in the other environment:

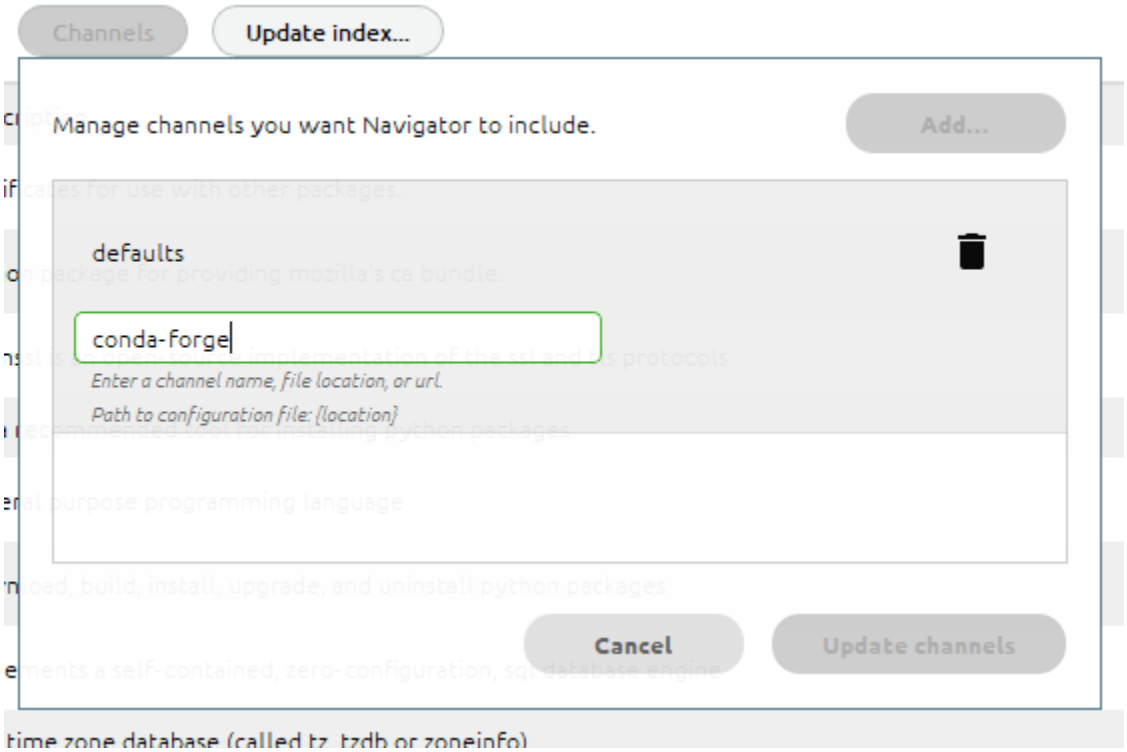


Loading packages of **C:\Users\s1036347\AppData\Local\ESRI\conda\envs\softdev_navigator\envs\softdev_nav_env**

Once it is done, click on the new environment in the panel and ti will show what packages and their versions are installed in that environment, like this:



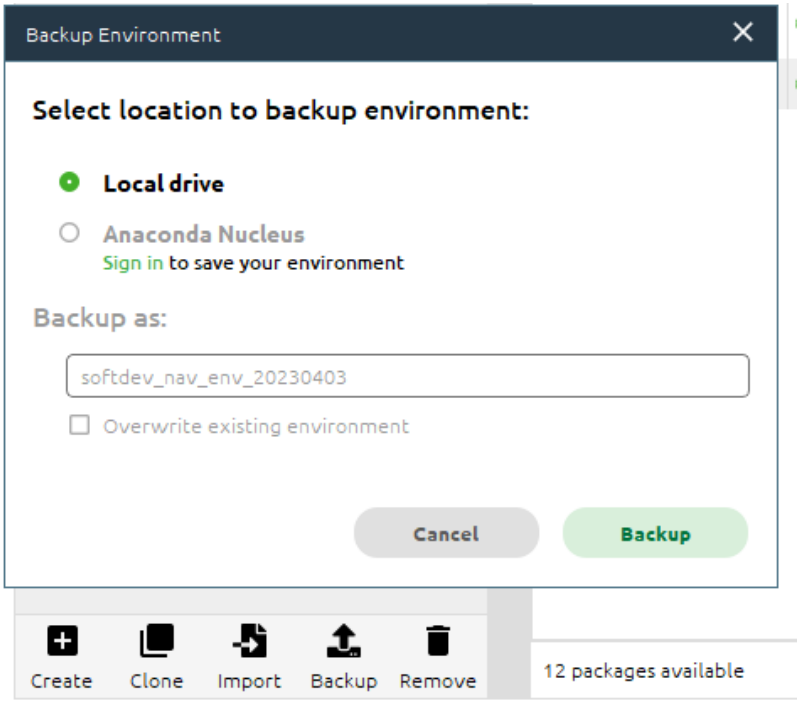
At the top of this list, you will see a button “channels”, this is where you could, for example, add a new channel. Add the conda-forge channel like this:



