KelPy User Manual

By Chet Russell

6/20/23

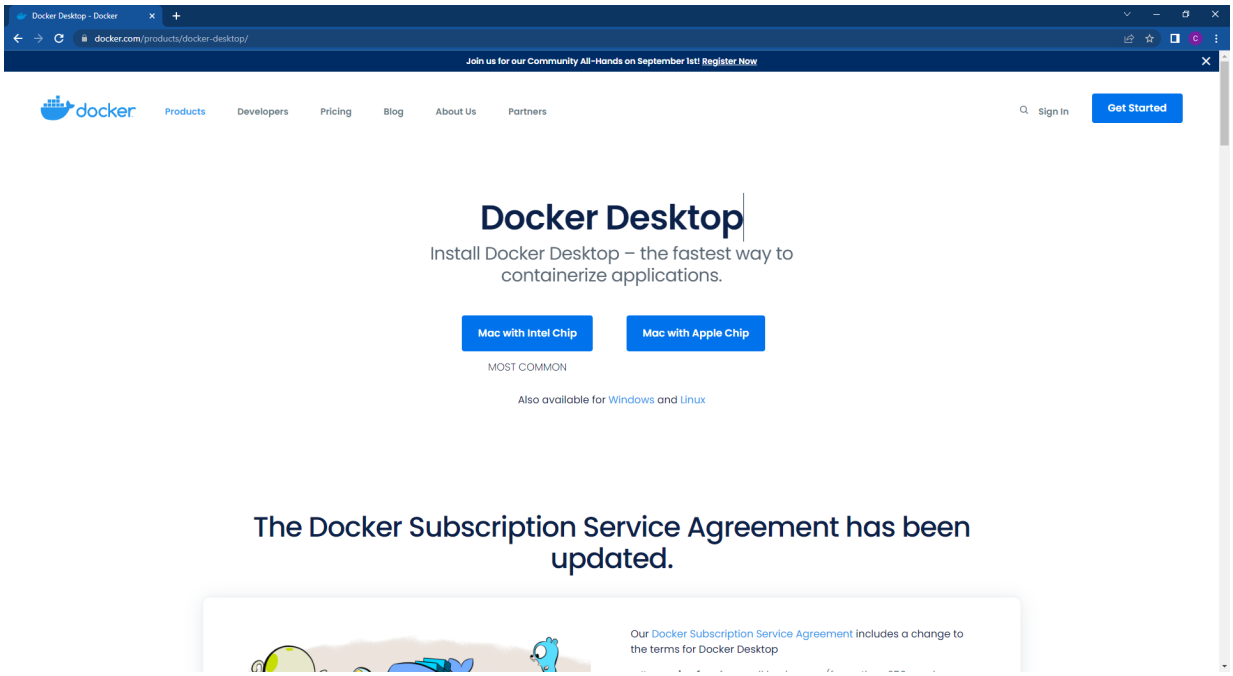
Note: this guide is aimed towards Windows users. The steps may not be the same for installing on Mac/Linux.
It is recommended you have at least 16GB of memory installed on your system to run this program.

Pre-installation

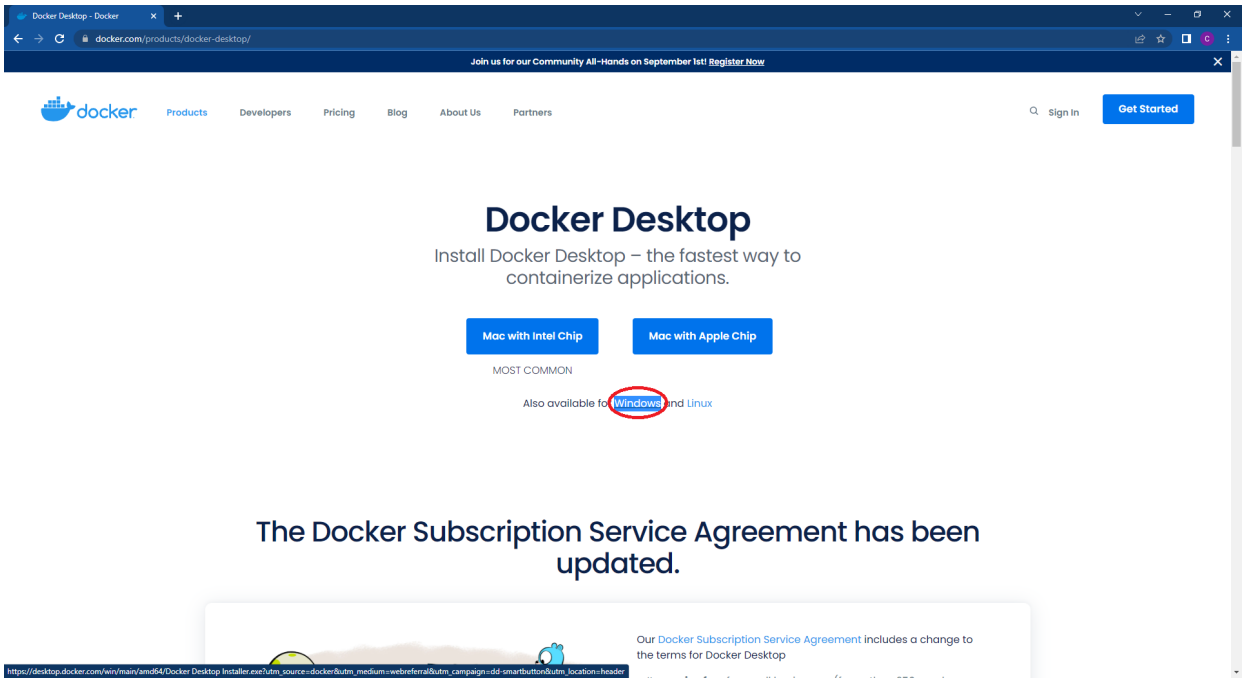
Before you can get to installing and using KelPy, you must install the node that KelPy uses to process data. To do this, we are going to be using Docker, specifically their Docker Desktop application. This will make it simple to launch and run the node.

Go to this link: https://www.docker.com/products/docker-desktop/

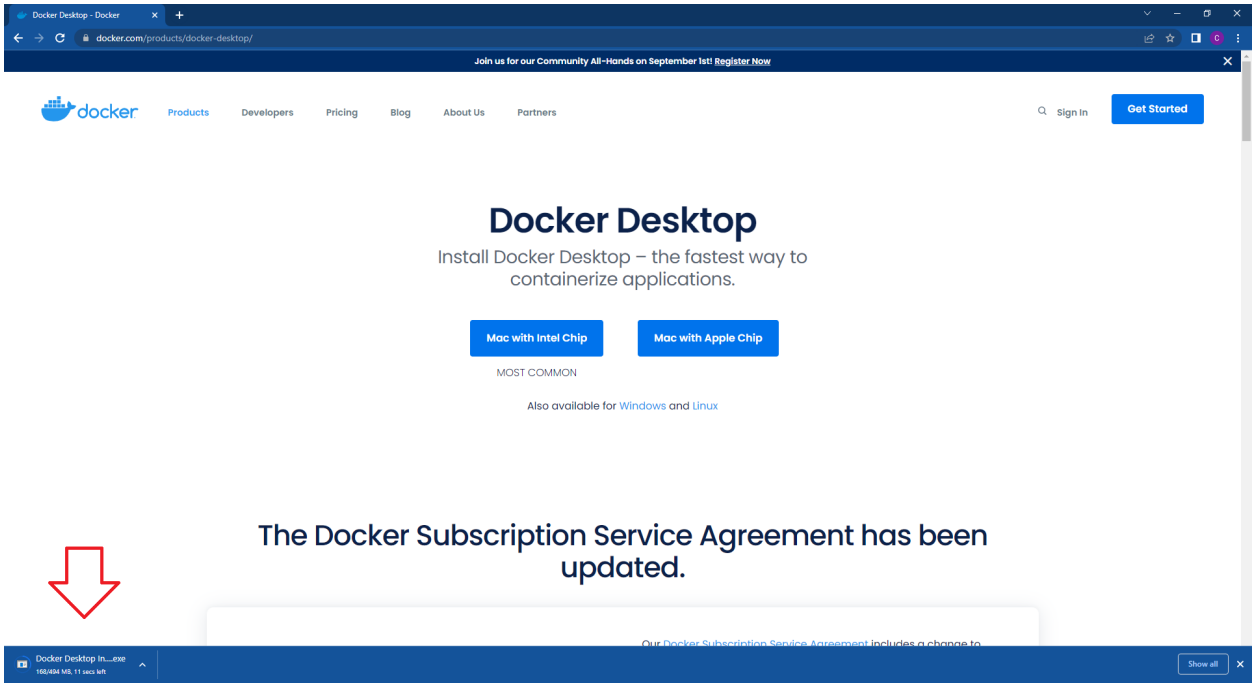
You will see this webpage:



Next, you will want to click on the “Windows” button here:

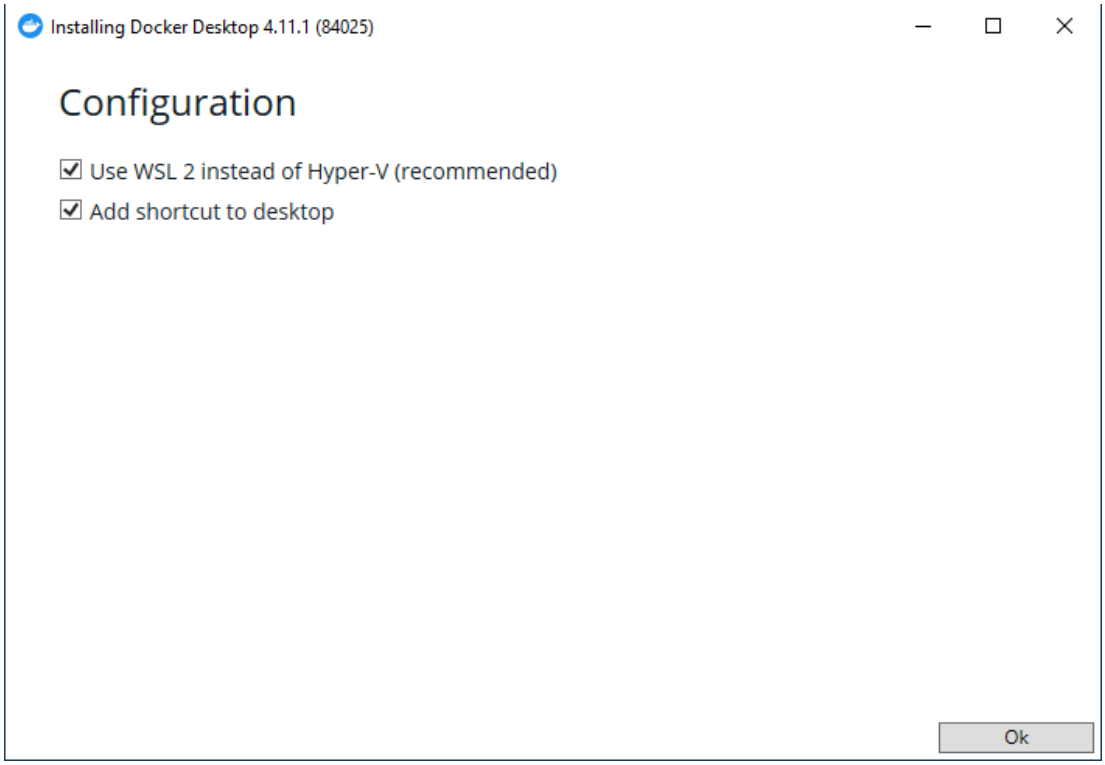


This will start a download that you can see in the bottom left of the webpage:

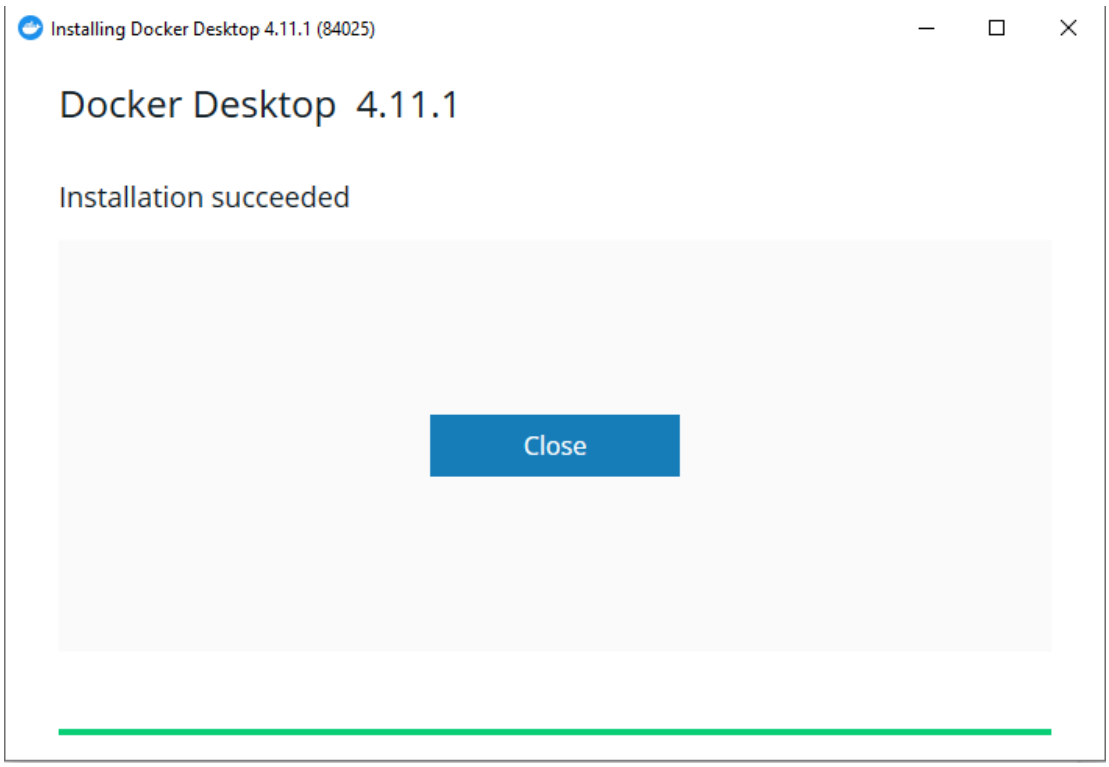


You should click and launch this .exe file once it completes the download.

On launch, you should see this popup:



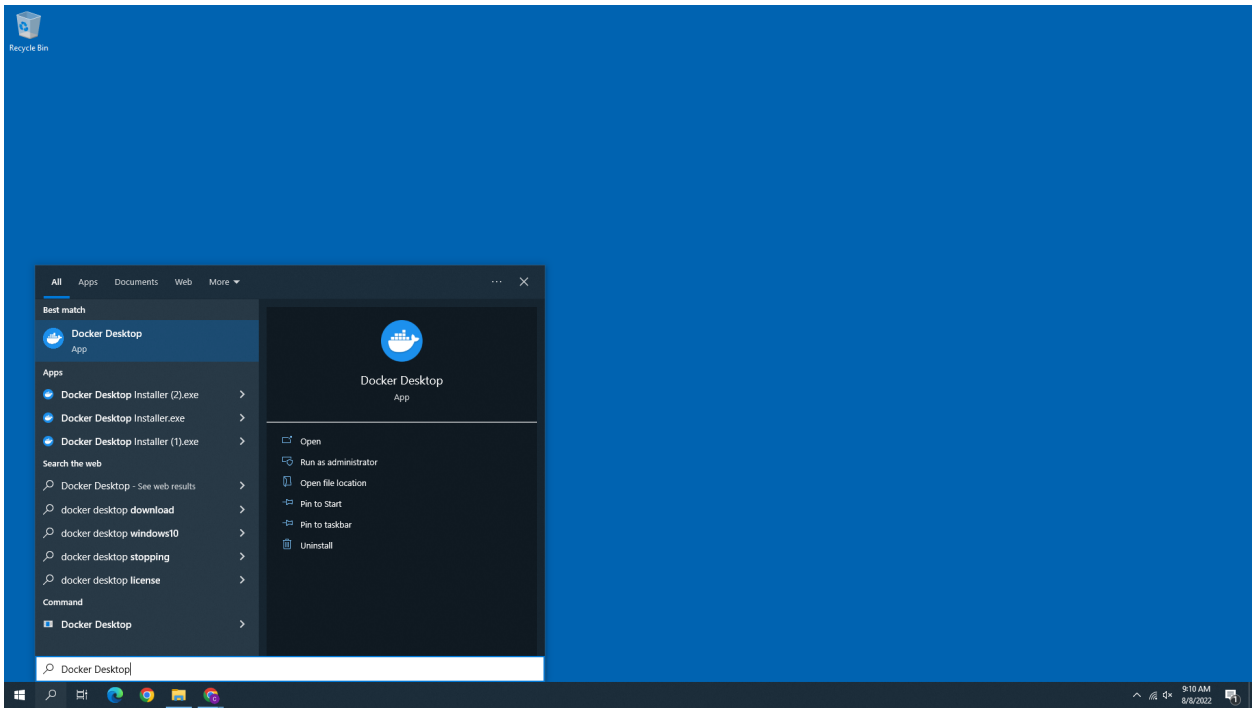
Make sure that both boxes are checked and click “Ok”.
Once the download completes, you can click the “Close” button to exit the installer:



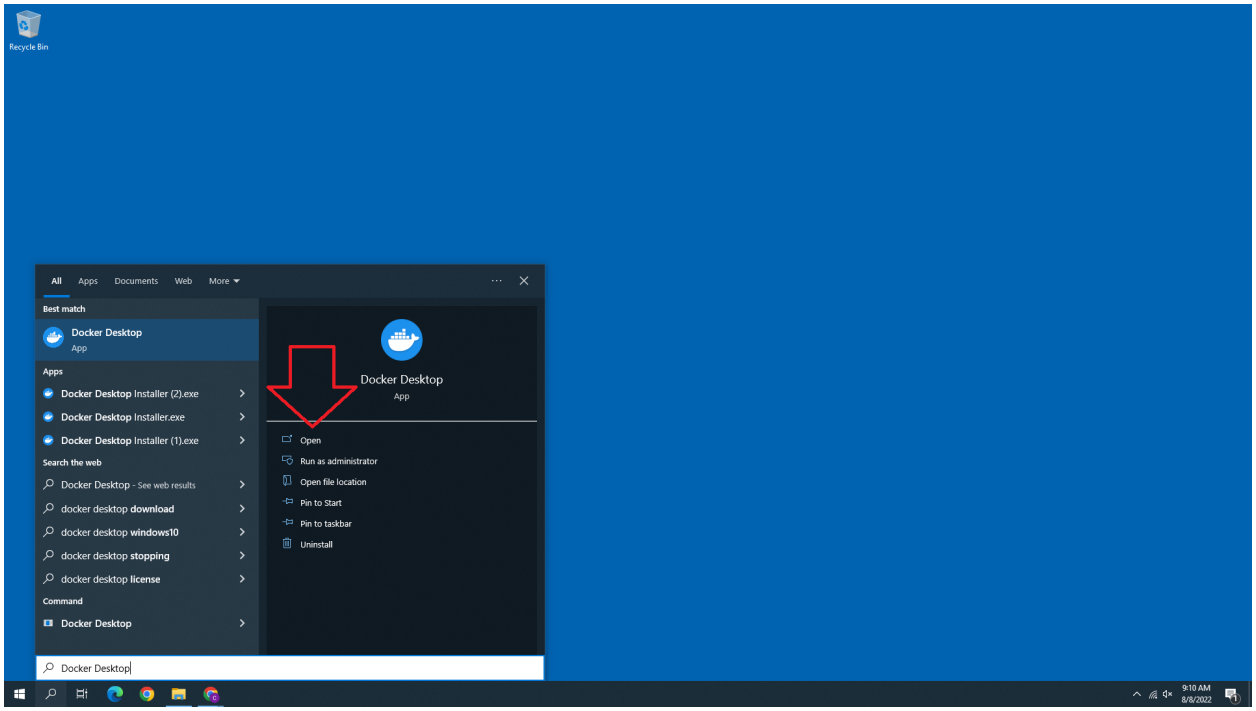
You now have Docker Desktop installed on your system.

Lets launch Docker Desktop now. In the bottom left hand side of your screen, you should see a small magnifying glass:

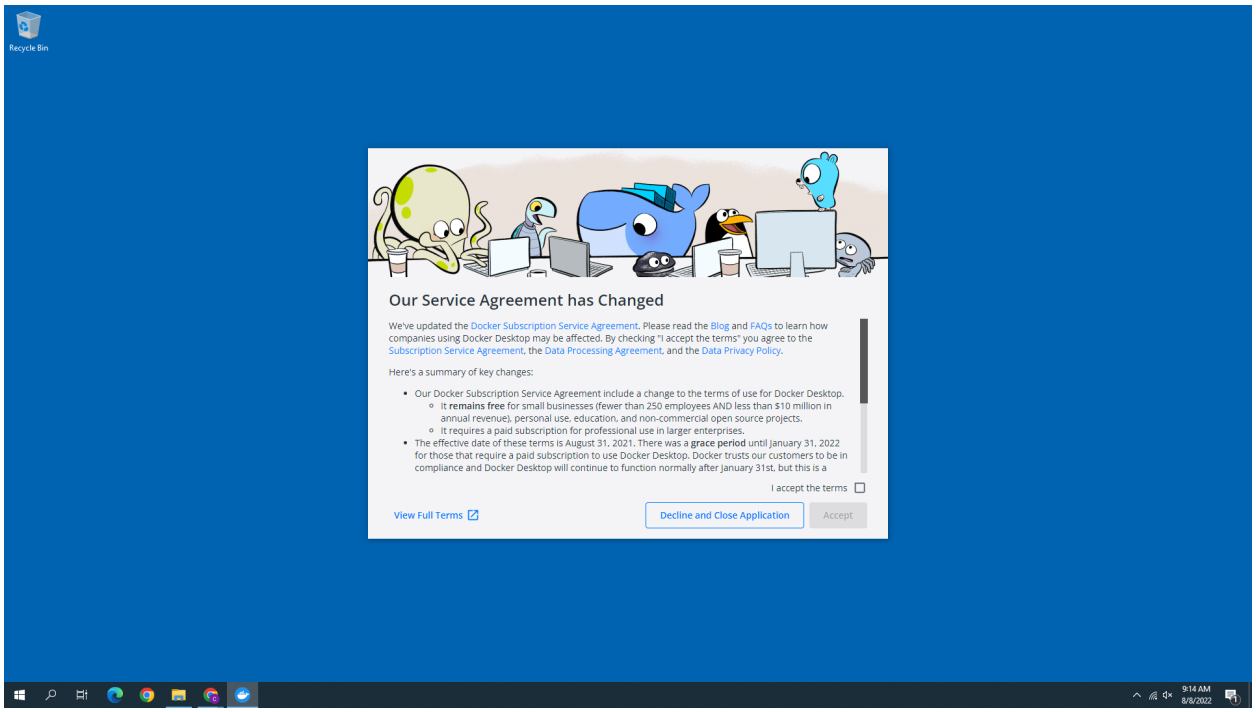
Click on this and type “Docker Desktop” in the search bar.



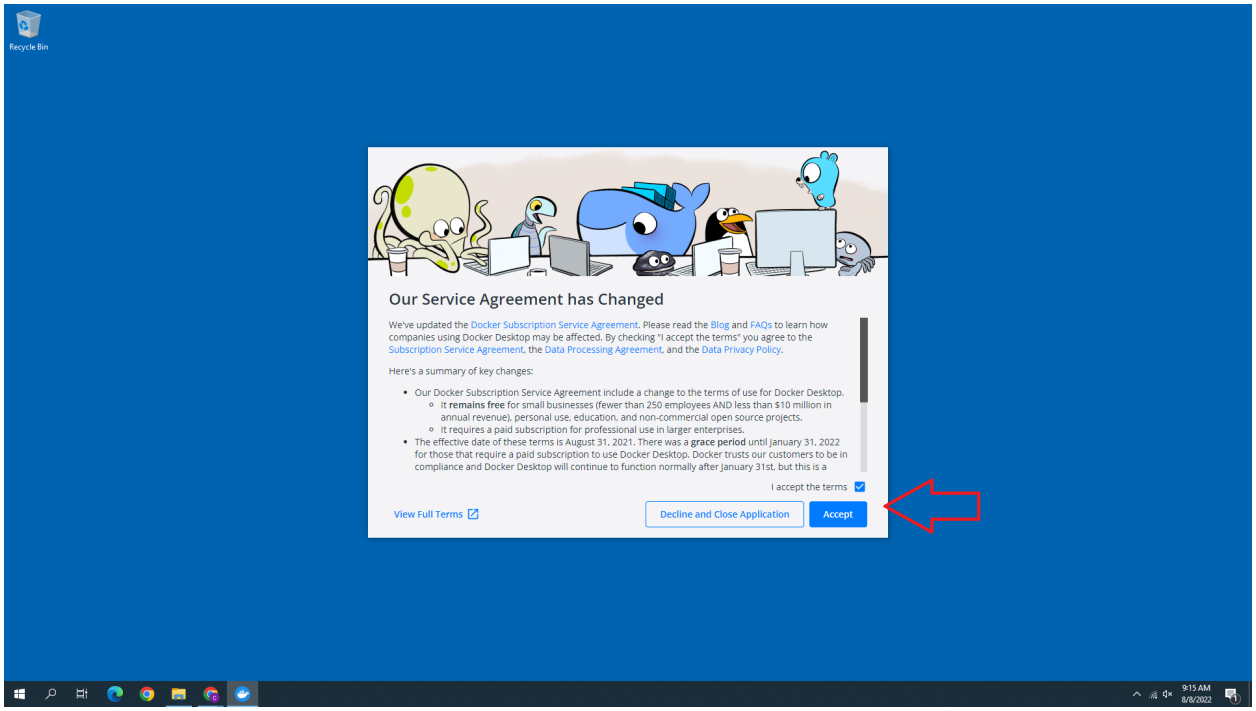
Click on the “Open” button



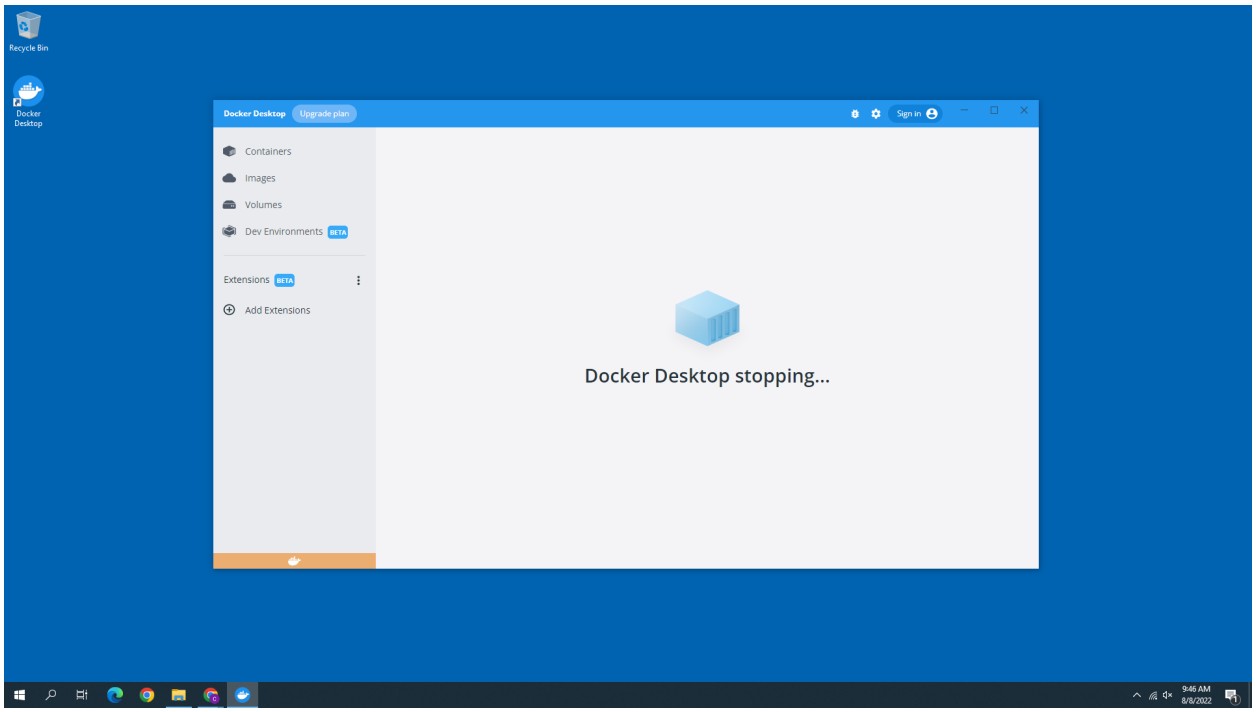
You should see a service agreement pop up on the screen.



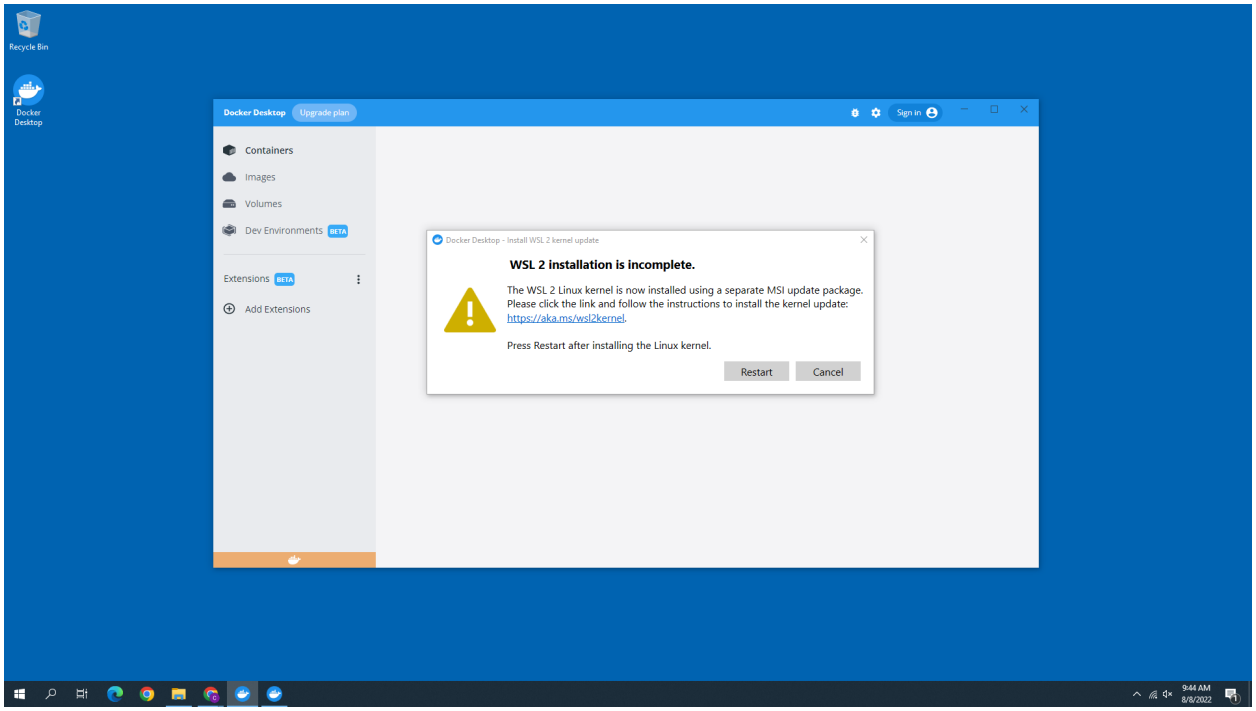
Check the box and click the “Accept” button



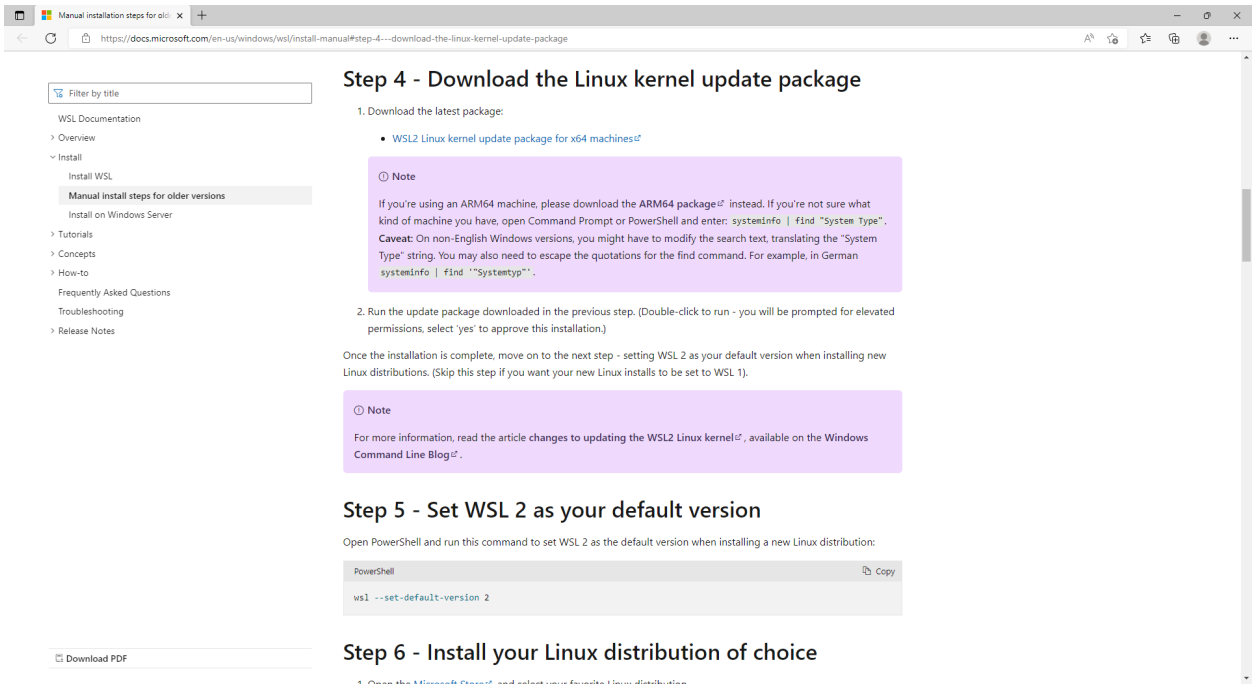
A window should pop up, saying “Docker Desktop stopping…”:



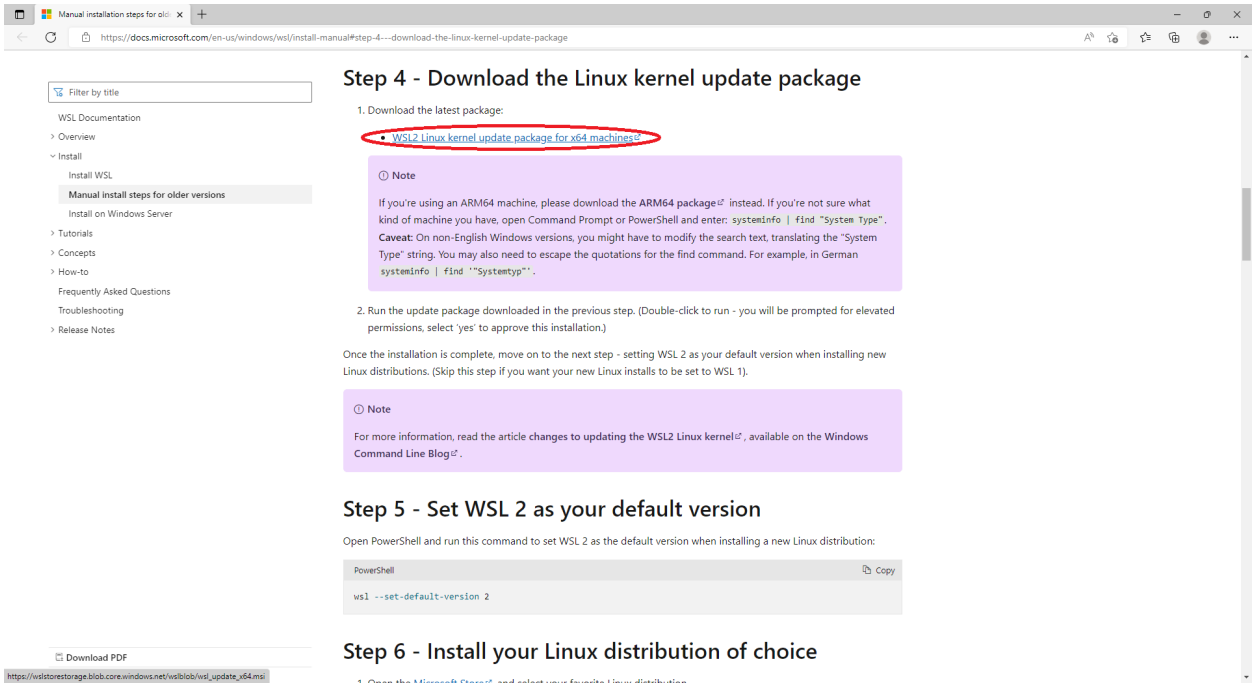
This is ok. Just wait until this next window comes along:



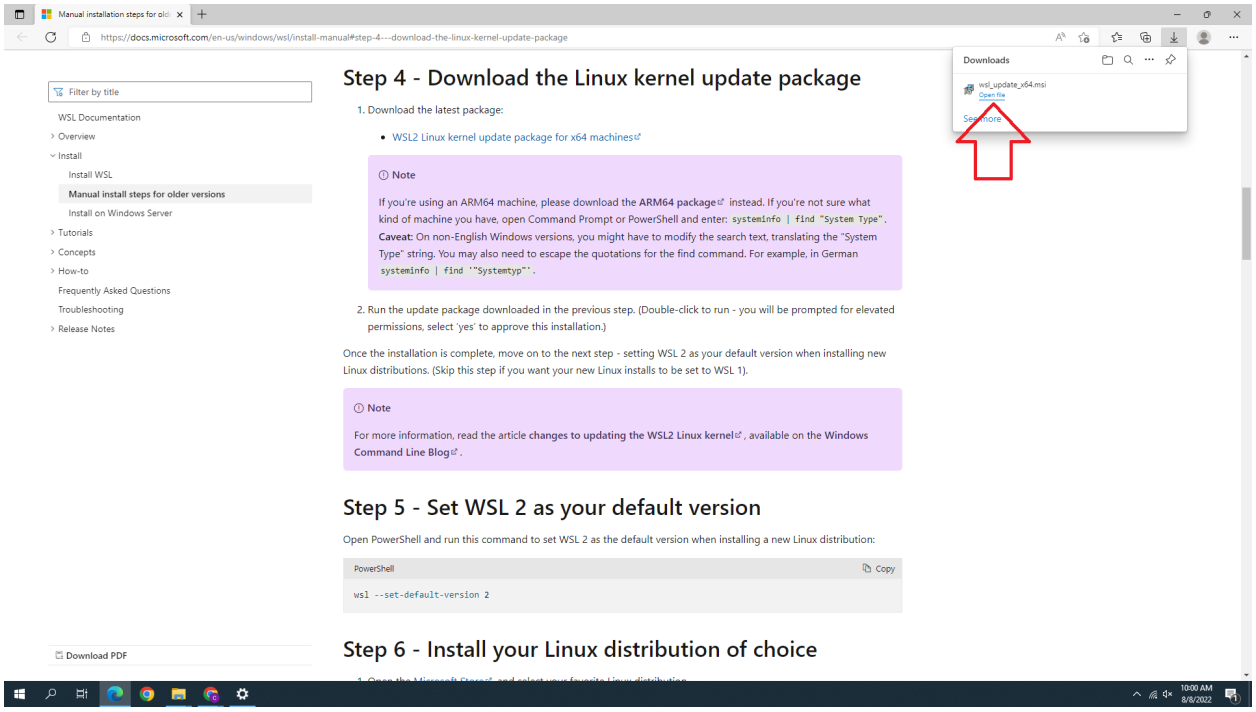
Click on the link provided in the popup, and it should open a page that looks like this:



Click on the “WSL2 Linux kernel update package for x64 machines” link here:

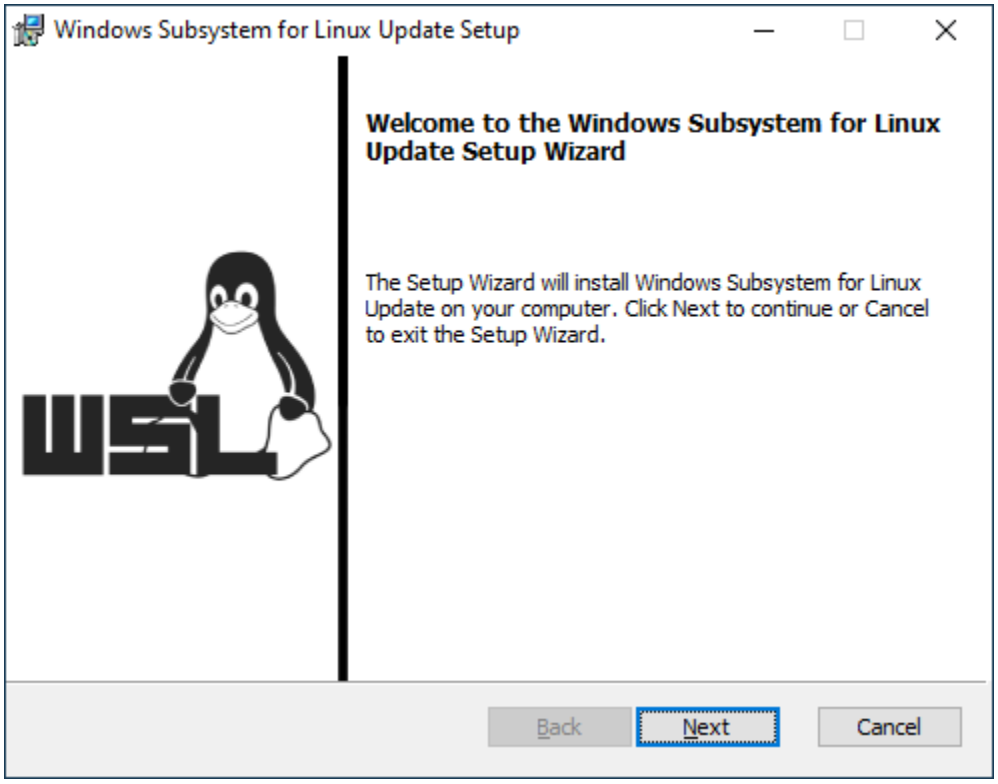


It should start to download an installer:

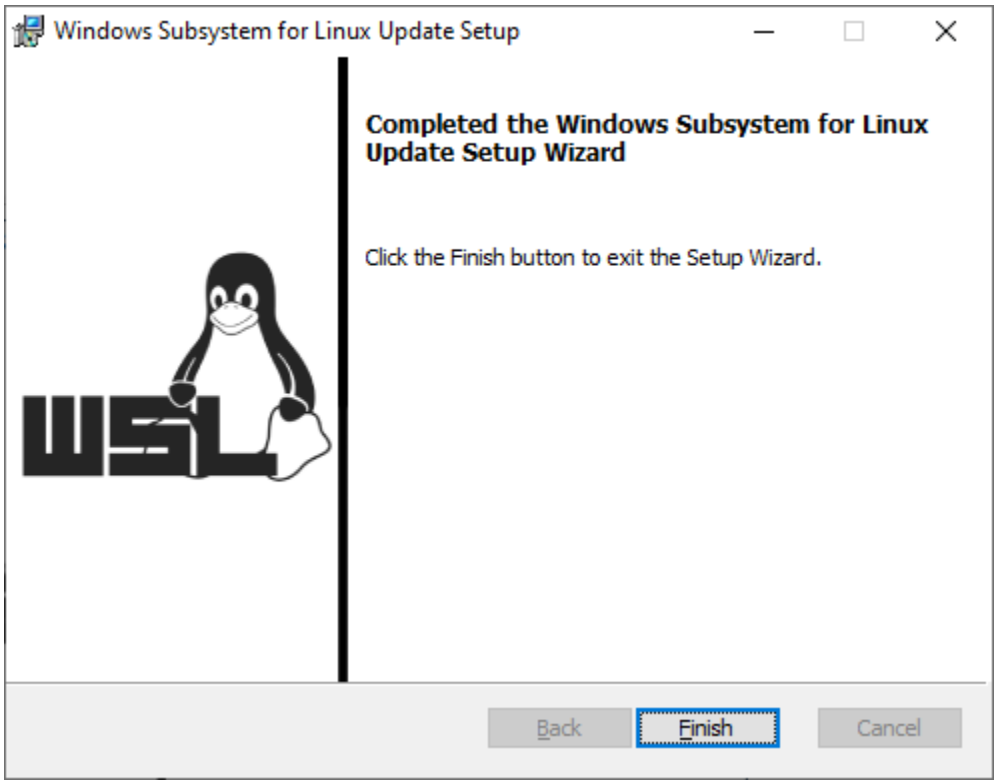


Click “Open file”, or launch it from your downloads folder.

You should now see a installer window that looks like this:

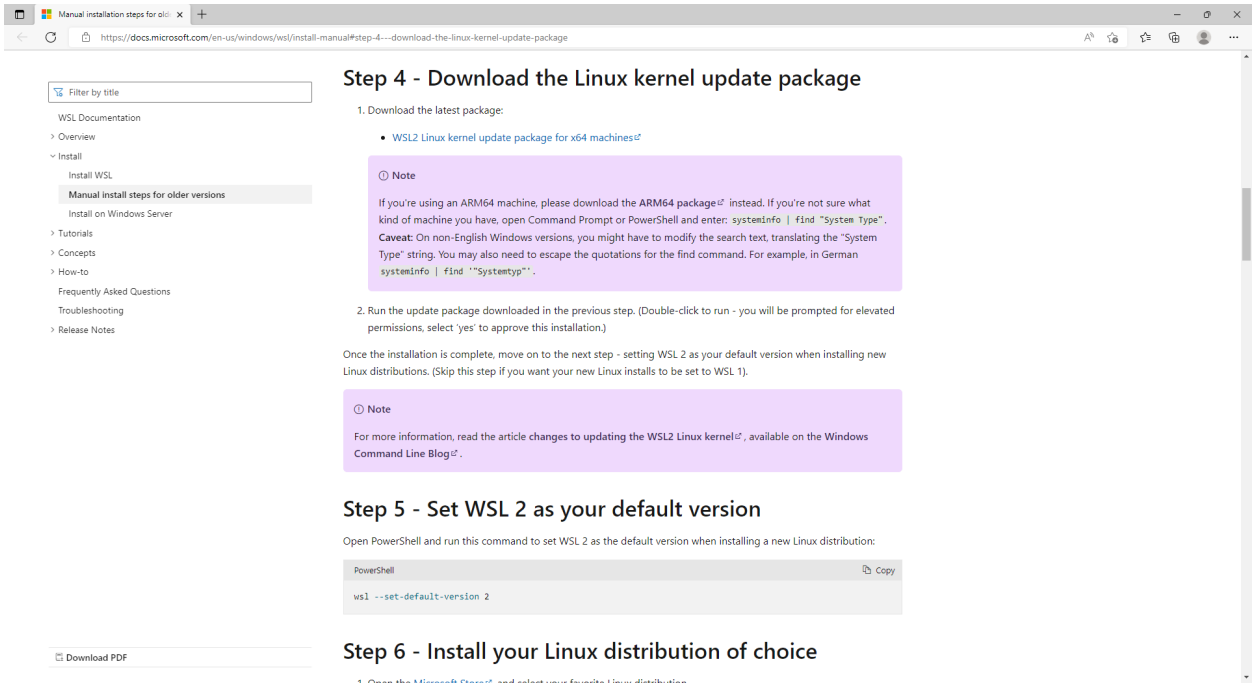


Click the “Next” button and allow all changes. This window will popup when it completes:

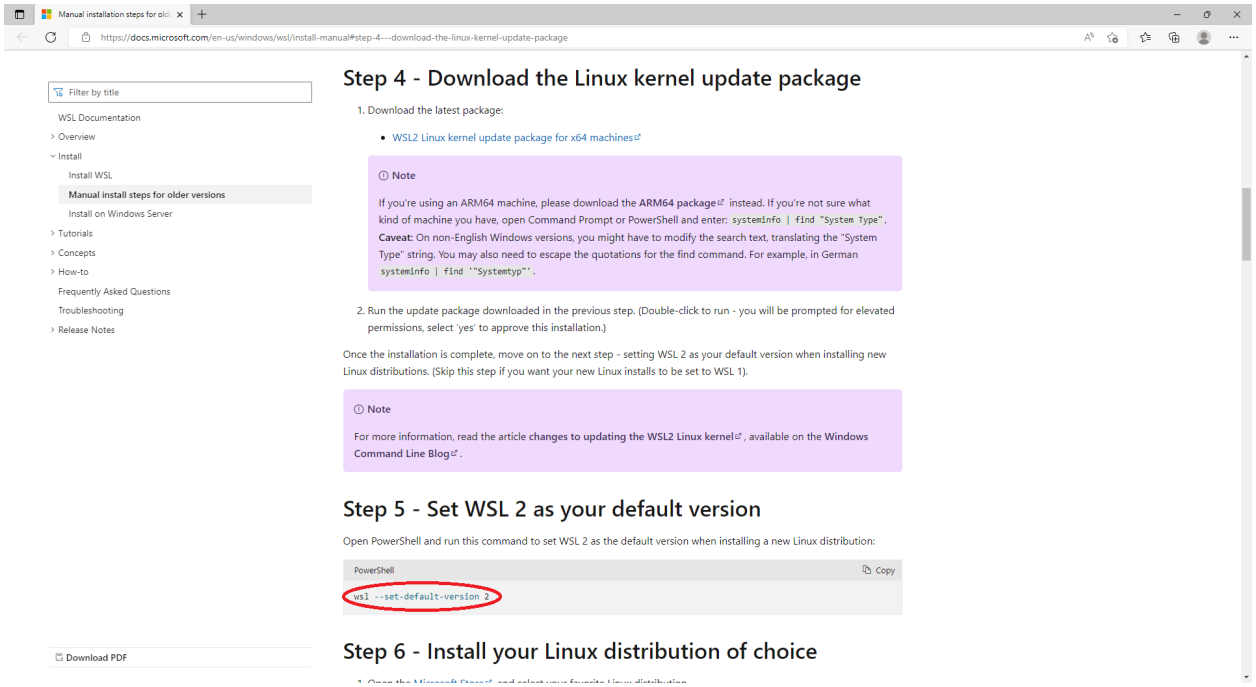


Click the “Finish” button.

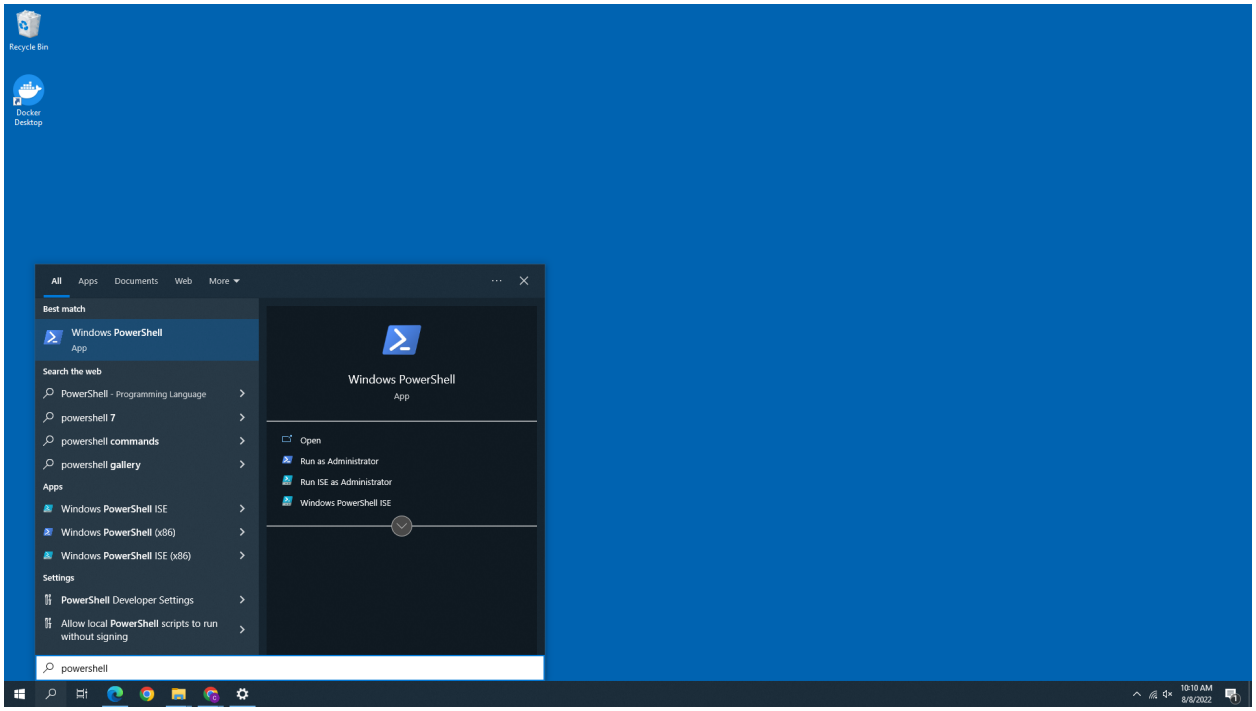
Now, go back to the original webpage:



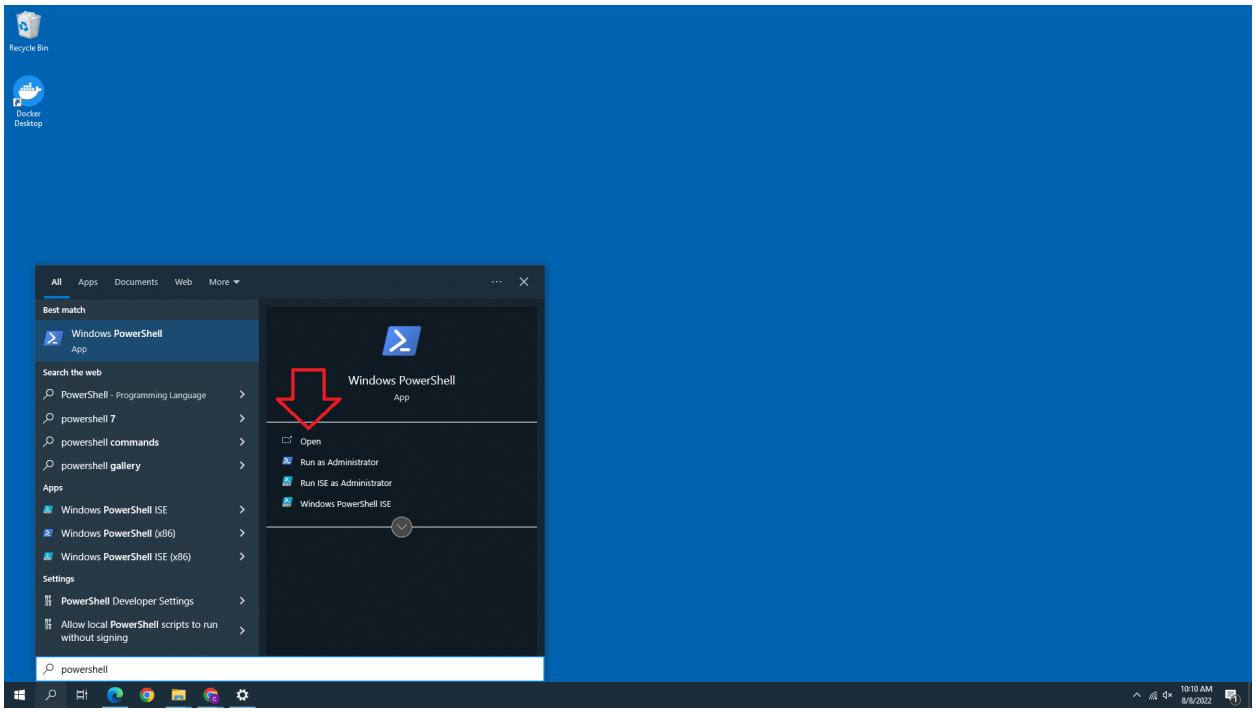
And copy the text located under Step 5:



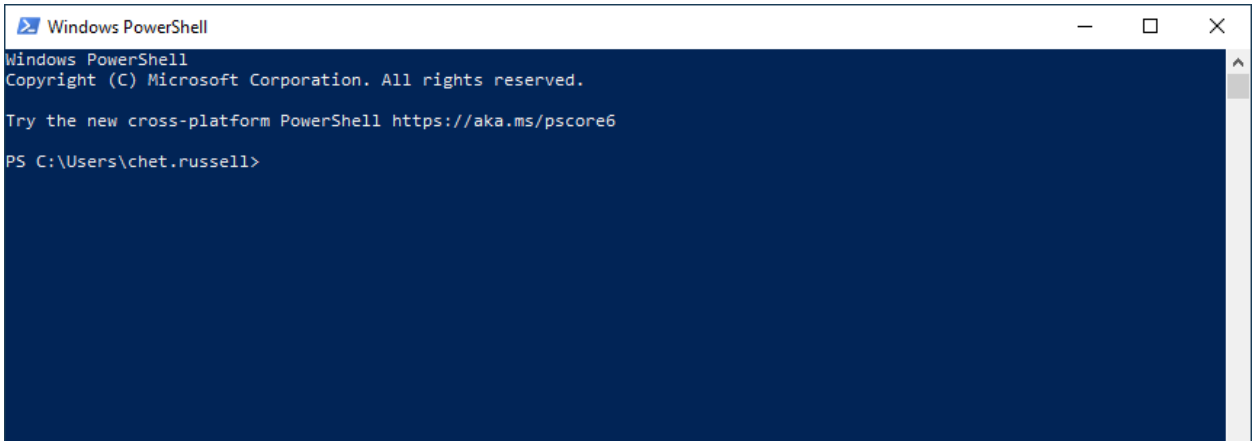
What you want to do now is click the small magnifying glass we used a couple steps before and type in the search bar “powershell”. You should see something like this come up:



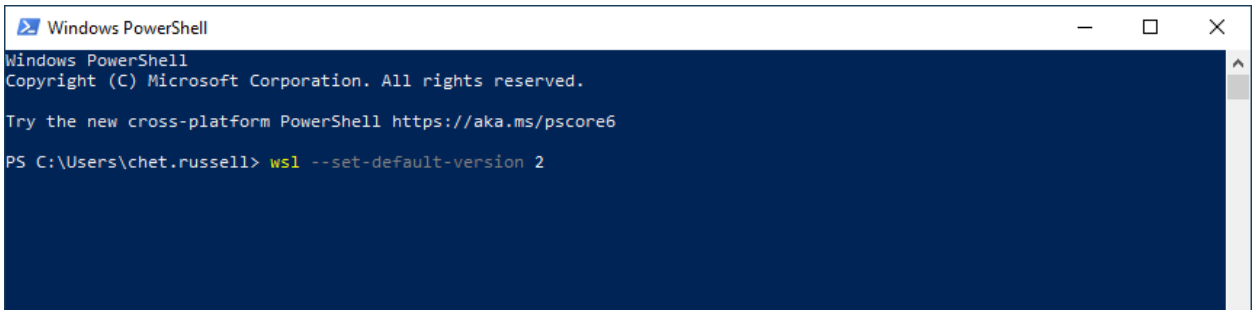
Click the “Open” button:



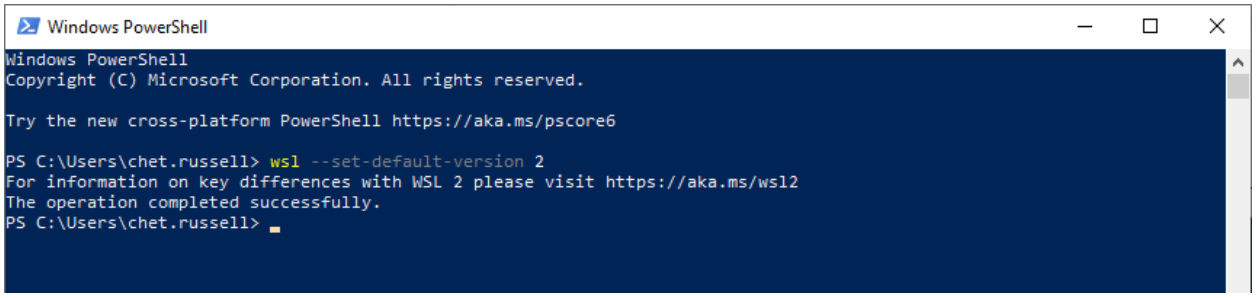
After clicking this button, a new powershell instance should show up:



You will now use the text you copied from Step 5 on the webpage and paste it in this powershell instance:

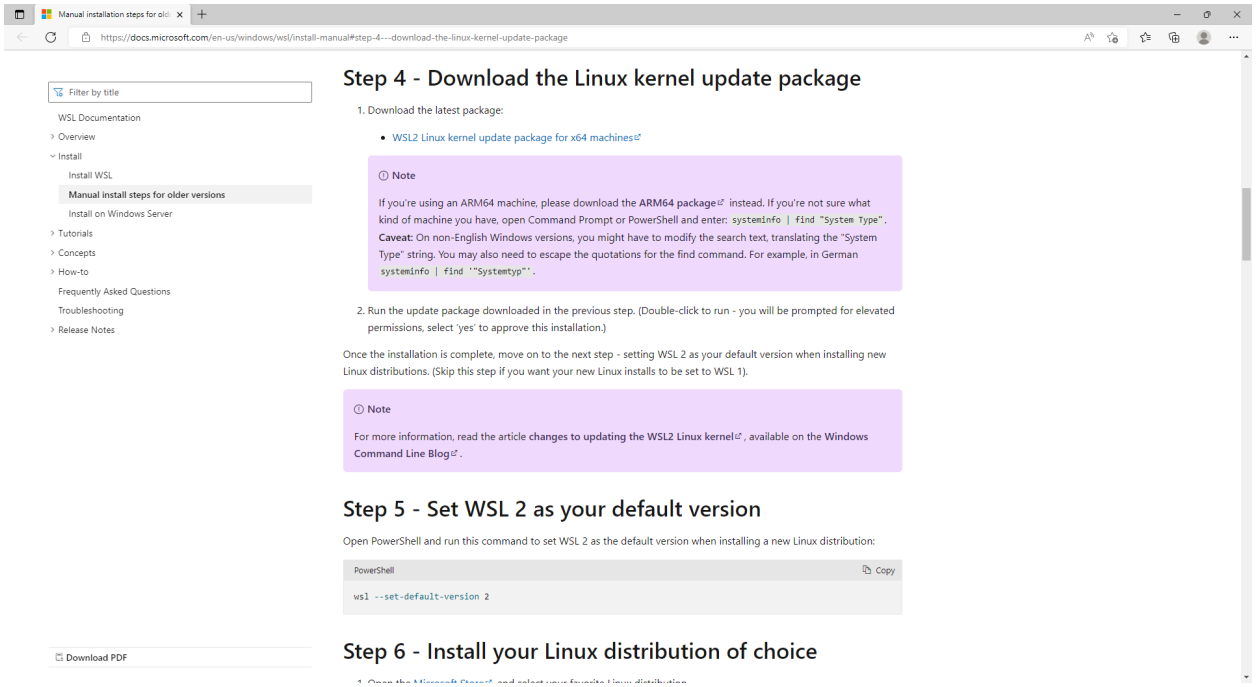


And click enter. You should see some text saying “The operation completed successfully.”:

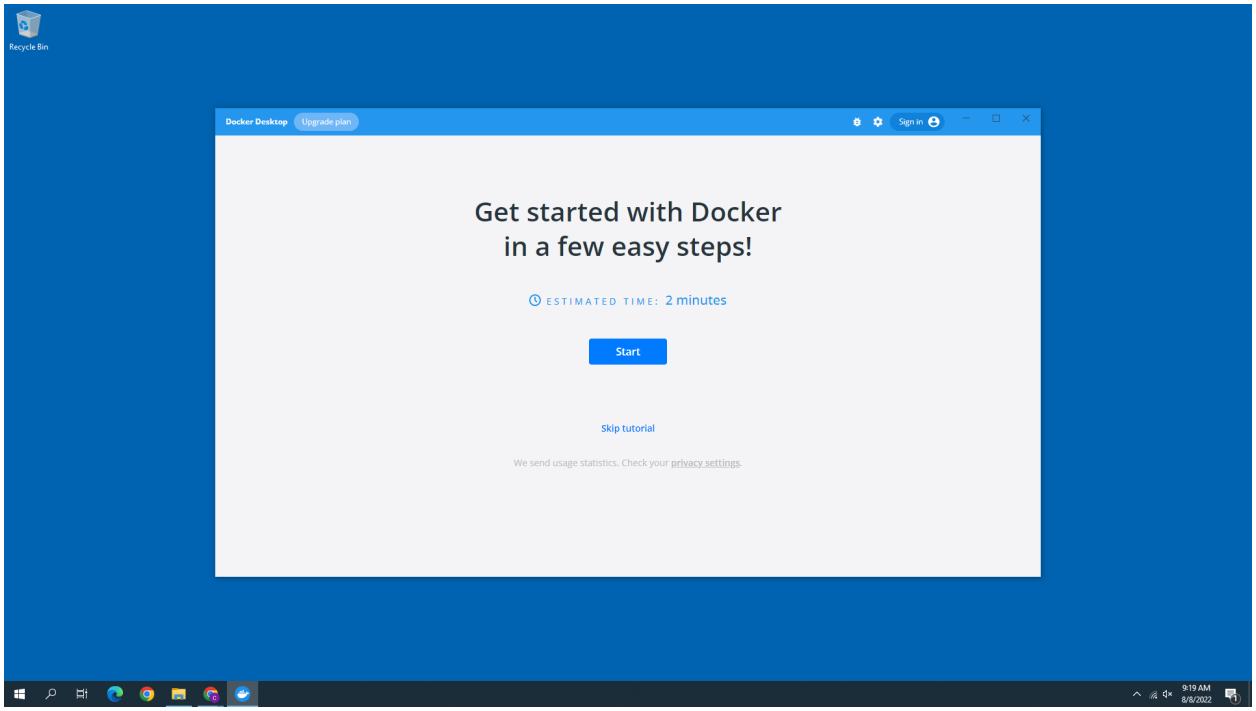


You can now close the powershell instance.

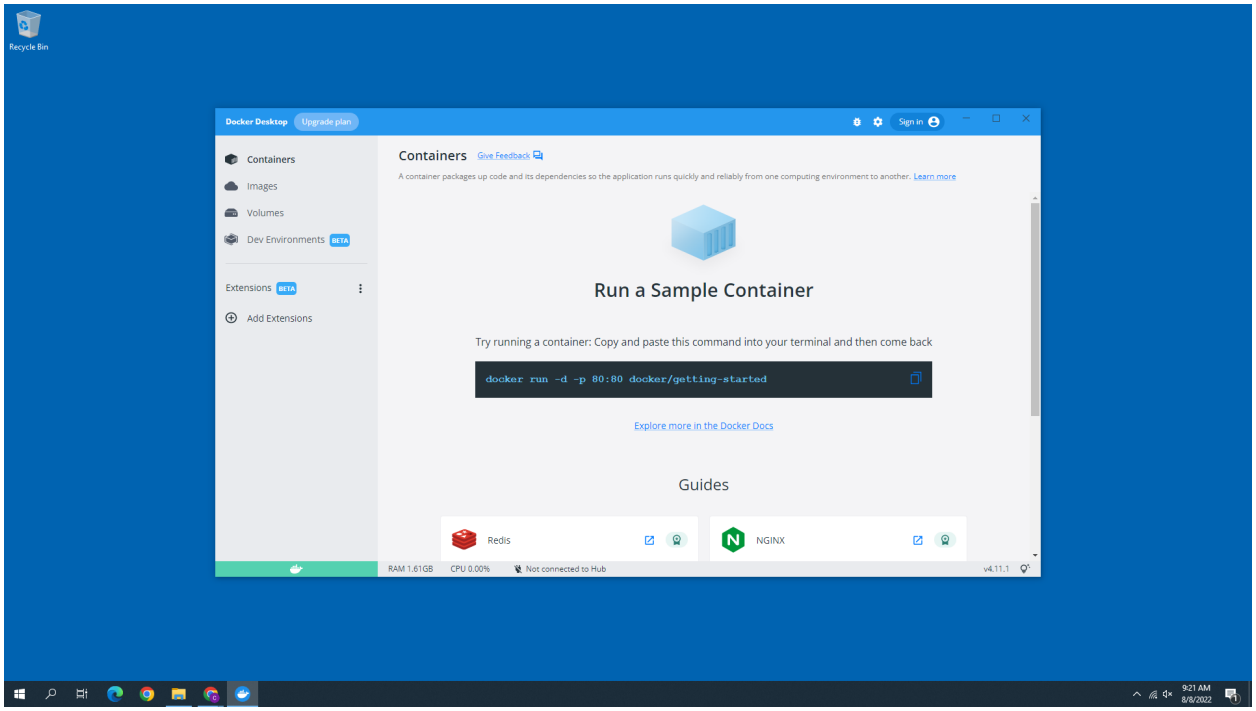
You should now follow along with Step 6 in the original webpage:



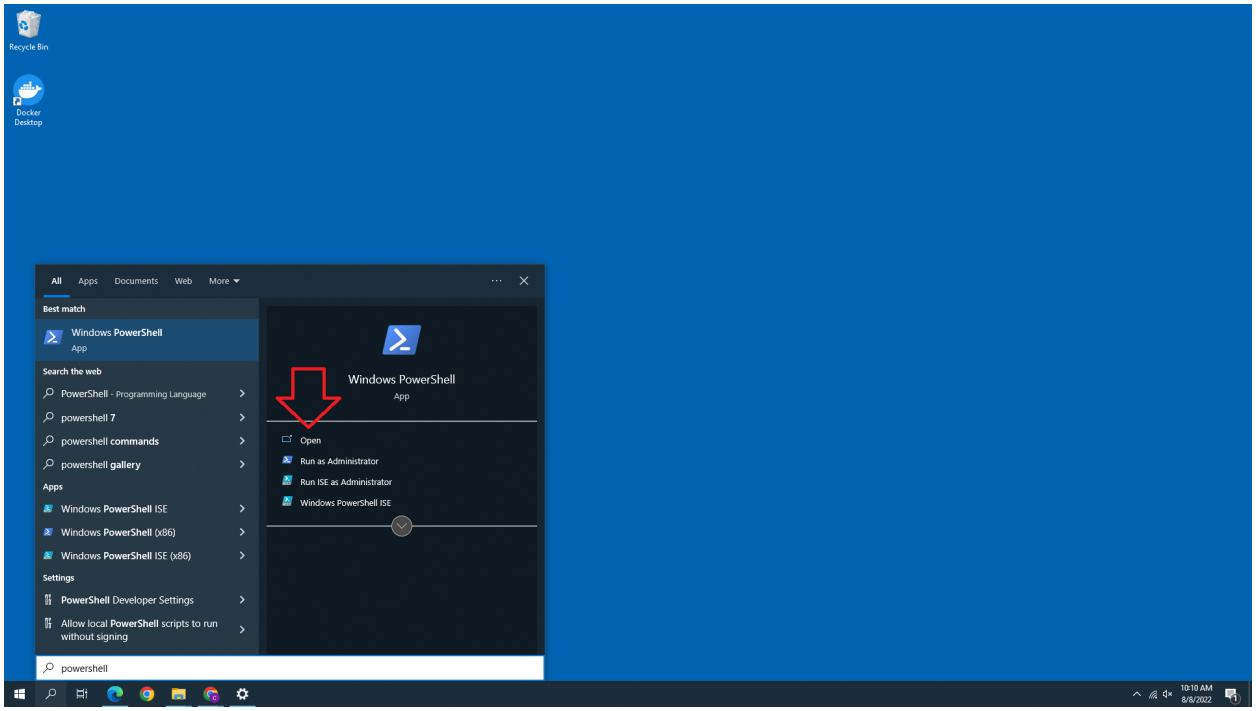
I have been using the Debian linux distribution, but it shouldn't matter which one you choose.
Once this is done, you should **restart** your computer before moving on to the next steps.
On launch, start Docker Desktop. After Docker Desktop starts, you should see this window:



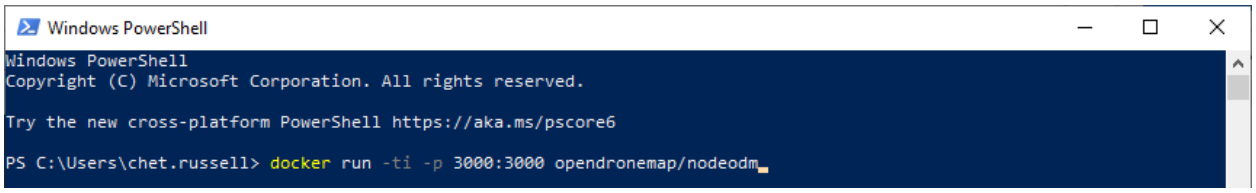
If you want to know more about Docker Desktop and how to use it you can click “Start” to start the tutorial. If you do not care, click the “Skip tutorial” button. You will now see this window:



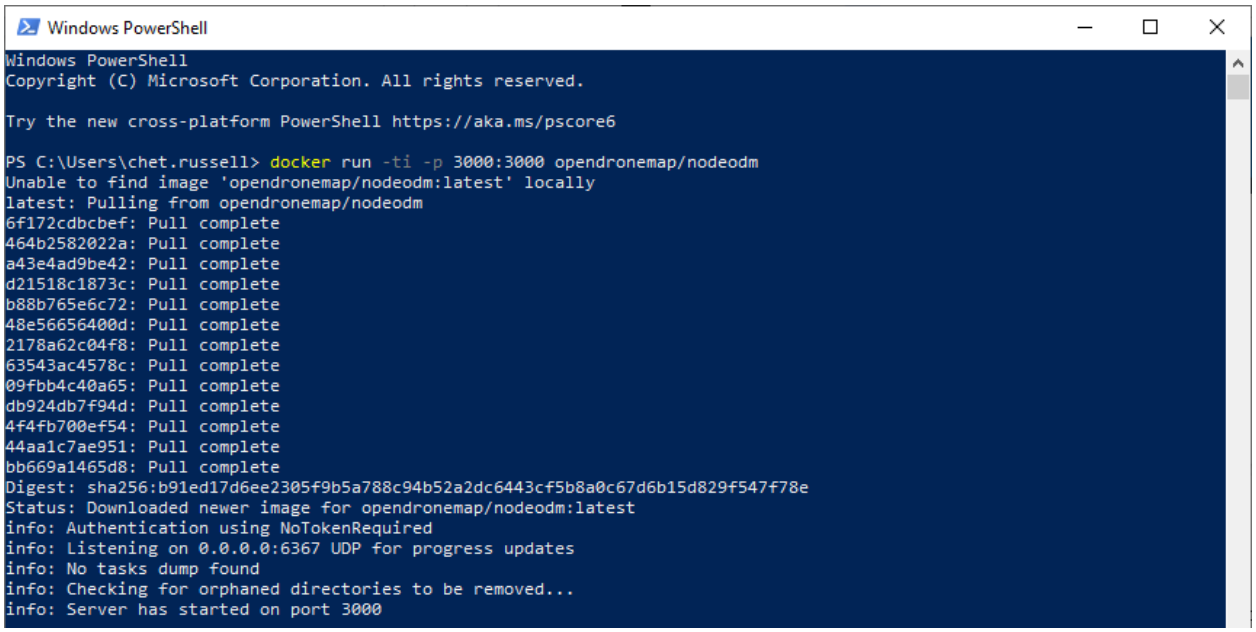
You have now installed Docker Desktop. Let us now install the processing node that KelPy uses. What you now want to do is open a powershell instance again.



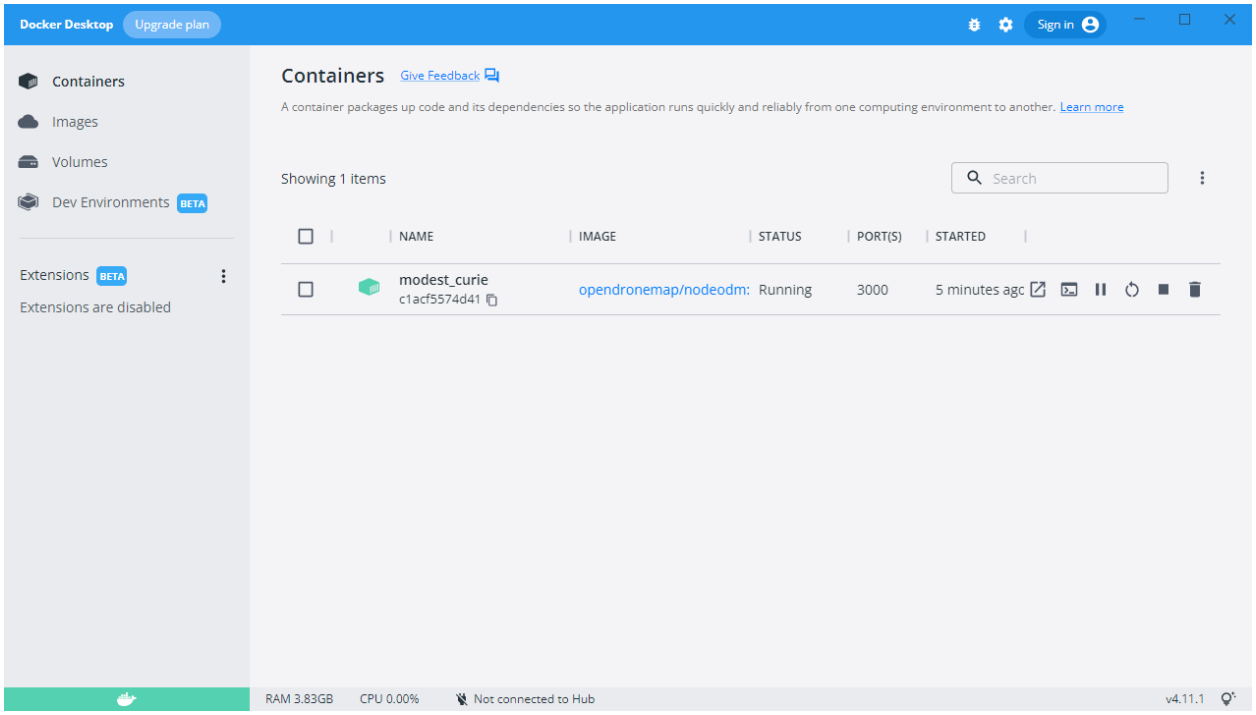
Copy and paste this into the instance: docker run -ti -p 3000:3000 opendronemap/nodeodm
If you want gpu acceleration paste: docker run -p 3000:3000 --gpus all opendronemap/nodeodm:gpu



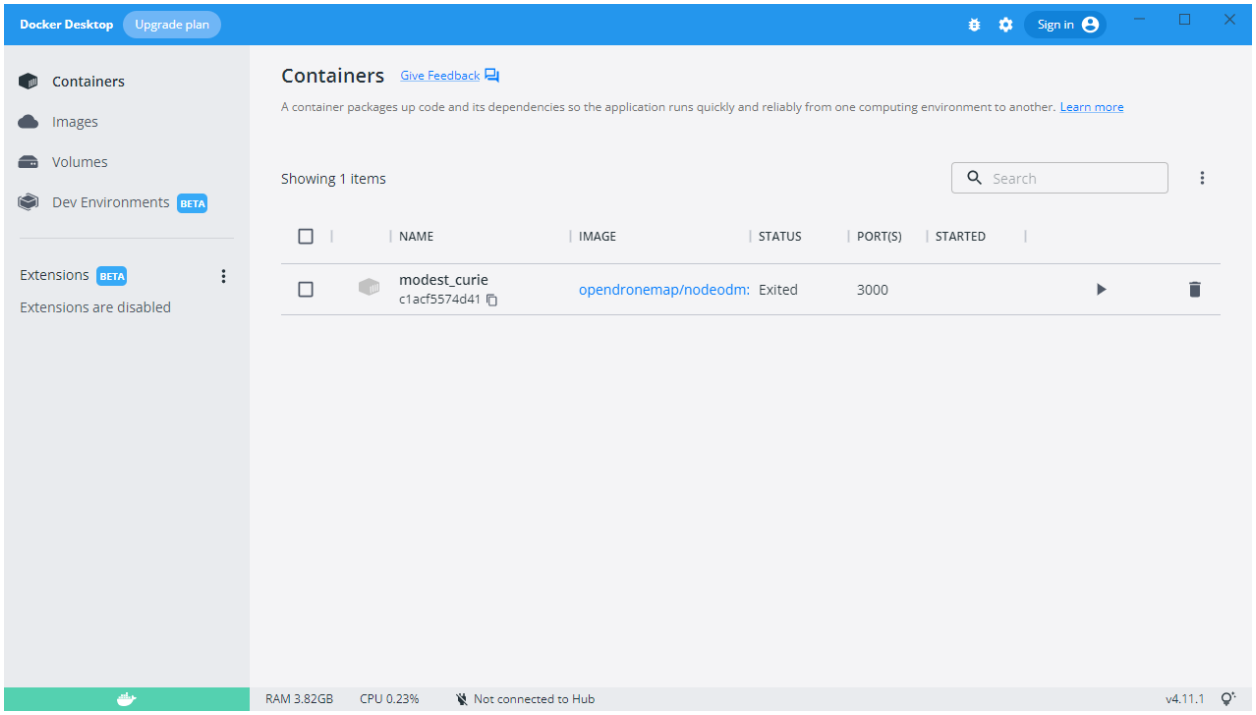
And click enter. This will begin downloading the node. After the download completes, you should see this in the powershell instance:



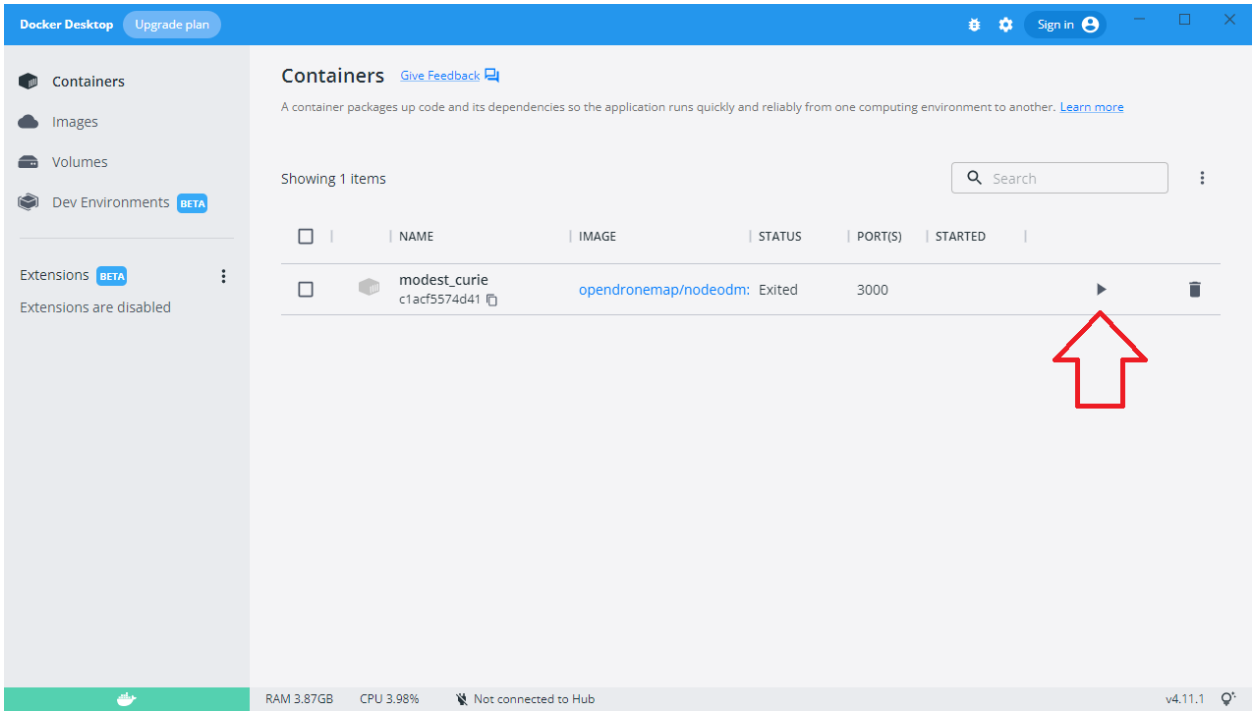
And now, your Docker Desktop should look like this:



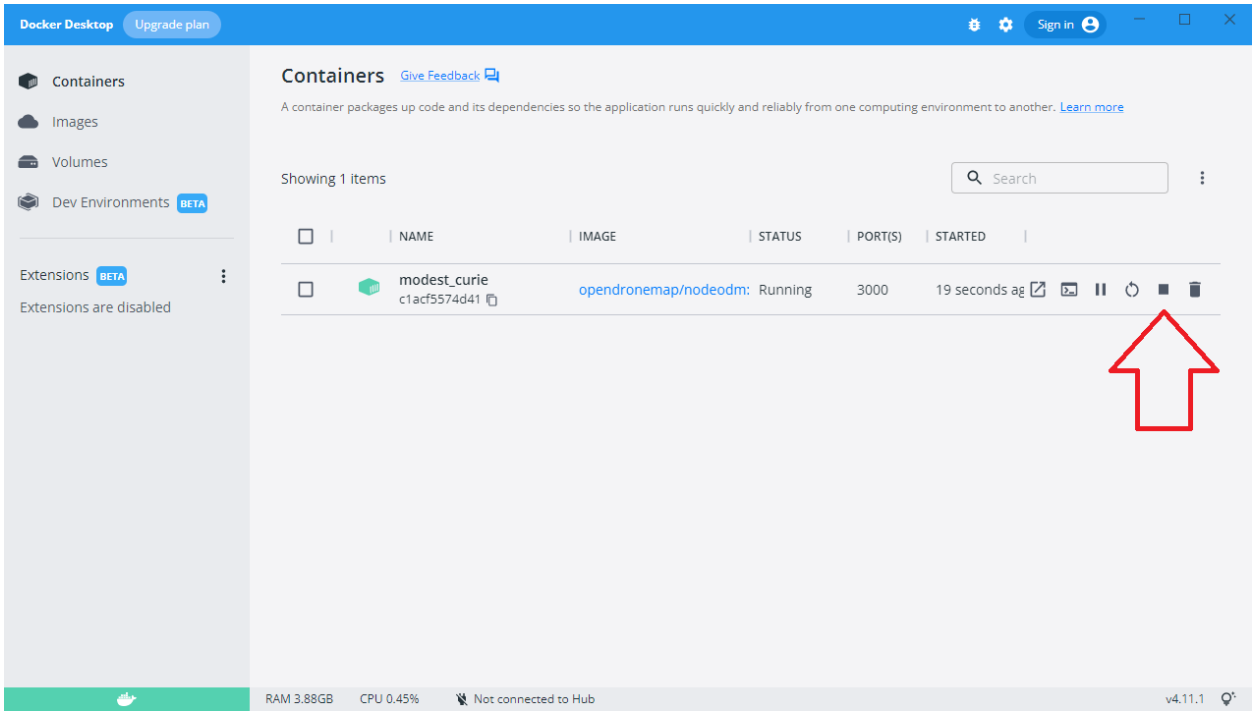
You can close your powershell instance and Docker Desktop will now look like this:



Once you closed the powershell instance, the node was shutdown too. You can now turn the node on with the little play button here:



And turn the node off with the little stop button:



You have now installed the processing node. If you want to run KelPy, you must start this node. This node will run in the background and consume a lot of memory while it is idling. If you want this to stop completely when you are not running KelPy, you must click this arrow in the bottom right hand side of the screen:

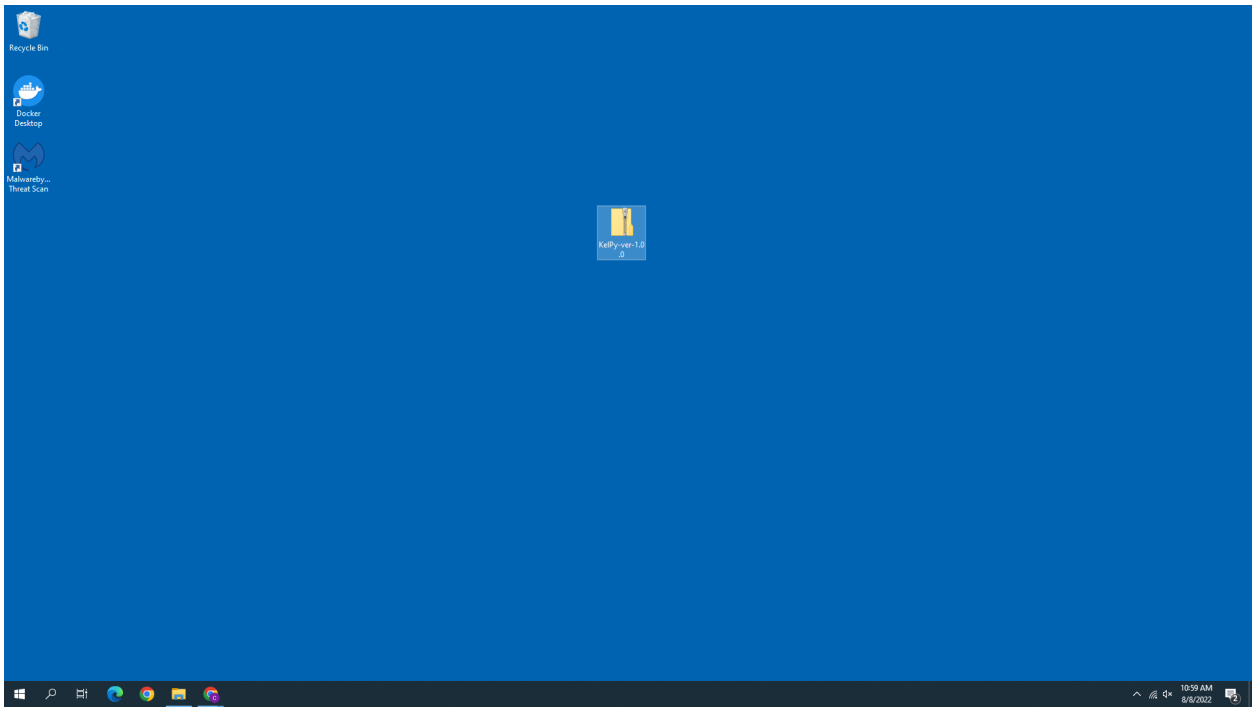
You will now see a group of icons. One of them will be the Docker icon:

Right click on this icon and this will show up:

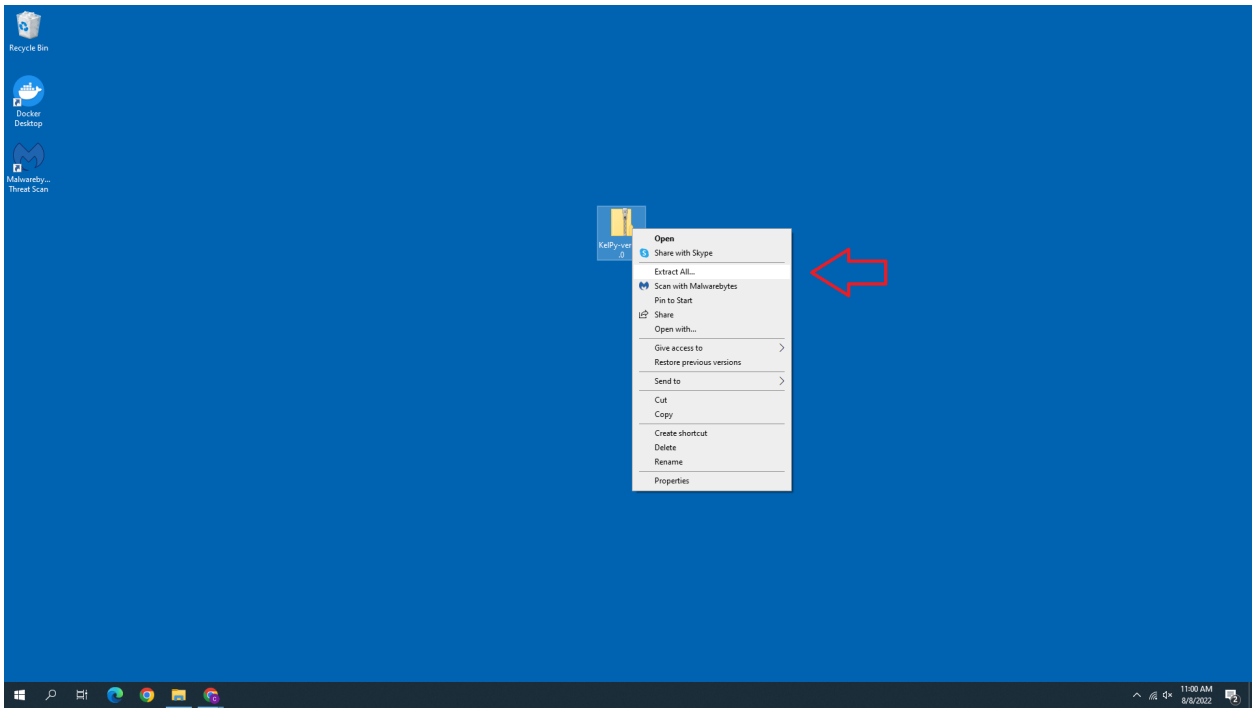
Click on the “Quit Docker Desktop” button. This will stop the node from taking a lot of memory from your system. Even when not running, Docker will still dedicate part of your memory to this node. Unfortunately, this is necessary, and there are not many workarounds, unless you want to reduce the memory that windows can allocate to Docker, but this will affect KelPy processing time.

KelPy Installation

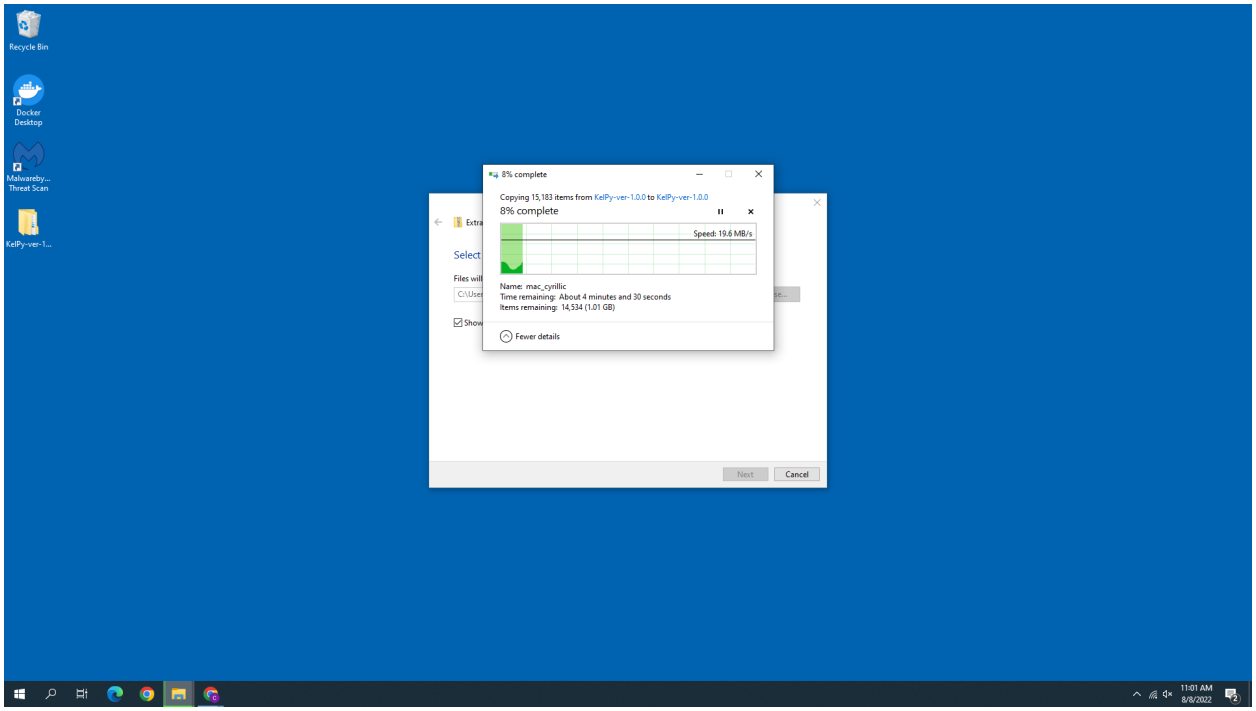
KelPy will be located in a zip file:



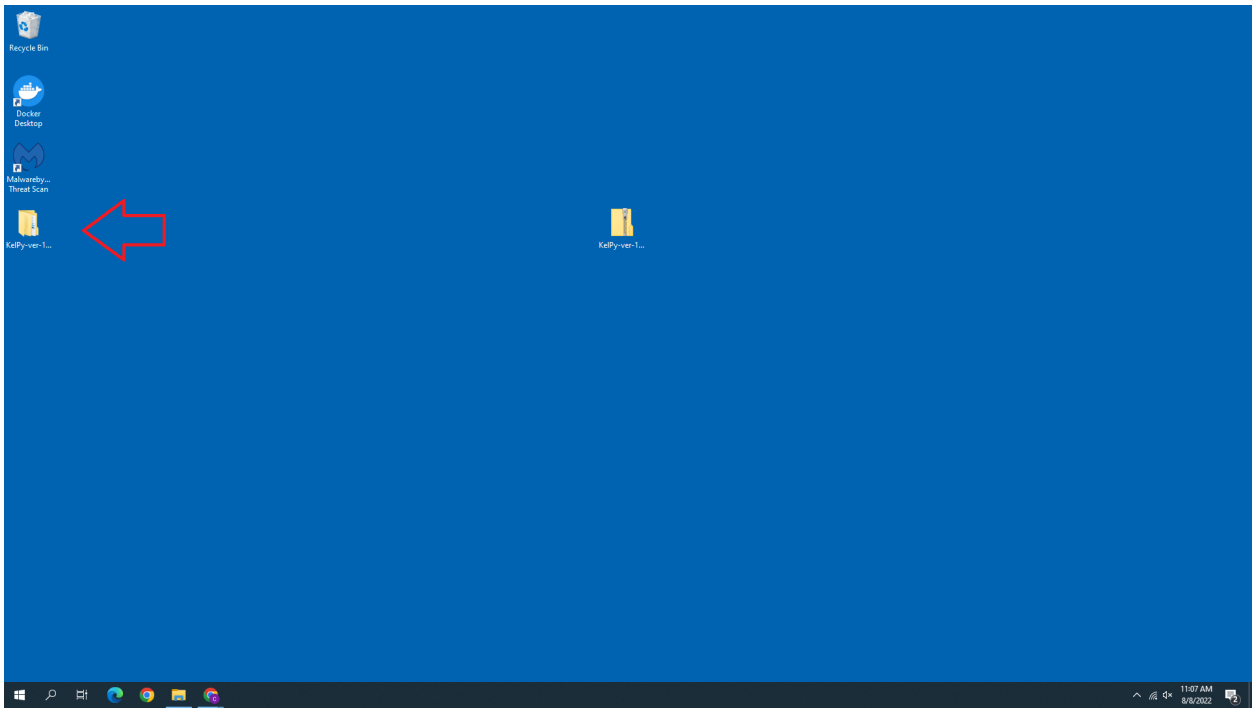
You will want to extract this zip file to use KelPy. Right click KelPy and click the “Extract All” button:



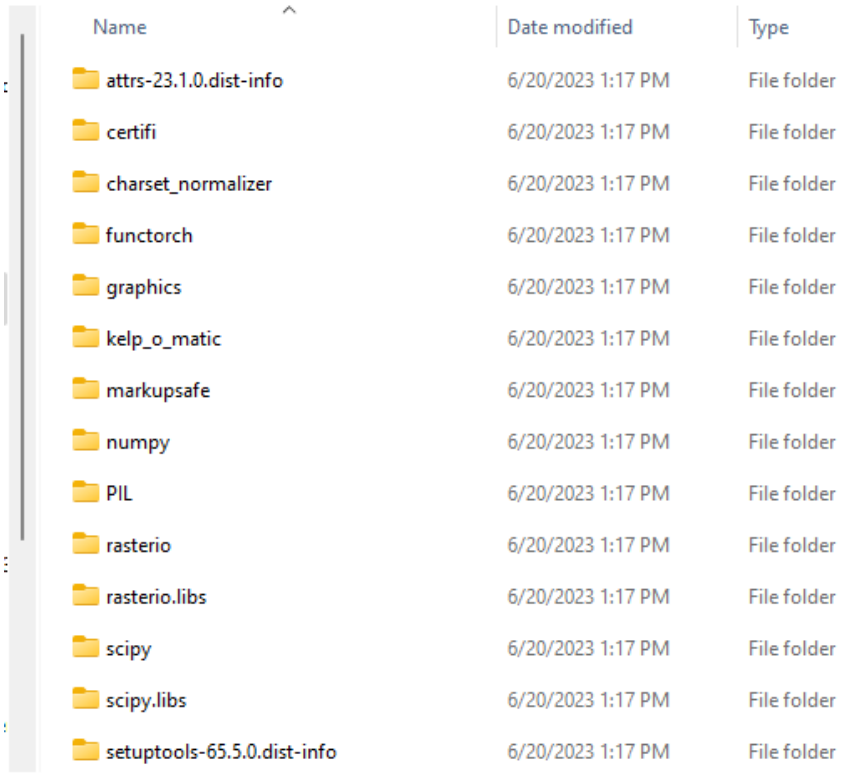
This should take a bit of time because KelPy is fairly large.



You should now see an extracted KelPy on your computer. Double click this folder to open it:

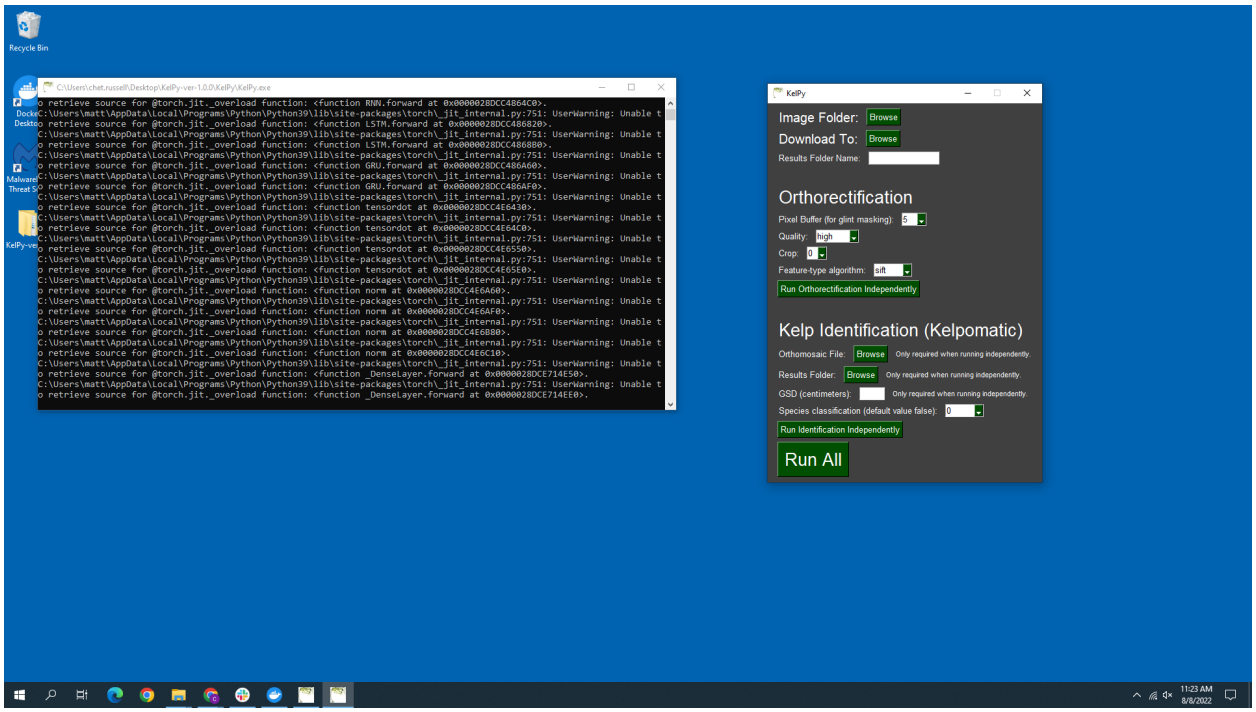


You should now see this:



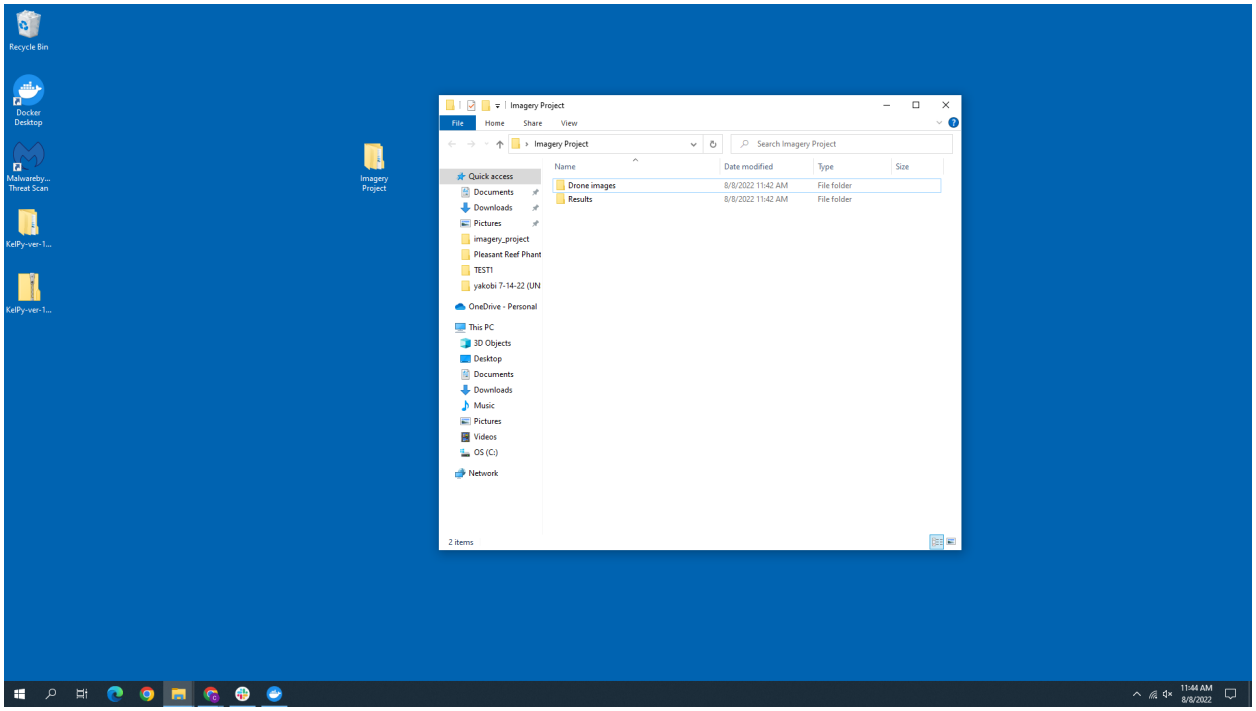
Name	Date modified	Type
attrs-23.1.0.dist-info	6/20/2023 1:17 PM	File folder
certifi	6/20/2023 1:17 PM	File folder
charset_normalizer	6/20/2023 1:17 PM	File folder
functorch	6/20/2023 1:17 PM	File folder
graphics	6/20/2023 1:17 PM	File folder
kelp_o_matic	6/20/2023 1:17 PM	File folder
markupsafe	6/20/2023 1:17 PM	File folder
numpy	6/20/2023 1:17 PM	File folder
PIL	6/20/2023 1:17 PM	File folder
rasterio	6/20/2023 1:17 PM	File folder
rasterio.libs	6/20/2023 1:17 PM	File folder
scipy	6/20/2023 1:17 PM	File folder
scipy.libs	6/20/2023 1:17 PM	File folder
setuptools-65.5.0.dist-info	6/20/2023 1:17 PM	File folder

Scroll down and double click on main.exe. KelPy will start and look like this:

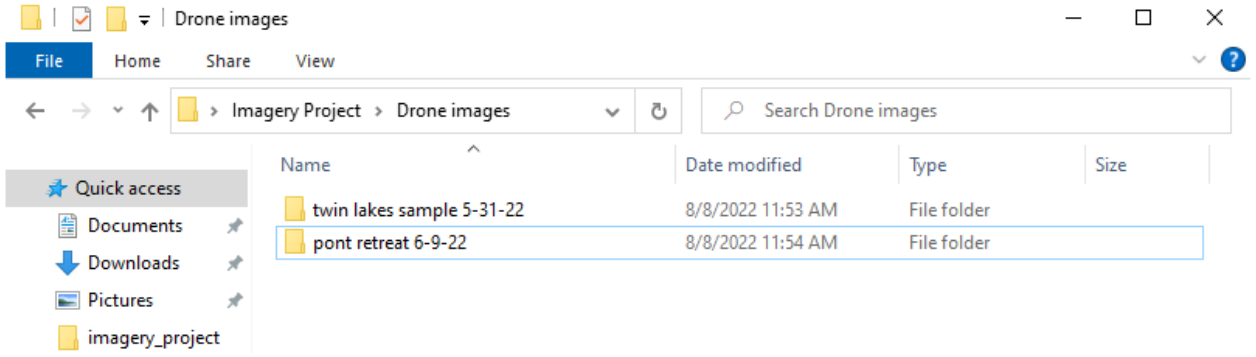


On launch, KelPy will have a console window accompanying it. It is a good way to check in on the progress of KelPy.

Before processing, I recommend that you create a folder layout similar to this:



As you can see, I have my Imagery Project folder on my Desktop, and within it I have two folders: Drone images and Results. The drone images folder holds the drone images and the results folder contains the results of KelPy. This is what my drone images folder looks like after I have placed 2 datasets in it:



KelPy Options

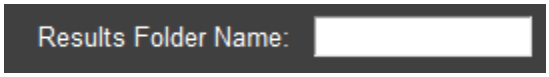
Image Folder

This is how you select your drone images. Make sure that the only images in the folder are the drone images from the bed you want to process. Do not put in any other files in this folder besides images.

Download To

This is how you designate a folder to hold your results to.

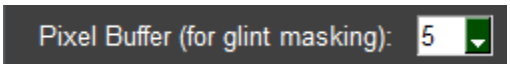
Results Folder Name



This is what the results folder is called. KelPy will use this name for the download folder, inside the results folder specified with the “Download To” option.

Orthorectification options

Pixel buffer



This is the pixel buffer selector. The default is 5. The higher the pixel buffer, the longer the processing.

Quality

This is the quality selector. Higher quality orthomosaics will take more time to process. The default is high.

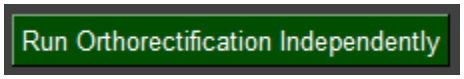
Crop

This is the crop option. Ideally, it will crop the orthomosaic to make it look nice and clean. Unfortunately, it tries to crop out all the water in a photo, including the kelp. Use at your own risk. The default is 0.

Feature-type algorithm

This determines which algorithm is used when processing orthomosaics. Default is sift.

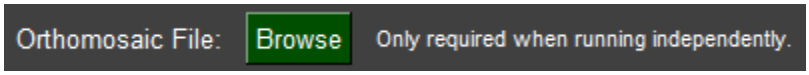
Run Orthorectification Independently Button



This will run the orthomosaic generator independently from kelp identification using the selected settings.

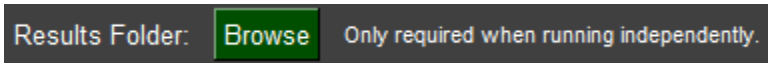
Kelp Identification (Kelpomatic) options

Orthomosaic File



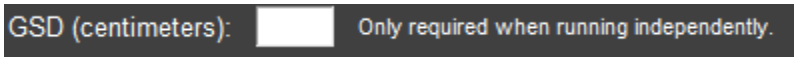
The orthomosaic file selector. Use this when you want to run kelp identification on an orthomosaic. As the text implies, this is only necessary when you are running identification independently.

Results Folder



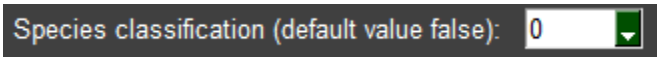
The results folder selector. Use this as the place to store the data generated by kelp identification. As the text implies, this is only necessary when you are running identification independently.

GSD



The GSD selector. GSD stands for ground sampling distance. This is the metric used when calculating surface area. If flying at 120 meters, GSD will be around 3.3 cm.

Species Classification



The selector to determine whether the species classification should run during kelp identification. Red = Bull Kelp, Green = Giant Kelp.

Run Identification Independently

This will run kelp identification with kelpomatic using the selected settings.

Run All

This button will run both orthorectification and identification back to back with the options selected. This is the most reliant way to get data from KelPy.

Addendum

Frequently Asked Questions

After running KelPy for many sessions, my computer starts to slow down/crash. Why does this happen?

This happens because the processing node does not have memory hard-cap. To hard-cap the memory usage of the processing node, go here: https://github.com/Barnacle-Foods/KelPy/issues/3

Error-Checking

If any errors occur, the best way to guarantee you are doing everything correctly is by going through a checklist.

1. Have you installed the processing node?
2. Have you started the processing node through Docker Desktop?
3. Does your image folder only contain drone images and nothing else?
4. Have you selected the correct processing options in KelPy?

If you experience errors in processing, you have three options:

1. Go through the checklist to make sure there are no problems on your end.
2. Restart KelPy and try again. This can fix many problems encountered.
3. Check if your error is logged at: https://github.com/Barnacle-Foods/barnacle-imagery/issues. If it is not, create a new issue. You can copy/paste the errors logged in the console to this issue tracker.