Once you click update, it will inform you that it is updating:

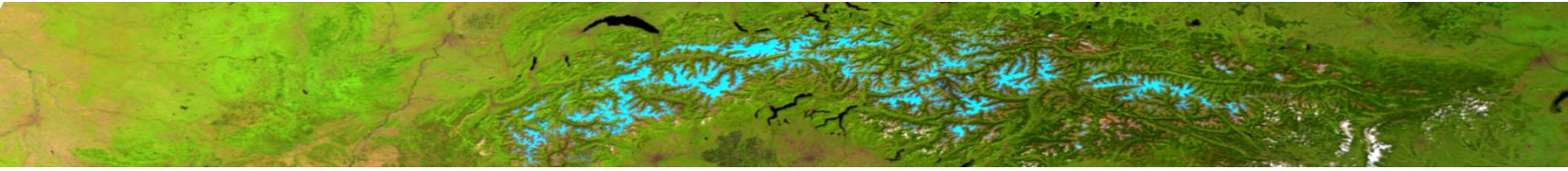
Feel free to test adding a package or two from the navigator so that you can get an idea how it works.

Finally, you may want to export your environment configuration to sent to someone or saved to be able to create a similar environment on a different machine. Click on backup and identify the name of the file:



The resulting file should be a YAML format file, and if you open it, will look something like this:

These are the types of files you will be working with in the conda assignment of the course. Congratulations! You can now do the most basic tasks from the Anaconda prompt and navigator!



Cleanup!!

1. Close the navigator.
2. Deactivate the environment however you were informed to do so from the commandline. For example:

   ```
   (softdev_navigator) C:\Users\s1036347\AppData\Local\ESRI\conda\envs\softdev_navigator>deactivate
   ```

   If deactivated properly, there should be no environment listed at the beginning of the prompt, like this: `C:\Users\s1036347\AppData\Local\ESRI\conda\envs\softdev_navigator>`
   Or, maybe (base) will be listed.
3. Now, remove the first environment that you created called “softdev_navigator”:

   ```
   conda remove -n softdev_navigator --all
   ```

Additional info:

This PDF cheat sheet will give you more information about basic conda commands:

https://conda.io/projects/conda/en/latest/user-guide/cheatsheet.html

If you don’t know what environment you are in, or what environments exist already on your machine, you can get more information using “conda info –envs”:

```
C:\Users\s1036347\AppData\Local\ESRI\conda\envs\softdev_navigator>conda info --envs
# conda environments:
#
base                     C:\Program Files\ArcGIS\Pro\bin\Python
arcgispro-py3         *  C:\Program Files\ArcGIS\Pro\bin\Python\envs\arcgispro-py3
softdev_navigator        C:\Users\s1036347\AppData\Local\ESRI\conda\envs\softdev_navigator
                         C:\Users\s1036347\AppData\Local\ESRI\conda\envs\softdev_navigator\envs\softdev_nav_env


C:\Users\s1036347\AppData\Local\ESRI\conda\envs\softdev_navigator>
```

(above you can see what this looks like with what we did in the tutorial on a machine where ArcGIS Pro is installed)

More information on determining environments here:

https://conda.io/projects/conda/en/latest/user-guide/tasks/manage-environments.html#determining-your-current-environment

Additionally, you should know that the Anaconda Navigator also comes with links to lots of documentation in the learning section of the lefthand panel. If you use the navigator, it may be useful to know this is all here for you: