

# KelPy User Manual

By Chet Russell

8/8/2022

[This](#) is where the source code for KelPy is. Unfortunately, the zip file that contains the .exe for KelPy and its associated libraries is too large to upload to GitHub. Eventually, I will thin the program down to get it to upload to GitHub, but for now you must transfer copies of the program using other methods.

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.

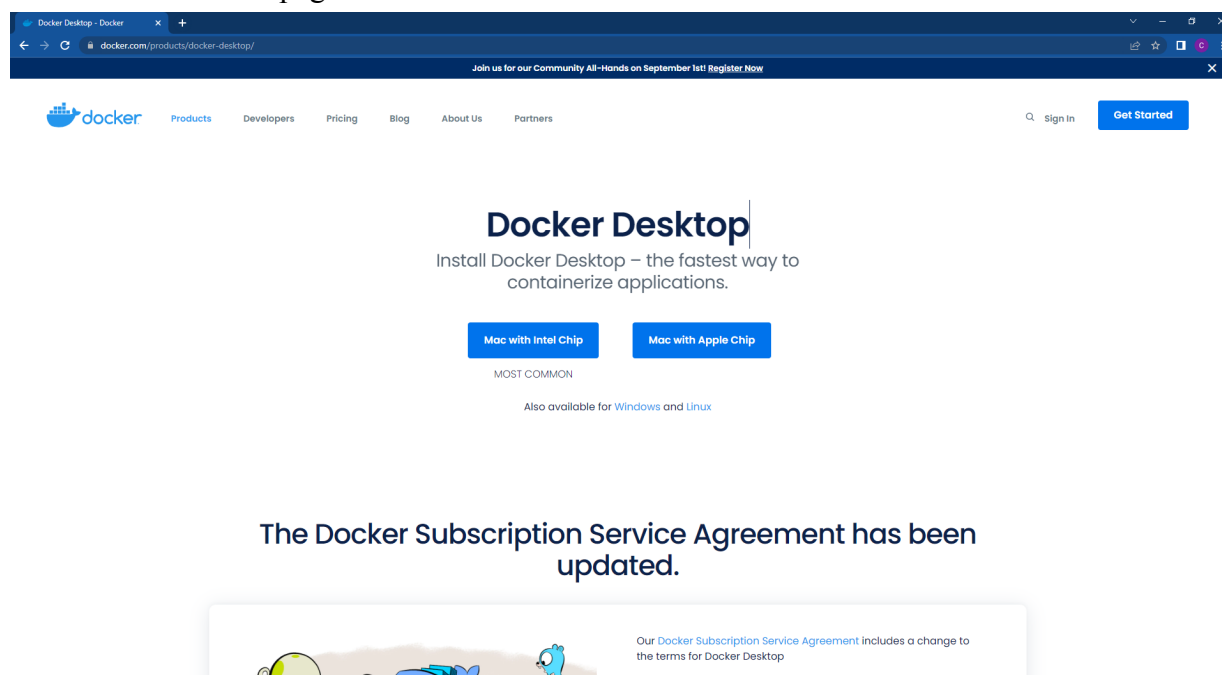
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KelPy installation	Pg 22
KelPy options	Pg 26
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# Pre-installation

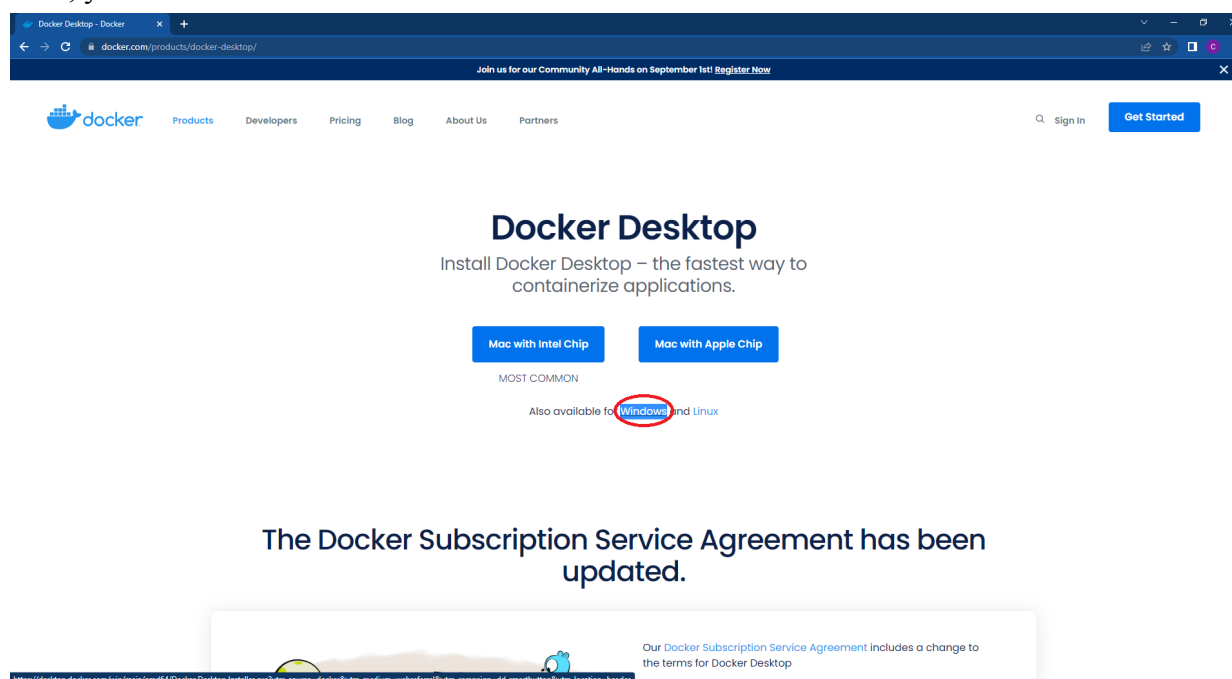
Before you can get to installing and using KelPy, you must install the node that KelPy uses to process data. To do this, we are going to be using Docker, specifically their Docker Desktop application. This will make it simple to launch and run the node.

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

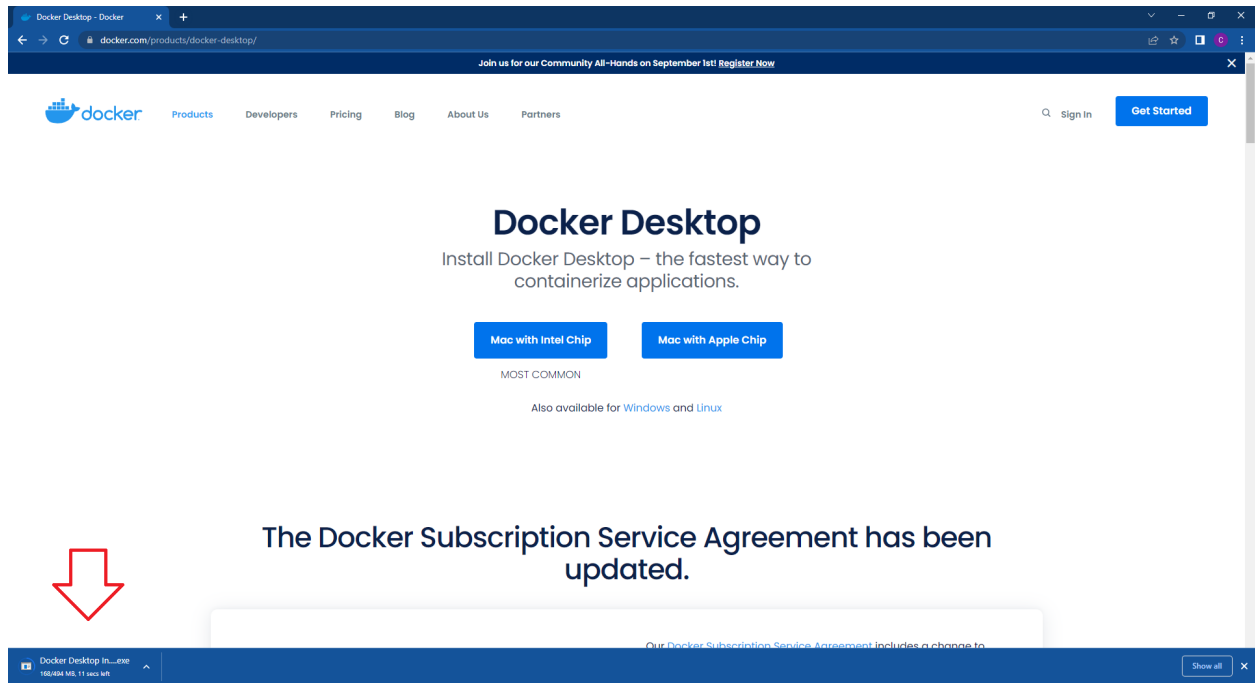
You will see this webpage:



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

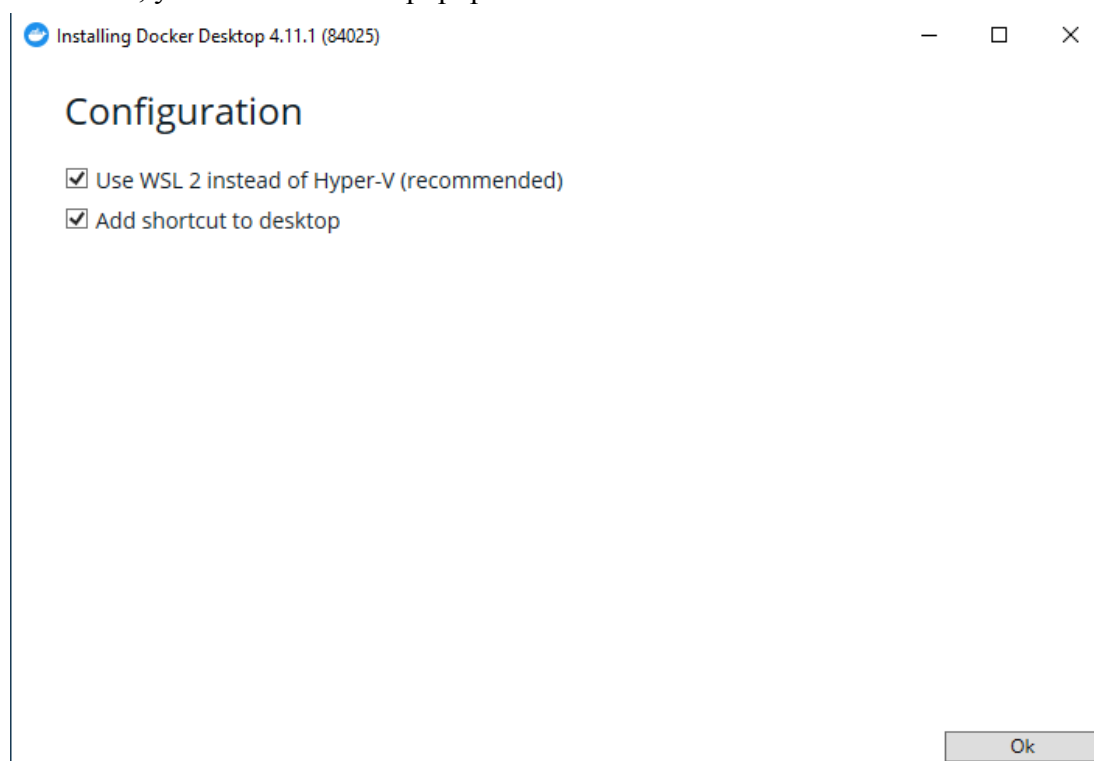


This will start a download that you can see in the bottom left of the webpage:



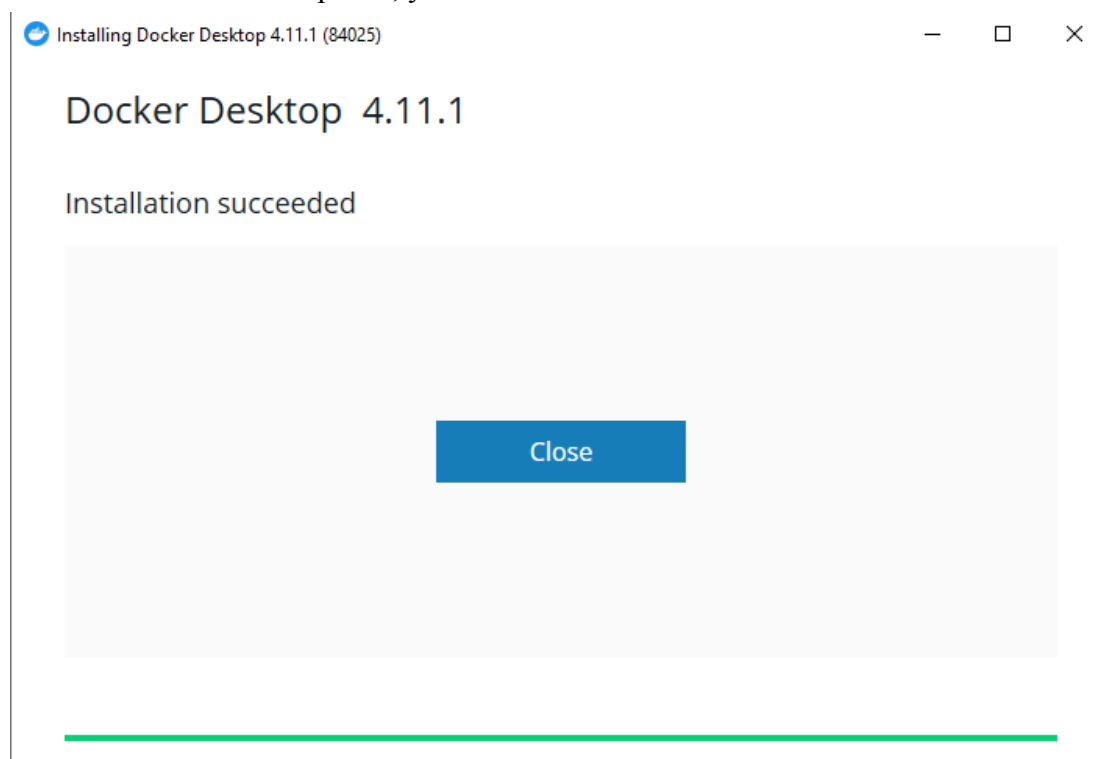
You should click and launch this .exe file once it completes the download.

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:

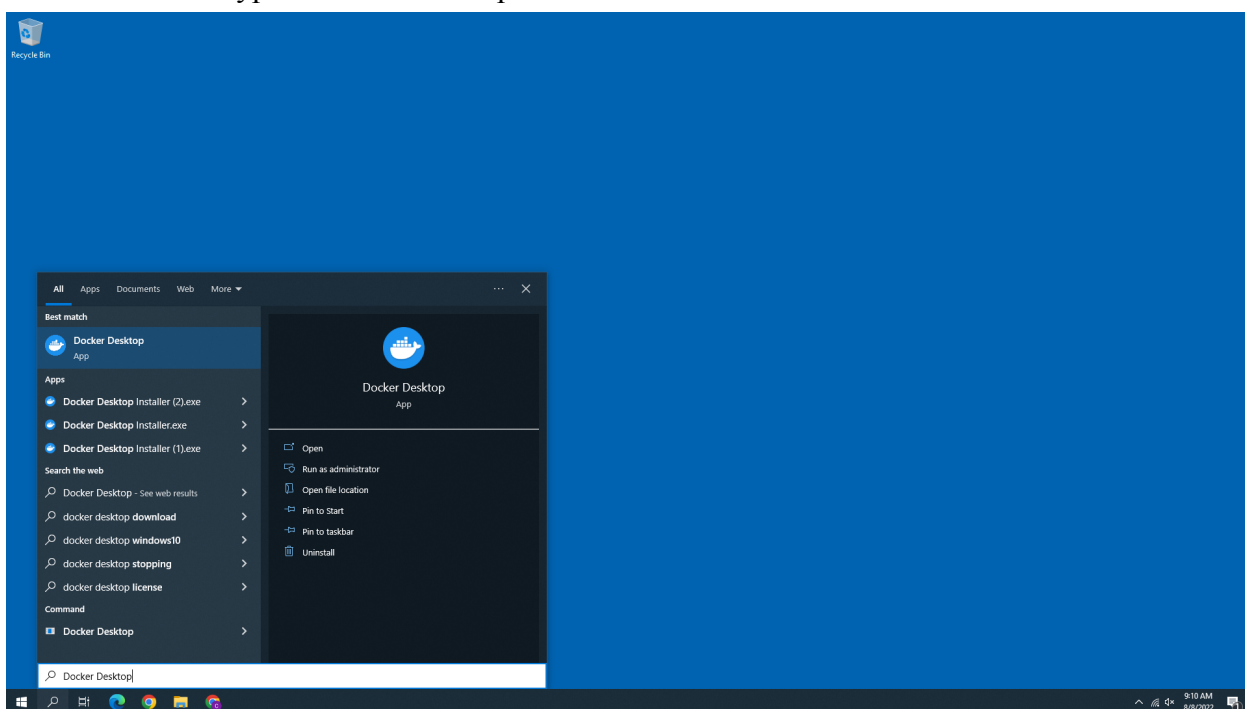


You now have Docker Desktop installed on your system.

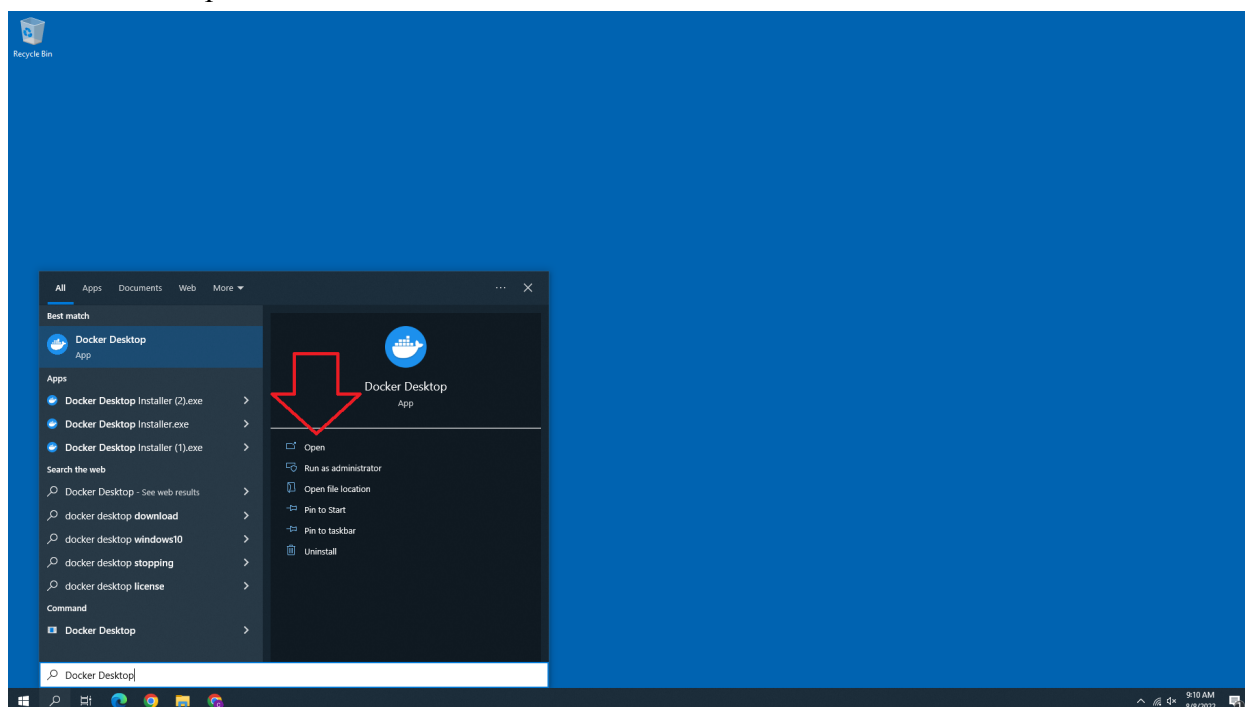
Lets launch Docker Desktop now. In the bottom left hand side of your screen, you should see a small magnifying glass:



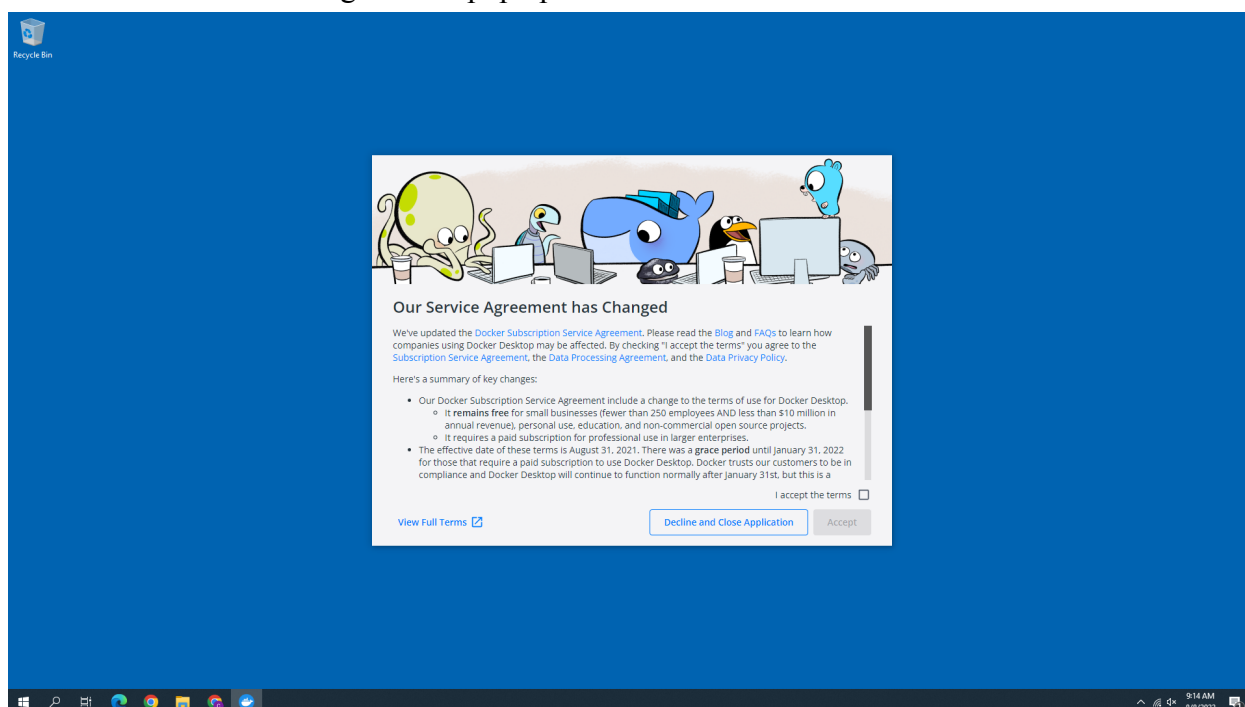
Click on this and type “Docker Desktop” in the search bar.



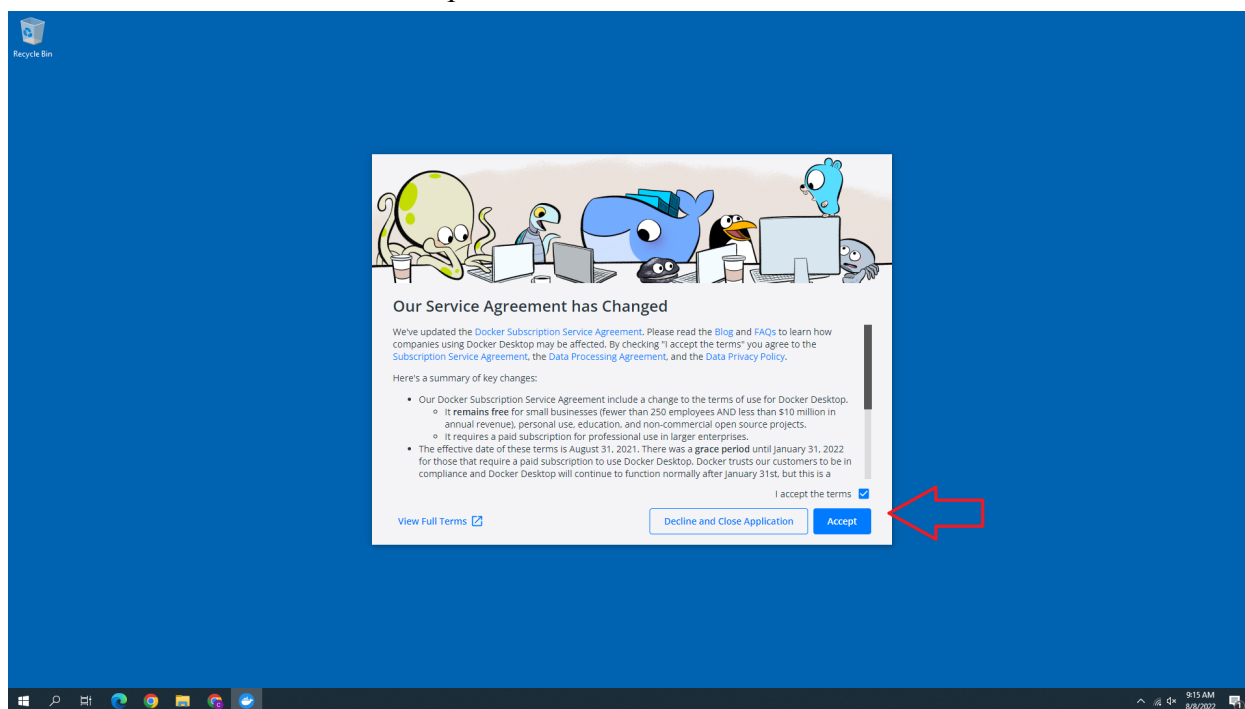
Click on the “Open” button



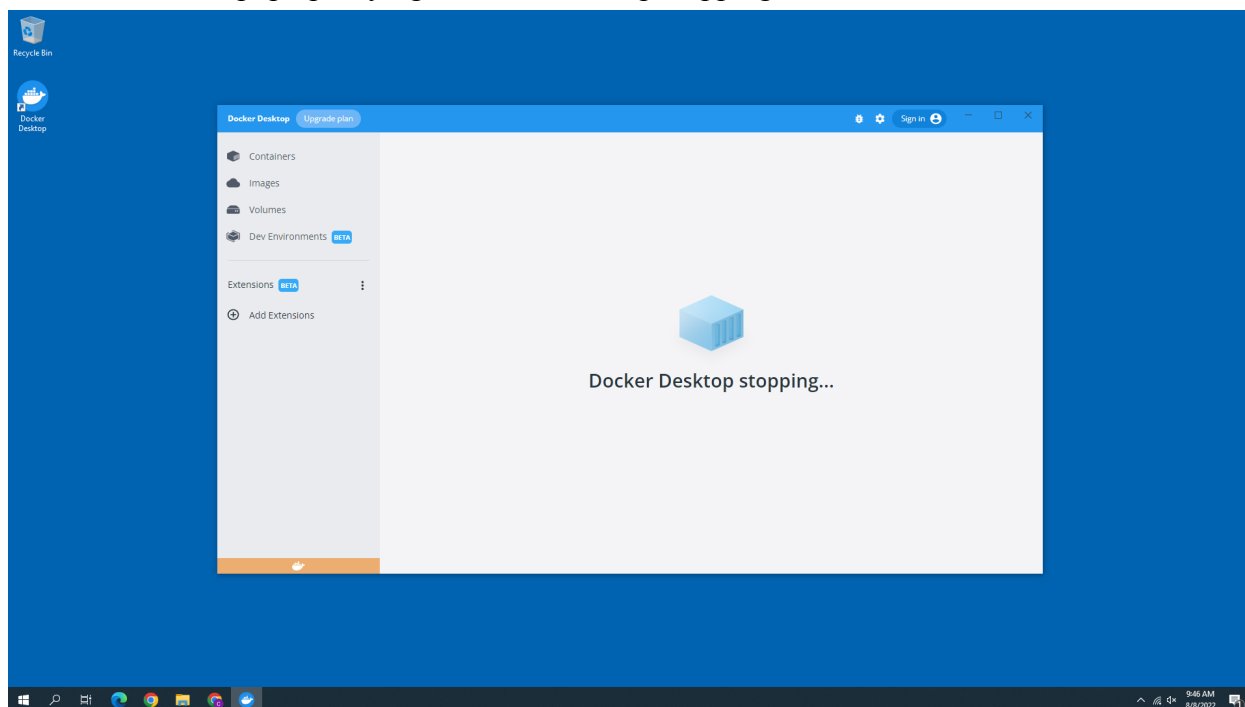
You should see a service agreement pop up on the screen.



Check the box and click the “Accept” button

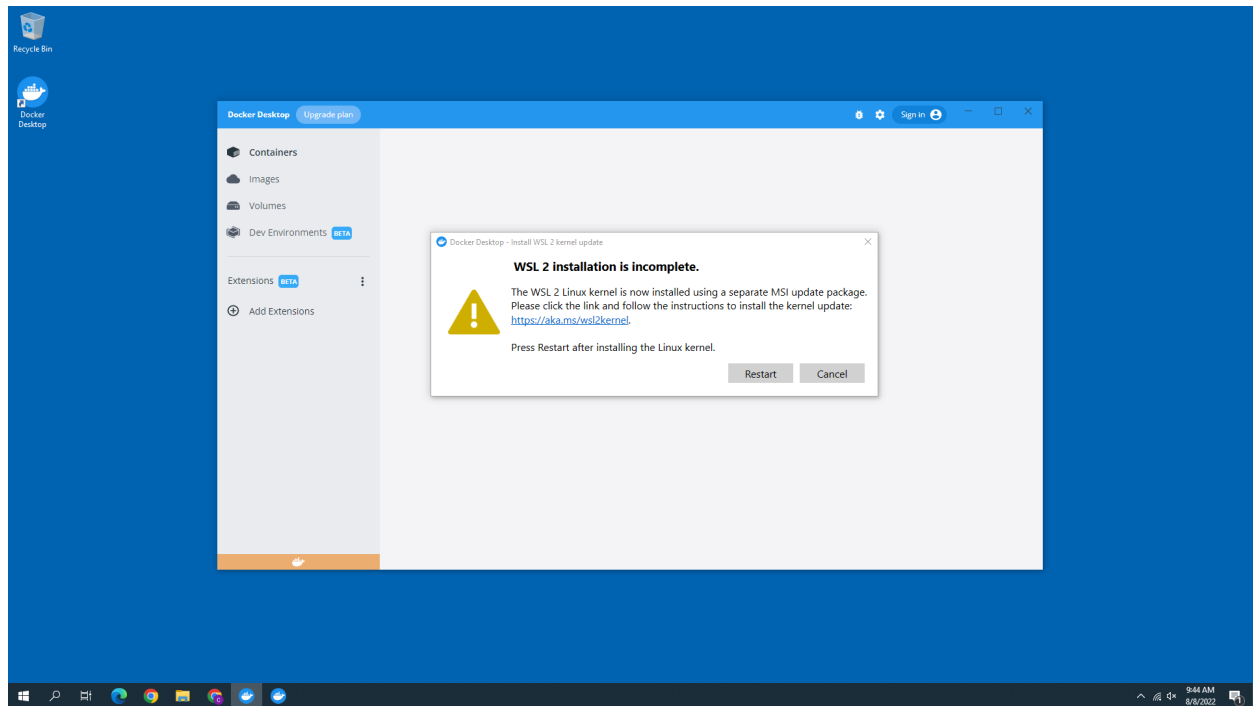


A window should pop up, saying “Docker Desktop stopping...”:

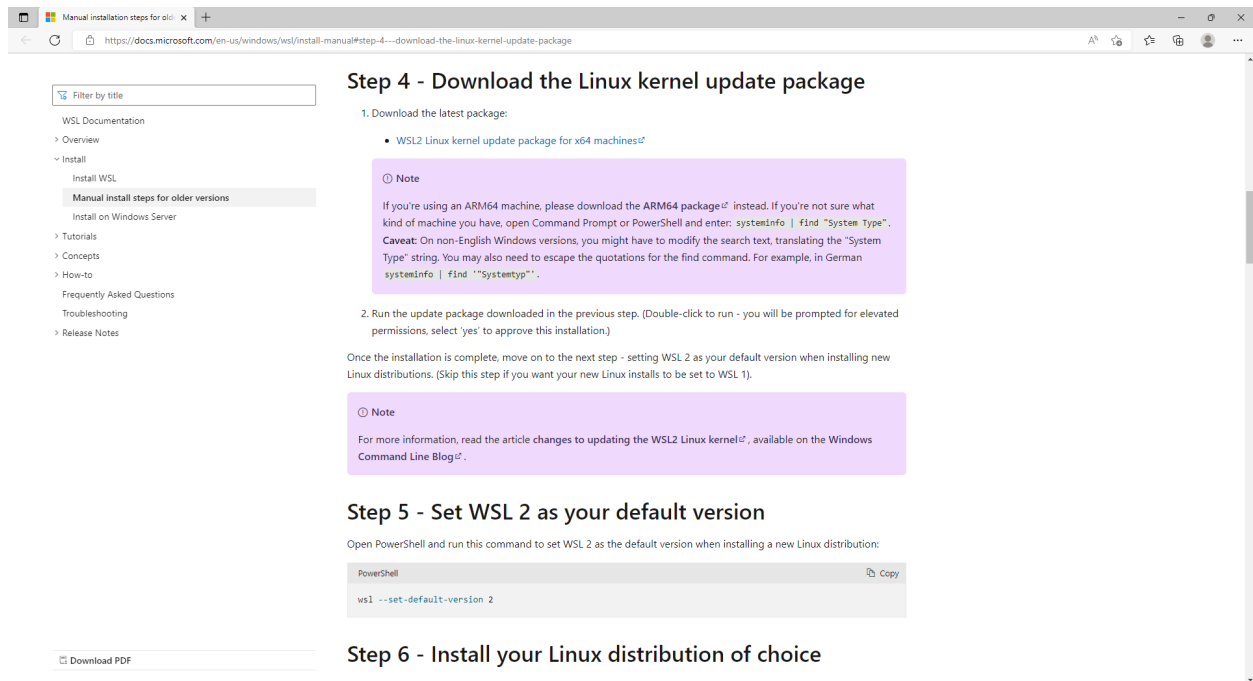




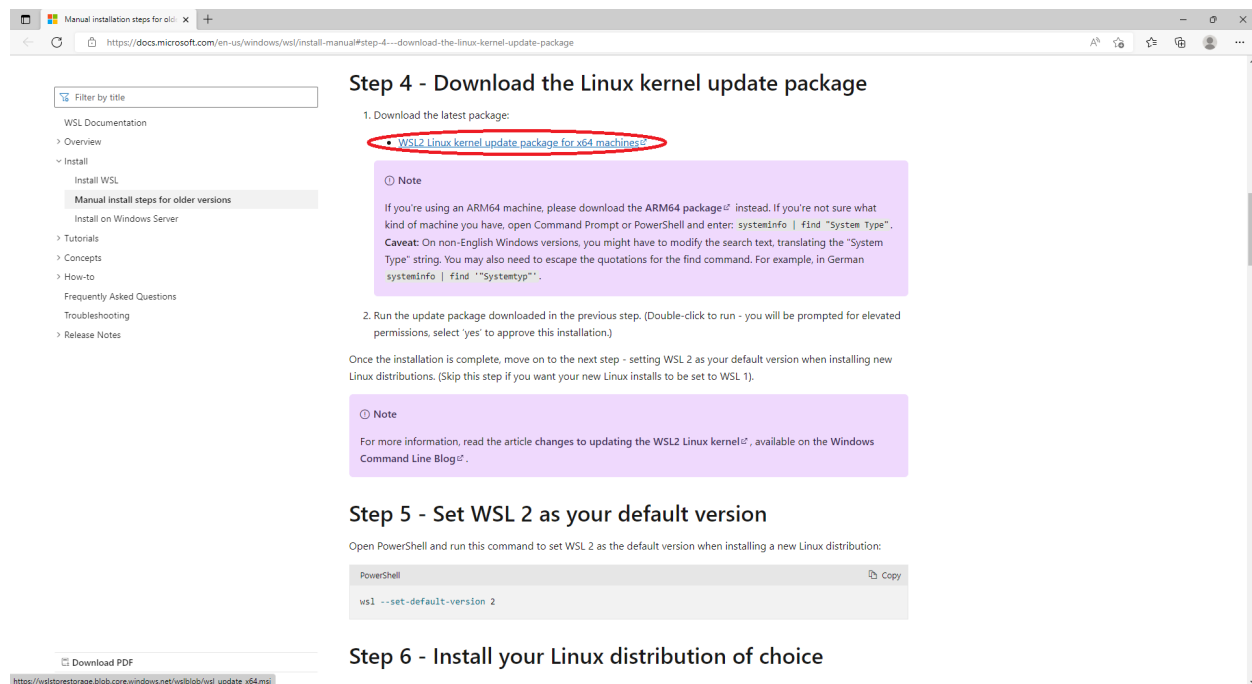
This is ok. Just wait until this next window comes along:



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:



The screenshot shows the Microsoft Docs page for the WSL2 Linux kernel update package for x64 machines. The page is titled "Step 4 - Download the Linux kernel update package". It includes a sidebar with navigation links, a main content area with instructions, and a "Downloads" button at the bottom.

**Step 4 - Download the Linux kernel update package**

- Download the latest package:
  - [WSL2 Linux kernel update package for x64 machines<sup>1</sup>](#)

**Note**

If you're using an ARM64 machine, please download the ARM64 package<sup>2</sup> instead. If you're not sure what kind of machine you have, open Command Prompt or PowerShell and enter: `systeminfo` | `find "System Type"`. **Caveat:** On non-English Windows versions, you might have to modify the search text, translating the "System Type" string. You may also need to escape the quotations for the find command. For example, in German `systeminfo` | `find '"Systemtyp"'`.

- Run the update package downloaded in the previous step. (Double-click to run - you will be prompted for elevated permissions, select 'yes' to approve this installation.)

Once the installation is complete, move on to the next step - setting WSL 2 as your default version when installing new Linux distributions. (Skip this step if you want your new Linux installs to be set to WSL 1).

**Note**

For more information, read the article changes to updating the WSL2 Linux kernel<sup>3</sup>, available on the Windows Command Line Blog<sup>4</sup>.

**Step 5 - Set WSL 2 as your default version**

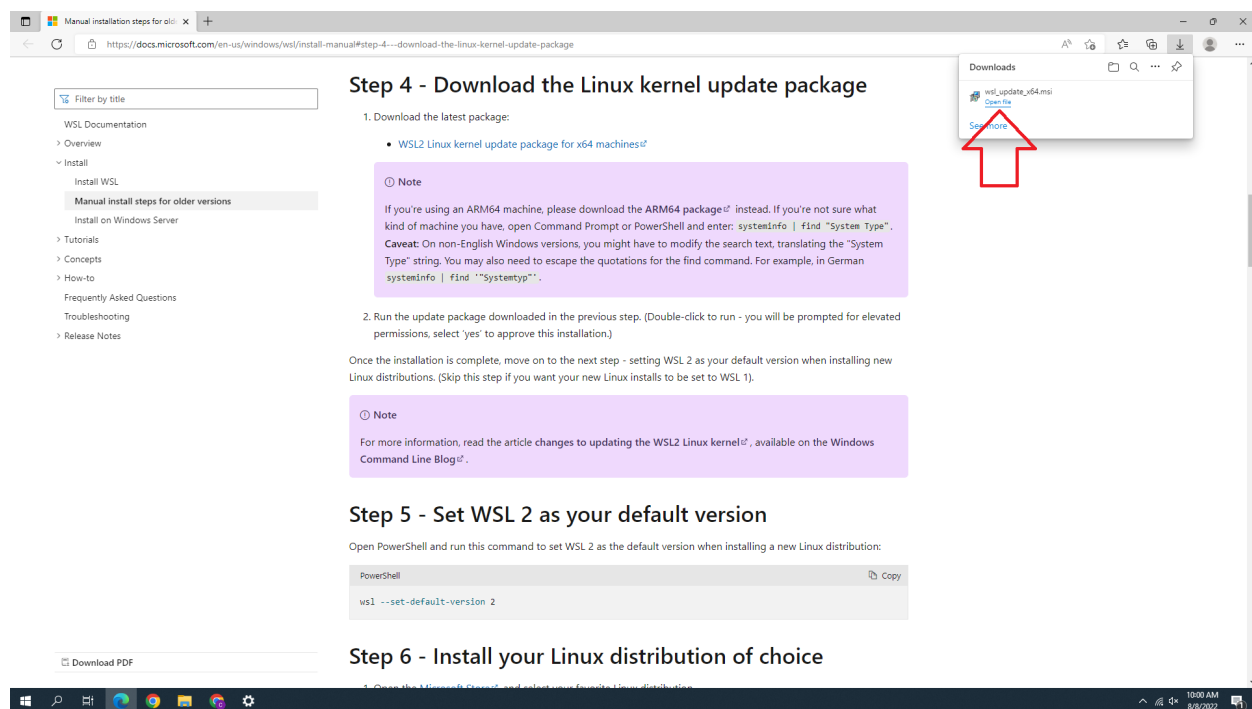
Open PowerShell and run this command to set WSL 2 as the default version when installing a new Linux distribution:

```
PowerShell
wsl --set-default-version 2
```

**Step 6 - Install your Linux distribution of choice**

1. Open the Microsoft Store<sup>5</sup> and select your favorite Linux distribution.

It should start to download an installer:



The screenshot shows the same Microsoft Docs page as above, but with a "Downloads" window open in the top right corner. The window displays the file "wsl\_update\_x64.msi" with a "Download" button and a "Search more" link. A red arrow points to the "Download" button.

**Step 4 - Download the Linux kernel update package**

- Download the latest package:
  - [WSL2 Linux kernel update package for x64 machines<sup>1</sup>](#)

**Note**

If you're using an ARM64 machine, please download the ARM64 package<sup>2</sup> instead. If you're not sure what kind of machine you have, open Command Prompt or PowerShell and enter: `systeminfo` | `find "System Type"`. **Caveat:** On non-English Windows versions, you might have to modify the search text, translating the "System Type" string. You may also need to escape the quotations for the find command. For example, in German `systeminfo` | `find '"Systemtyp"'`.

- Run the update package downloaded in the previous step. (Double-click to run - you will be prompted for elevated permissions, select 'yes' to approve this installation.)

Once the installation is complete, move on to the next step - setting WSL 2 as your default version when installing new Linux distributions. (Skip this step if you want your new Linux installs to be set to WSL 1).

**Note**

For more information, read the article changes to updating the WSL2 Linux kernel<sup>3</sup>, available on the Windows Command Line Blog<sup>4</sup>.

**Step 5 - Set WSL 2 as your default version**

Open PowerShell and run this command to set WSL 2 as the default version when installing a new Linux distribution:

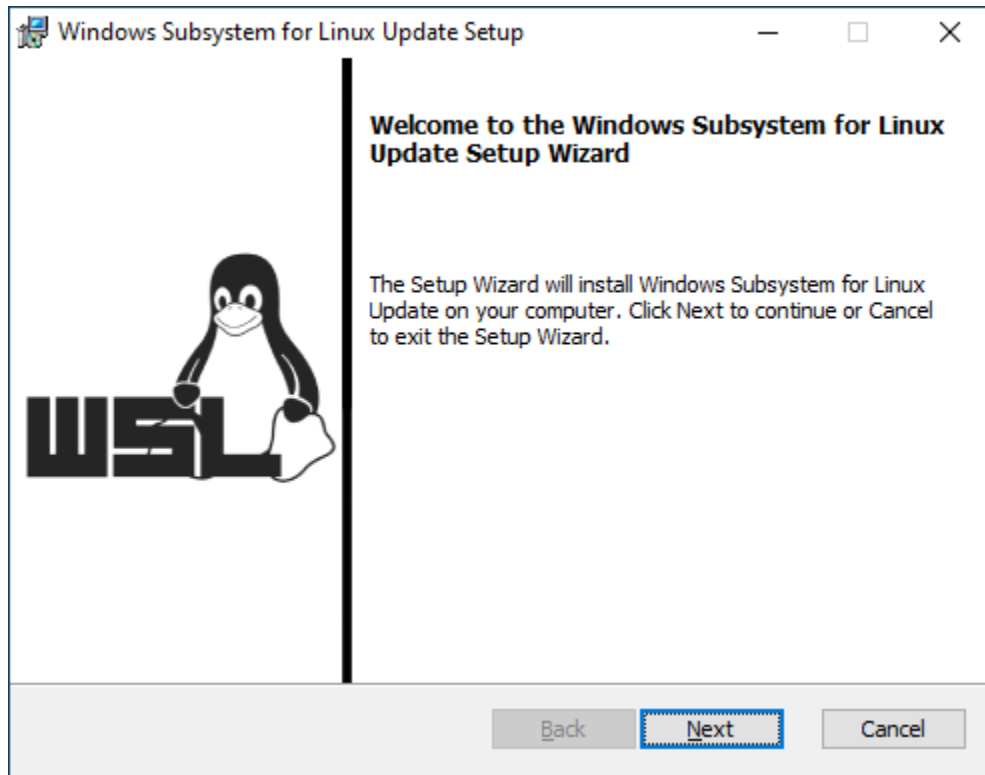
```
PowerShell
wsl --set-default-version 2
```

**Step 6 - Install your Linux distribution of choice**

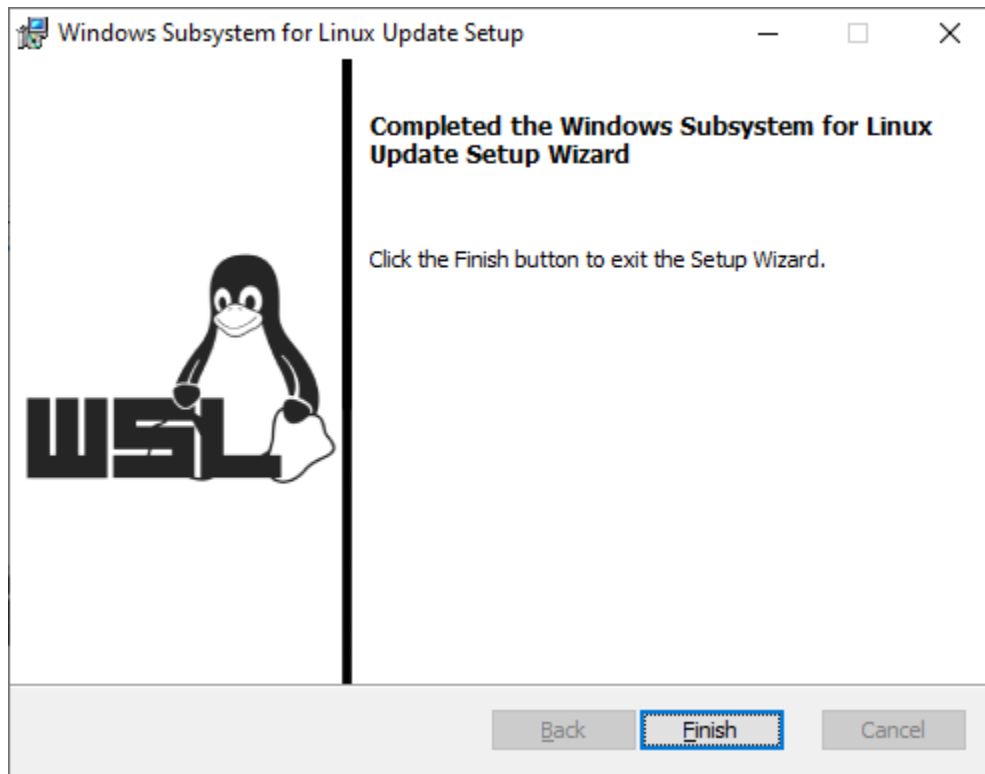
1. Open the Microsoft Store<sup>5</sup> and select your favorite Linux distribution.

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:

Manual installation steps for WSL2: x

Filter by title

WSL Documentation

- Overview
- Install
  - Install WSL
  - Manual install steps for older versions
  - Install on Windows Server
- Tutorials
- Concepts
- How-to
- Frequently Asked Questions
- Troubleshooting
- Release Notes

Download PDF

## Step 4 - Download the Linux kernel update package

- Download the latest package:
  - WSL2 Linux kernel update package for x64 machines<sup>1</sup>

**Note**

If you're using an ARM64 machine, please download the ARM64 package<sup>2</sup> instead. If you're not sure what kind of machine you have, open Command Prompt or PowerShell and enter: `systeminfo` | `find "System Type"`. **Caveat:** On non-English Windows versions, you might have to modify the search text, translating the "System Type" string. You may also need to escape the quotations for the find command. For example, in German: `systeminfo` | `find '"Systemtyp"'`.

- Run the update package downloaded in the previous step. (Double-click to run - you will be prompted for elevated permissions, select 'yes' to approve this installation.)

Once the installation is complete, move on to the next step - setting WSL 2 as your default version when installing new Linux distributions. (Skip this step if you want your new Linux installs to be set to WSL 1).

**Note**

For more information, read the article changes to updating the WSL2 Linux kernel<sup>3</sup>, available on the Windows Command Line Blog<sup>4</sup>.

## Step 5 - Set WSL 2 as your default version

Open PowerShell and run this command to set WSL 2 as the default version when installing a new Linux distribution:

```
PowerShell
wsl --set-default-version 2
```

Copy

## Step 6 - Install your Linux distribution of choice

<sup>1</sup> [Open the Microsoft PowerShell and select your favorite Linux distribution](#)

And copy the text located under Step 5:

Manual installation steps for WSL2: x

Filter by title

WSL Documentation

- Overview
- Install
  - Install WSL
  - Manual install steps for older versions
  - Install on Windows Server
- Tutorials
- Concepts
- How-to
- Frequently Asked Questions
- Troubleshooting
- Release Notes

Download PDF

## Step 4 - Download the Linux kernel update package

- Download the latest package:
  - WSL2 Linux kernel update package for x64 machines<sup>1</sup>

**Note**

If you're using an ARM64 machine, please download the ARM64 package<sup>2</sup> instead. If you're not sure what kind of machine you have, open Command Prompt or PowerShell and enter: `systeminfo` | `find "System Type"`. **Caveat:** On non-English Windows versions, you might have to modify the search text, translating the "System Type" string. You may also need to escape the quotations for the find command. For example, in German: `systeminfo` | `find '"Systemtyp"'`.

- Run the update package downloaded in the previous step. (Double-click to run - you will be prompted for elevated permissions, select 'yes' to approve this installation.)

Once the installation is complete, move on to the next step - setting WSL 2 as your default version when installing new Linux distributions. (Skip this step if you want your new Linux installs to be set to WSL 1).

**Note**

For more information, read the article changes to updating the WSL2 Linux kernel<sup>3</sup>, available on the Windows Command Line Blog<sup>4</sup>.

## Step 5 - Set WSL 2 as your default version

Open PowerShell and run this command to set WSL 2 as the default version when installing a new Linux distribution:

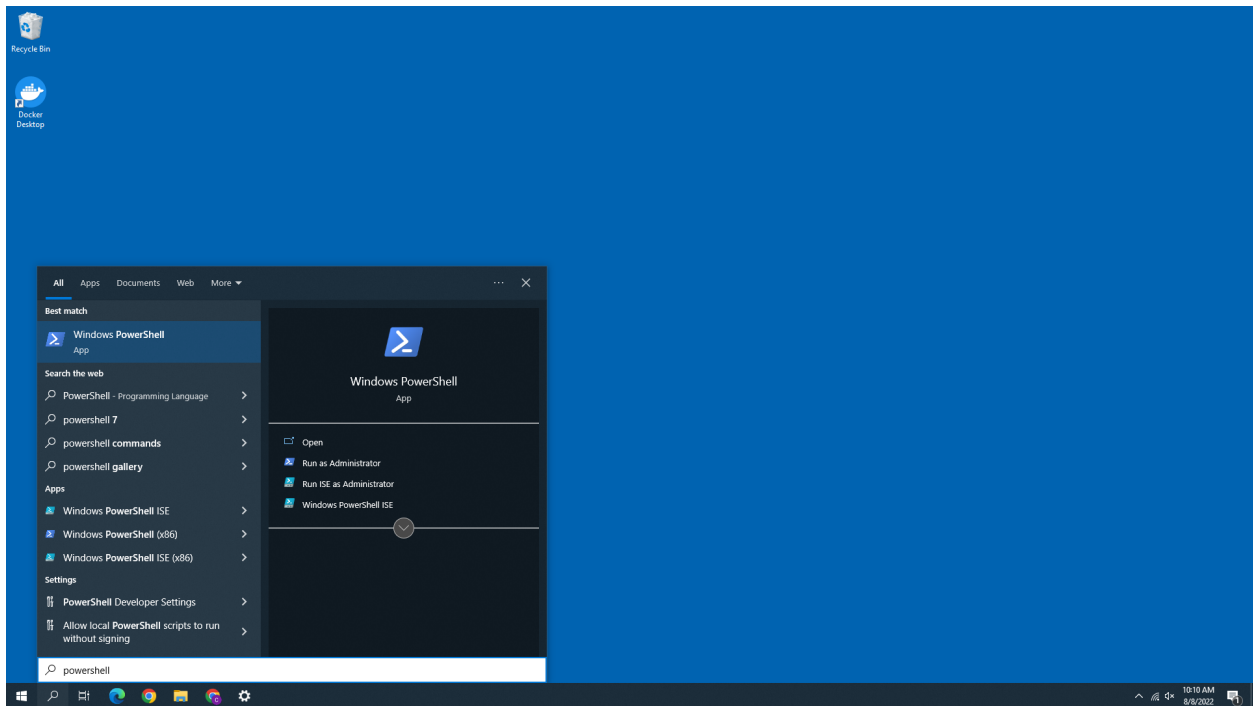
```
PowerShell
wsl --set-default-version 2
```

Copy

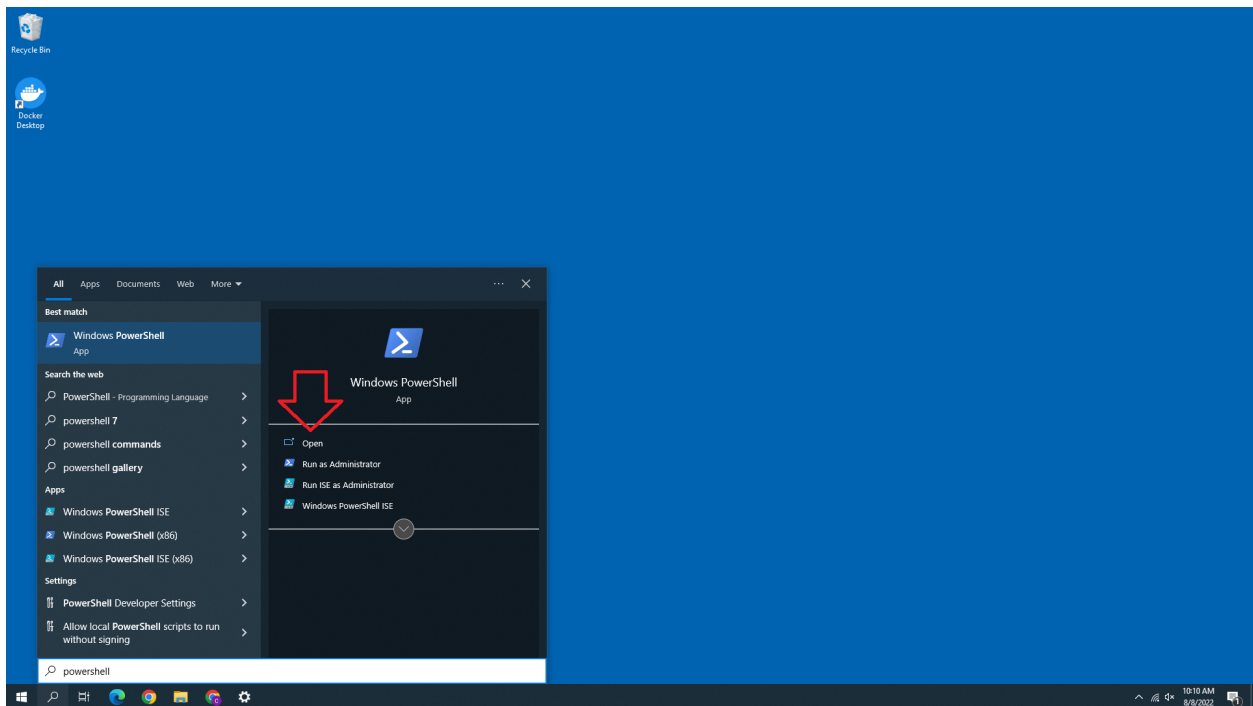
## Step 6 - Install your Linux distribution of choice

<sup>1</sup> [Open the Microsoft PowerShell and select your favorite Linux distribution](#)

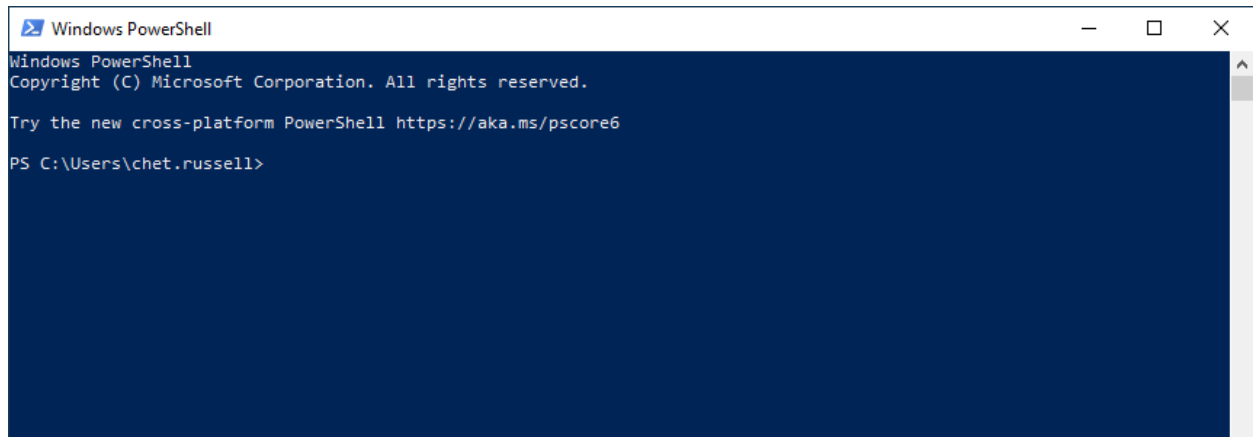
What you want to do now is click the small magnifying glass we used a couple steps before and type in the search bar “powershell”. You should see something like this come up:



Click the “Open” button:



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

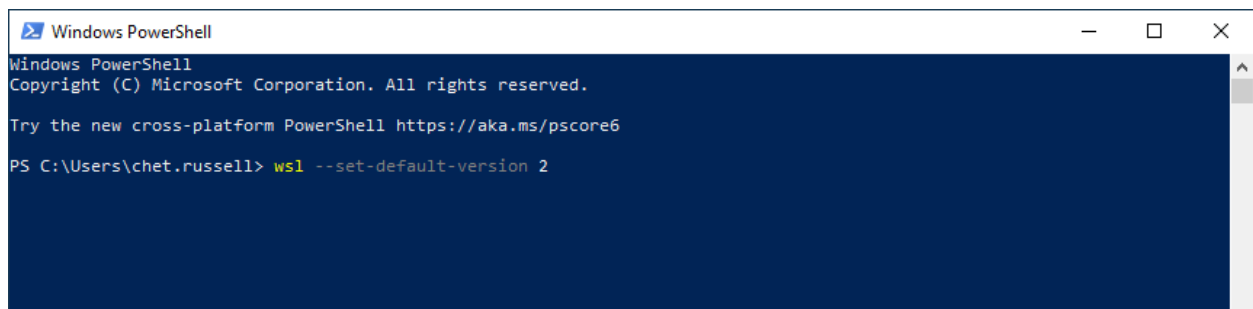
A screenshot of a Windows PowerShell window. The title bar reads "Windows PowerShell". The window has a dark blue background with white text. The text inside the window reads: "Windows PowerShell", "Copyright (C) Microsoft Corporation. All rights reserved.", "Try the new cross-platform PowerShell https://aka.ms/pscore6", and "PS C:\Users\chet.russell>".

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\Users\chet.russell>
```

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

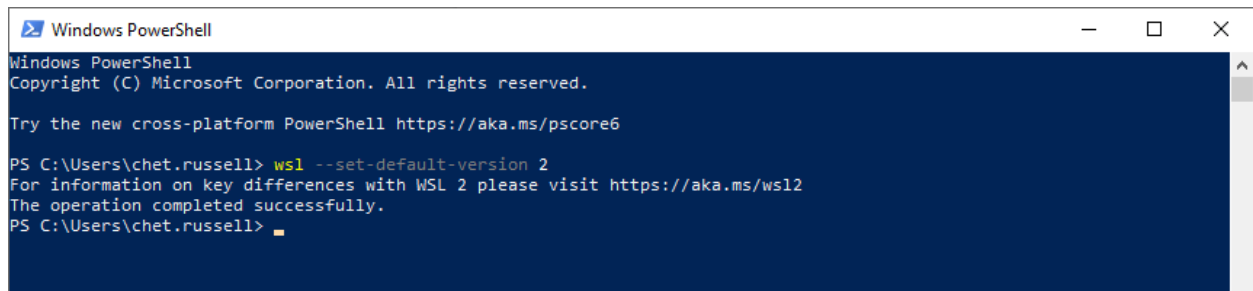
A screenshot of a Windows PowerShell window. The title bar reads "Windows PowerShell". The window has a dark blue background with white text. The text inside the window reads: "Windows PowerShell", "Copyright (C) Microsoft Corporation. All rights reserved.", "Try the new cross-platform PowerShell https://aka.ms/pscore6", and "PS C:\Users\chet.russell> wsl --set-default-version 2".

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\Users\chet.russell> wsl --set-default-version 2
```

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

A screenshot of a Windows PowerShell window. The title bar reads "Windows PowerShell". The window has a dark blue background with white text. The text inside the window reads: "Windows PowerShell", "Copyright (C) Microsoft Corporation. All rights reserved.", "Try the new cross-platform PowerShell https://aka.ms/pscore6", "PS C:\Users\chet.russell> wsl --set-default-version 2", "For information on key differences with WSL 2 please visit https://aka.ms/ws12", "The operation completed successfully.", and "PS C:\Users\chet.russell>".

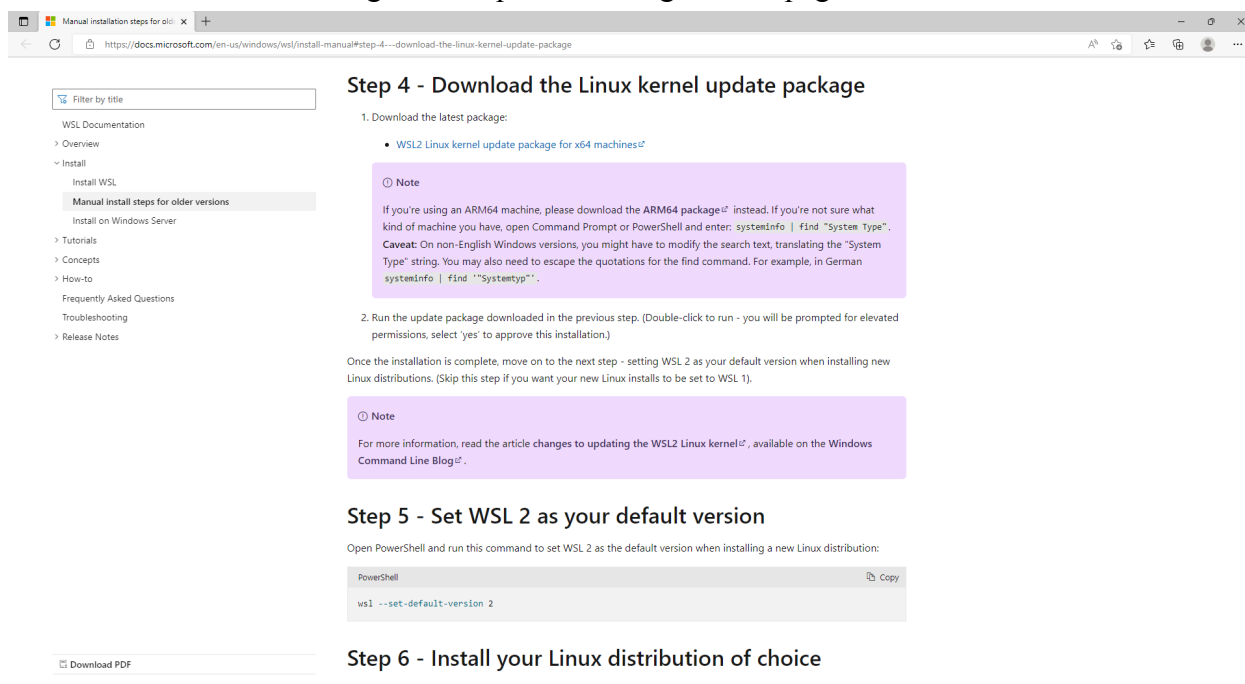
```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\Users\chet.russell> wsl --set-default-version 2
For information on key differences with WSL 2 please visit https://aka.ms/ws12
The operation completed successfully.
PS C:\Users\chet.russell>
```

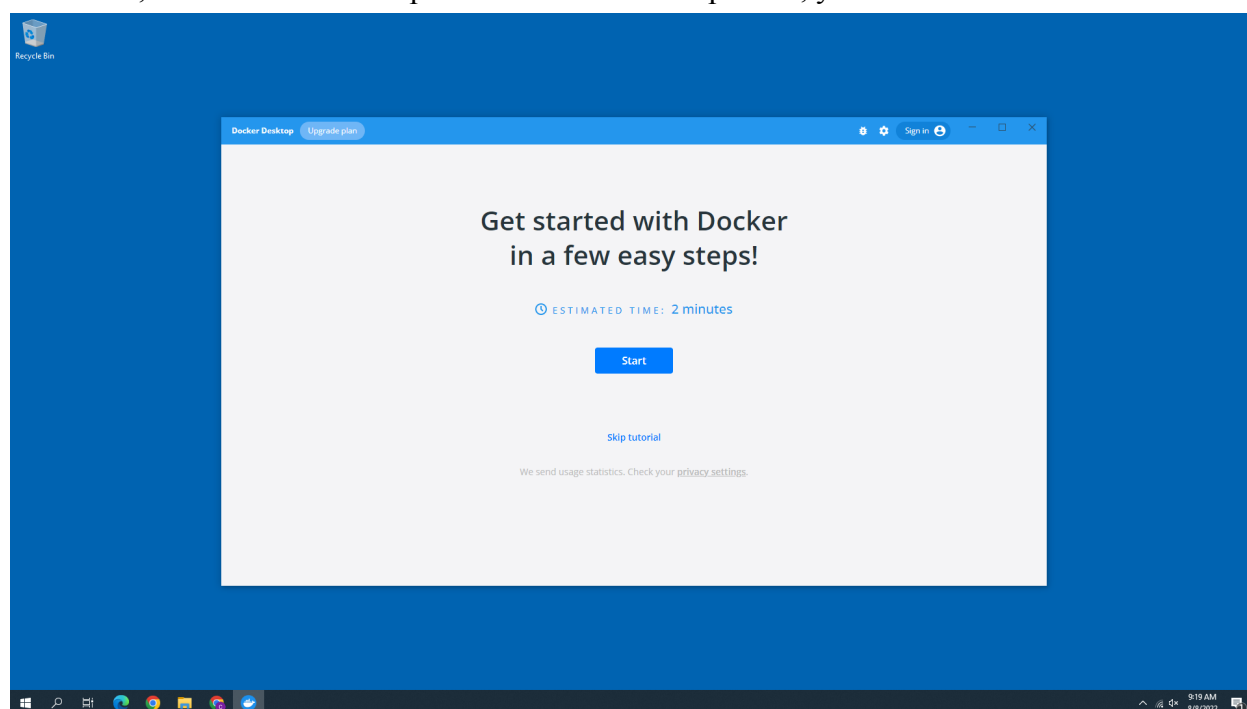
You can now close the powershell instance.

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

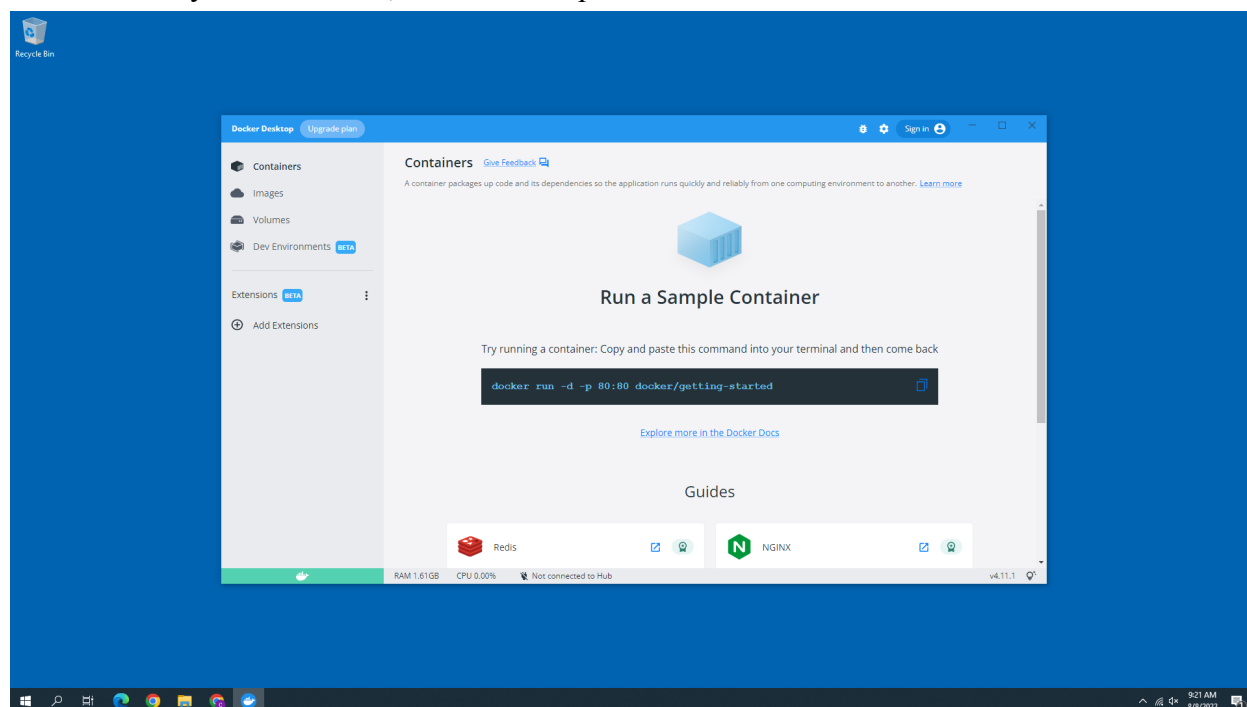


The screenshot shows the Microsoft Docs page for "Manual installation steps for older versions" of WSL. The page is titled "Step 4 - Download the Linux kernel update package". It includes a sidebar with navigation links like "Overview", "Install", "Manual install steps for older versions", "Tutorials", "Concepts", "How-to", "Frequently Asked Questions", "Troubleshooting", and "Release Notes". The main content area has a "Filter by title" search bar and a list of steps. Step 4 is highlighted, showing instructions to download the latest package (WSL2 Linux kernel update package for x64 machines) and run it. A note mentions that for ARM64 machines, the ARM64 package should be used instead. Step 5 is titled "Set WSL 2 as your default version" and includes a PowerShell command: `wsl --set-default-version 2`. Step 6 is titled "Install your Linux distribution of choice".

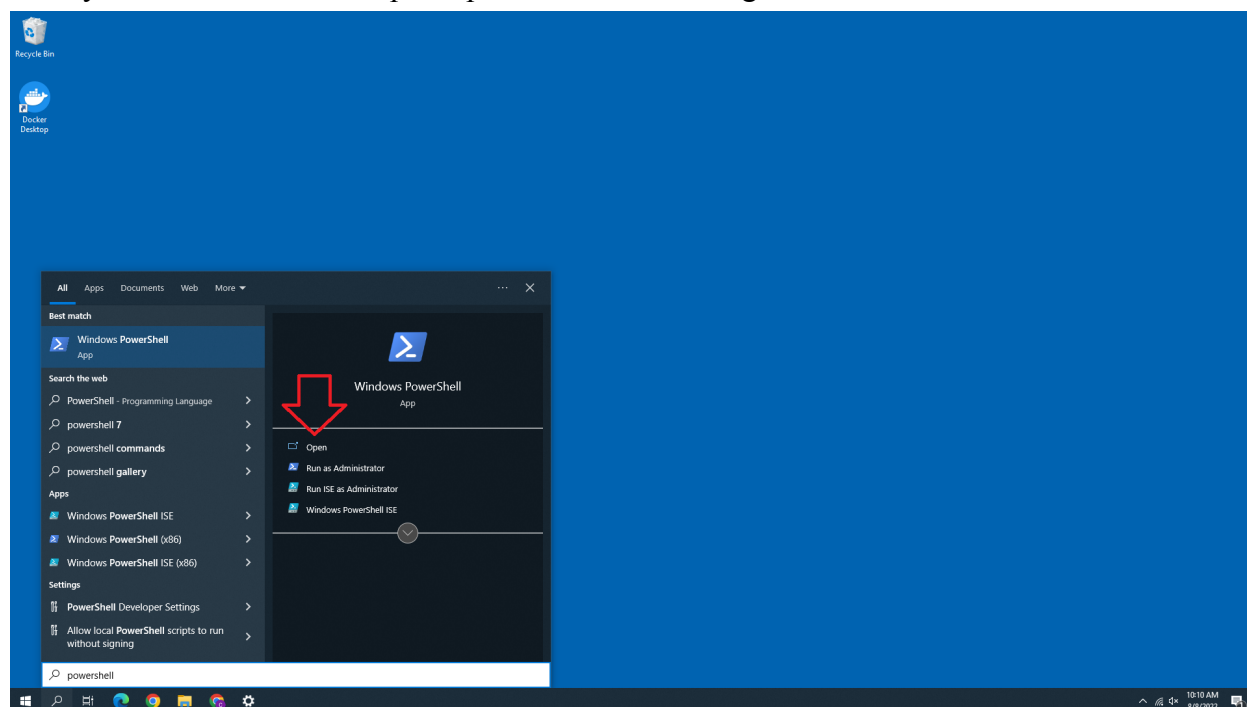
I have been using the Debian linux distribution, but it shouldn't matter which one you choose. Once this is done, you should **restart** your computer before moving on to the next steps. On launch, start Docker Desktop. After Docker Desktop starts, you should see this window:



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:



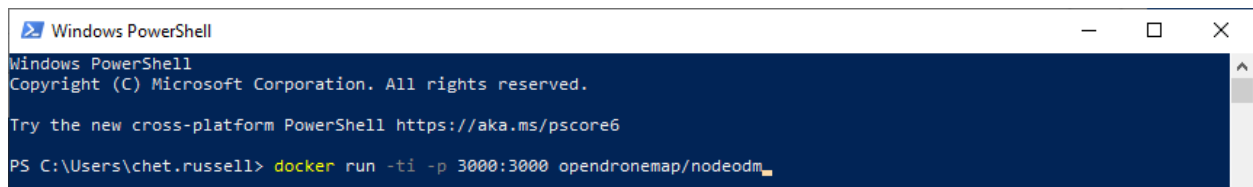
You have now installed Docker Desktop. Let us now install the processing node that KelPy uses. What you now want to do is open a powershell instance again.





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`

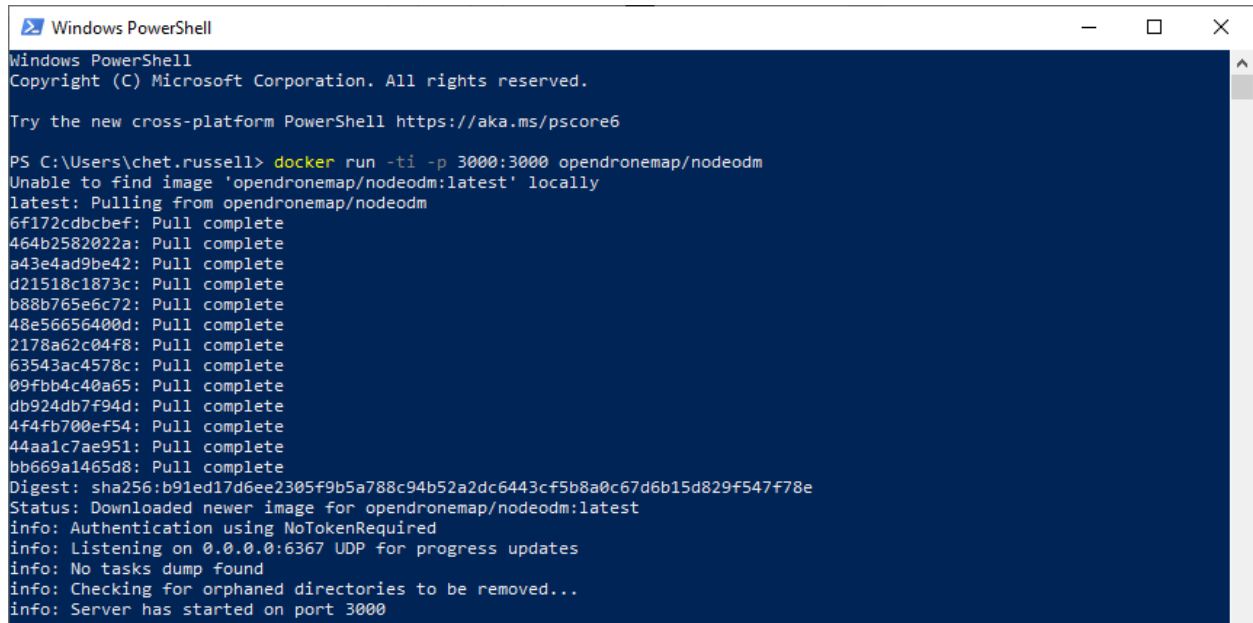


```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\Users\chert.russell> docker run -ti -p 3000:3000 opendronemap/nodeodm
```

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

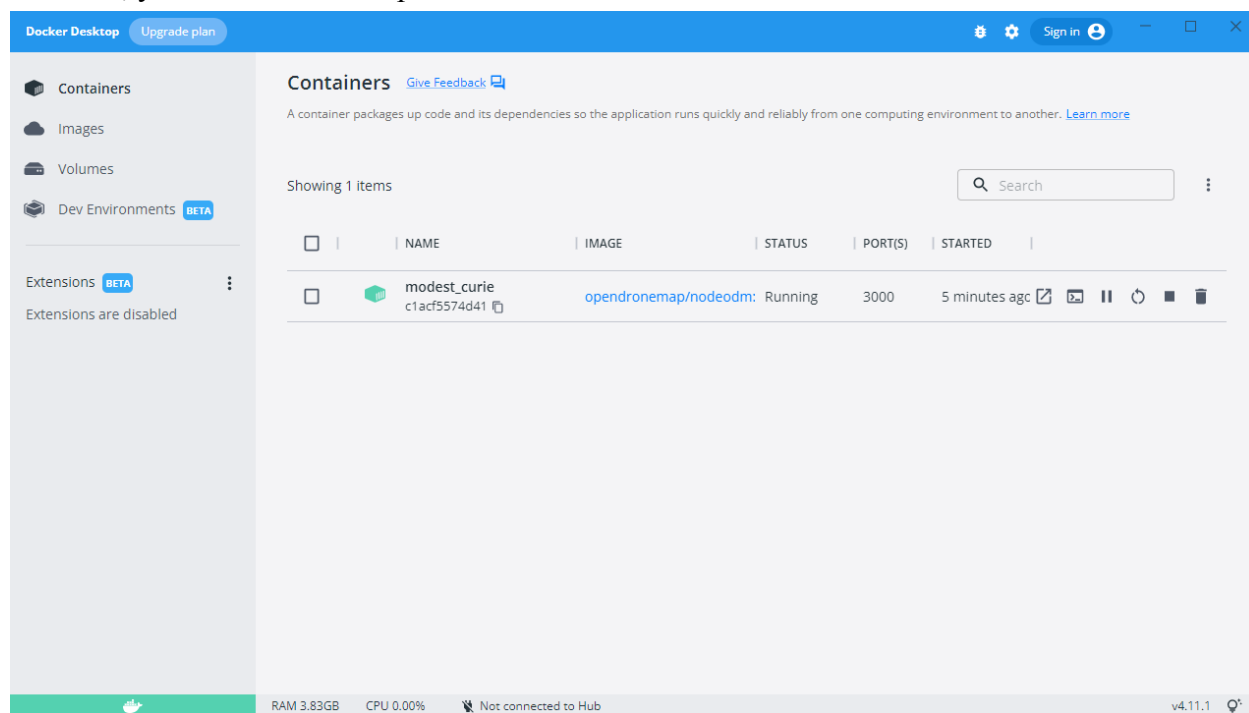


```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

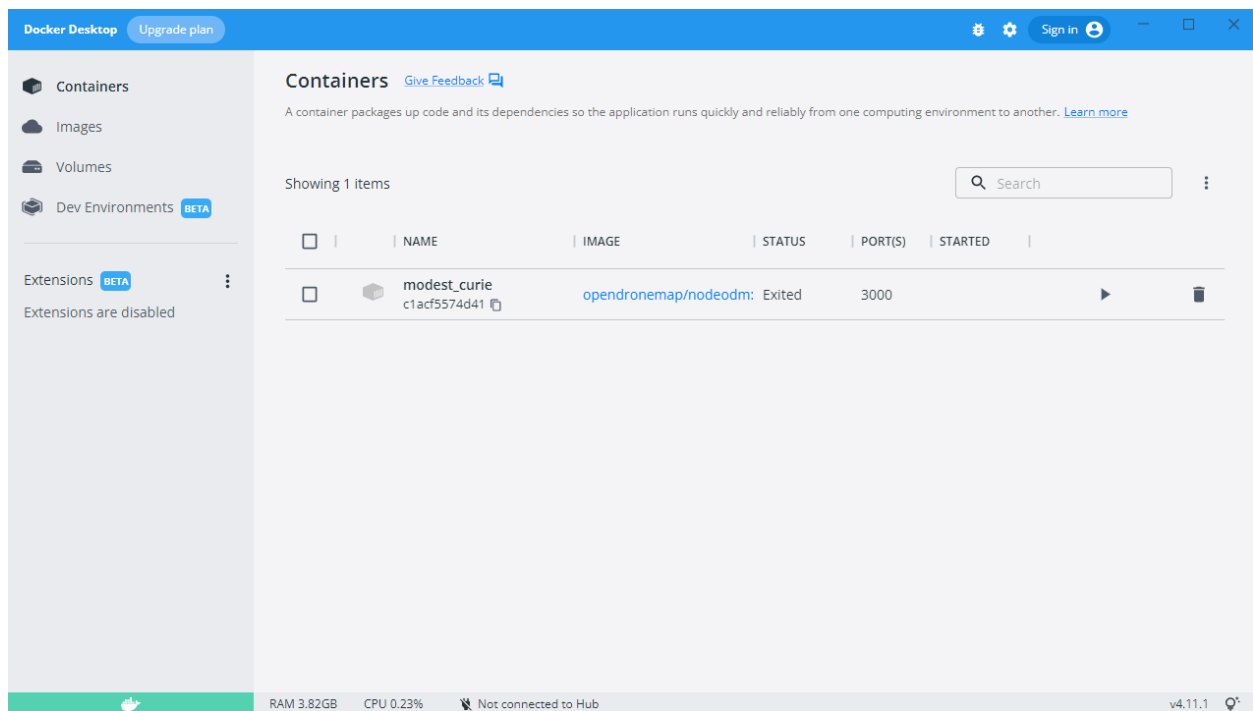
Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\Users\chert.russell> docker run -ti -p 3000:3000 opendronemap/nodeodm
Unable to find image 'opendronemap/nodeodm:latest' locally
latest: Pulling from opendronemap/nodeodm
6f172cdbcbe: Pull complete
464b2582022a: Pull complete
a43e4ad9be42: Pull complete
d21518c1873c: Pull complete
b88b765e6c72: Pull complete
48e56656400d: Pull complete
2178a62c04f8: Pull complete
63543ac4578c: Pull complete
09fbb4c40a65: Pull complete
db924db7f94d: Pull complete
4f4fb700ef54: Pull complete
44aa1c7ae951: Pull complete
bb669a1465d8: Pull complete
Digest: sha256:b91ed17d6ee2305f9b5a788c94b52a2dc6443cf5b8a0c67d6b15d829f547f78e
Status: Downloaded newer image for opendronemap/nodeodm:latest
info: Authentication using NoTokenRequired
info: Listening on 0.0.0.0:6367 UDP for progress updates
info: No tasks dump found
info: Checking for orphaned directories to be removed...
info: Server has started on port 3000
```

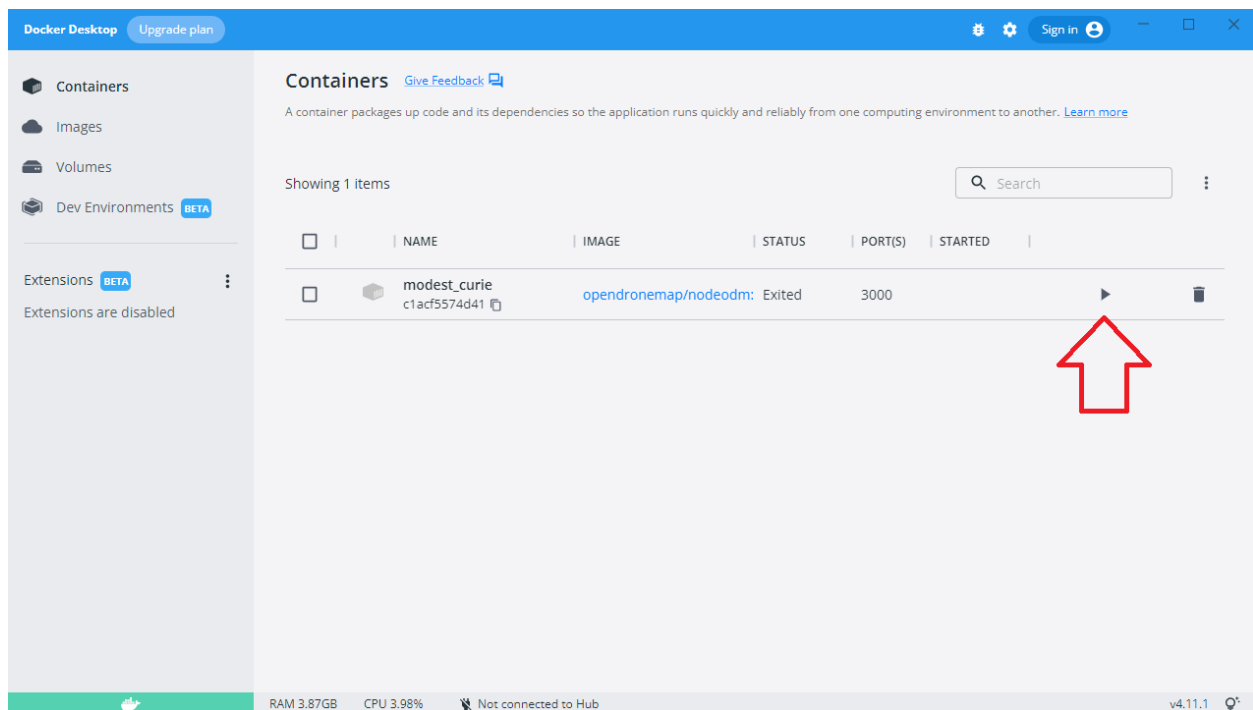
And now, your Docker Desktop should look like this:



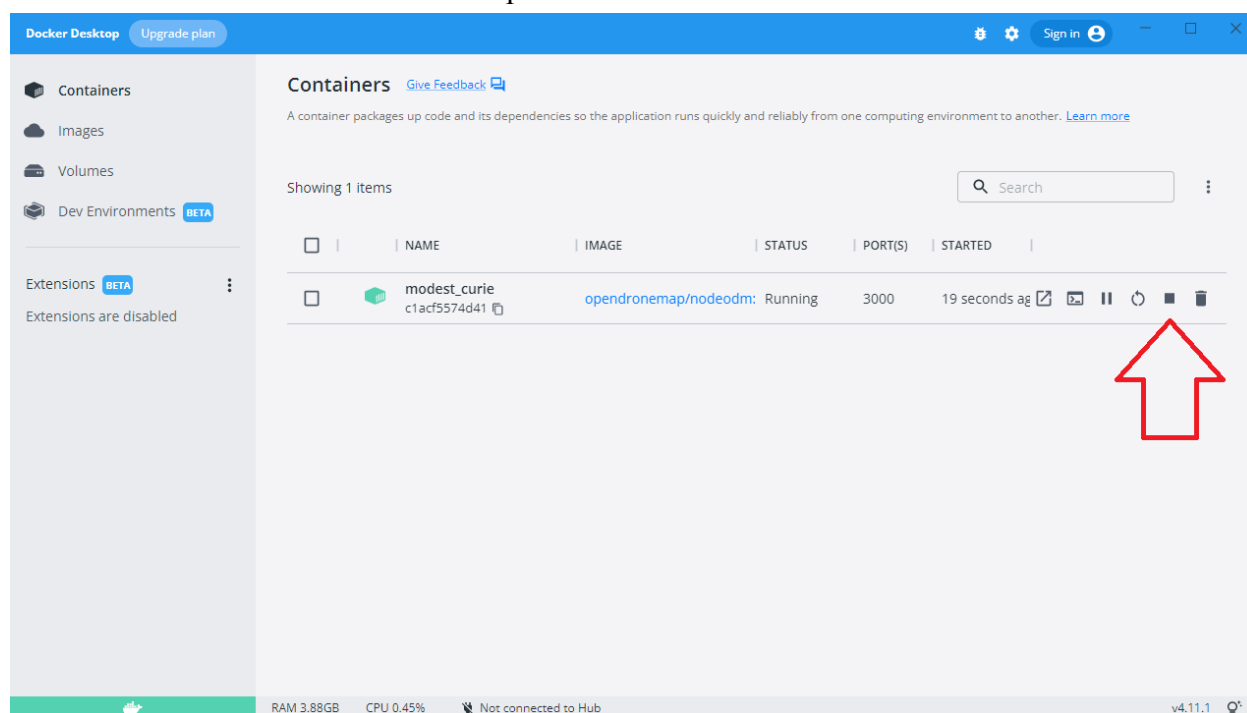
You can close your powershell instance and Docker Desktop will now look like this:



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



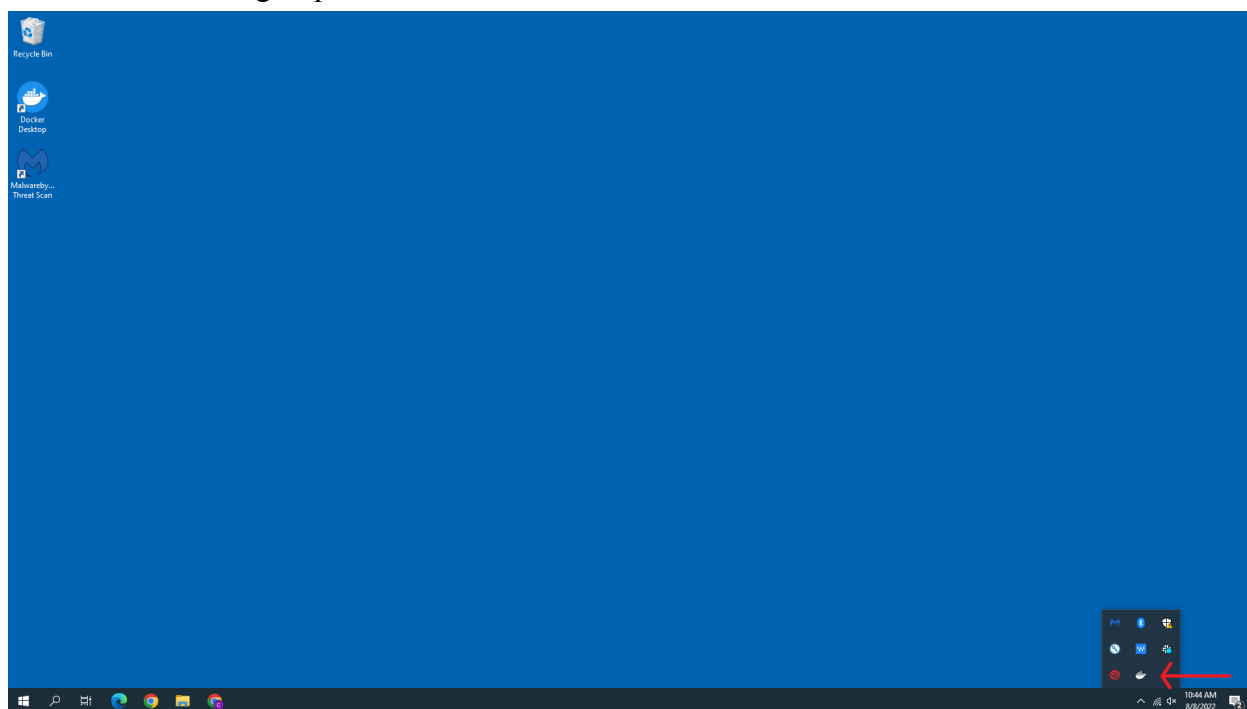
And turn the node off with the little stop button:



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:



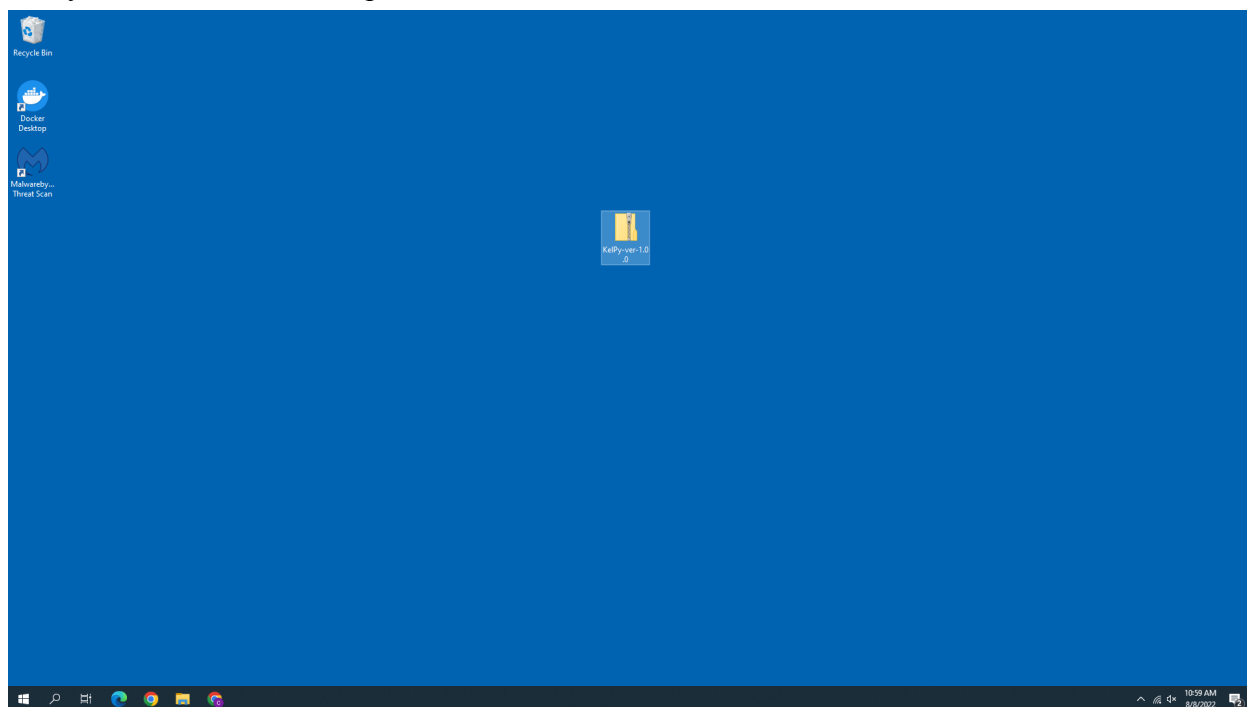
Right click on this icon and this will show up:



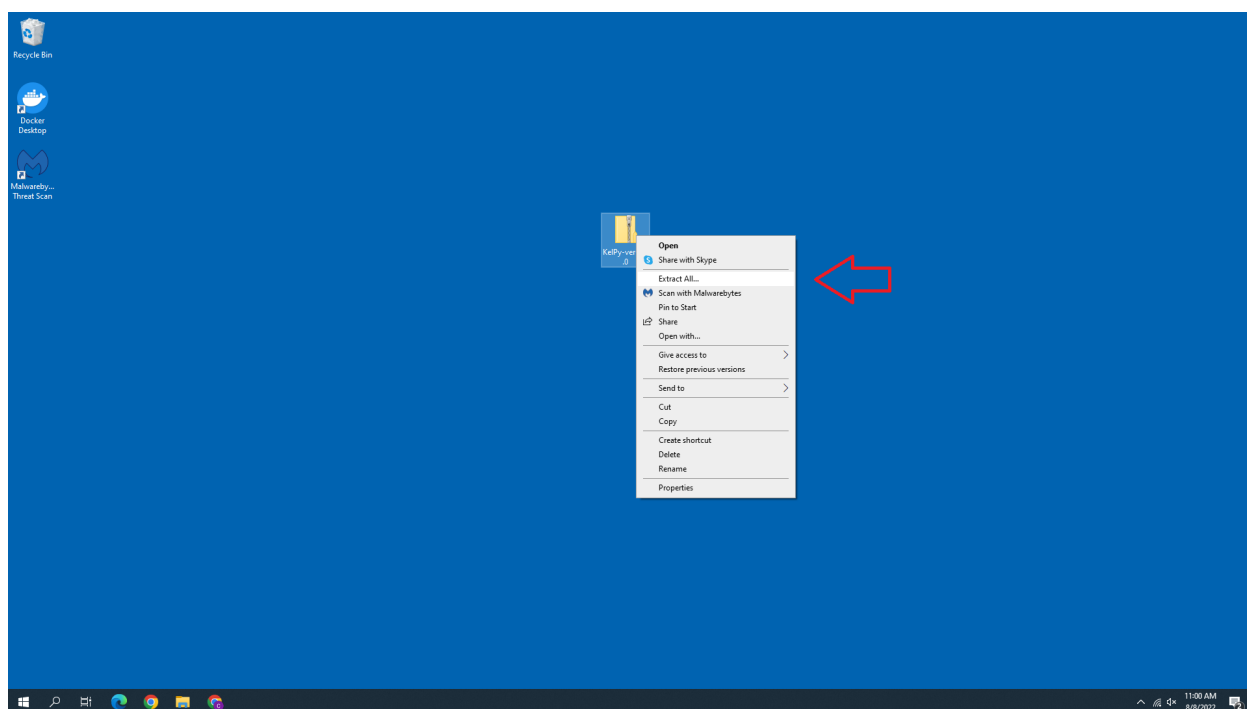
Click on the “Quit Docker Desktop” button. This will stop the node from taking a lot of memory from your system. Even when not running, Docker will still dedicate part of your memory to this node. Unfortunately, this is necessary, and there are not many workarounds, unless you want to reduce the memory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

# KelPy Installation

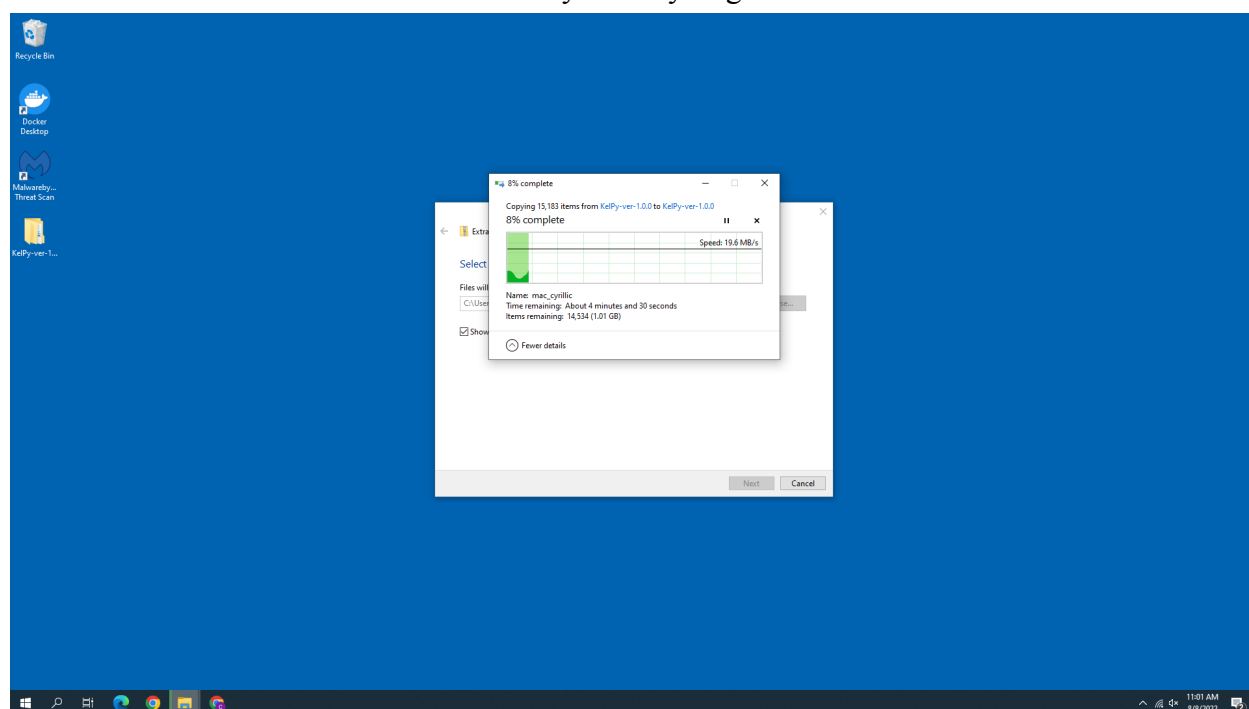
KelPy will be located in a zip file:



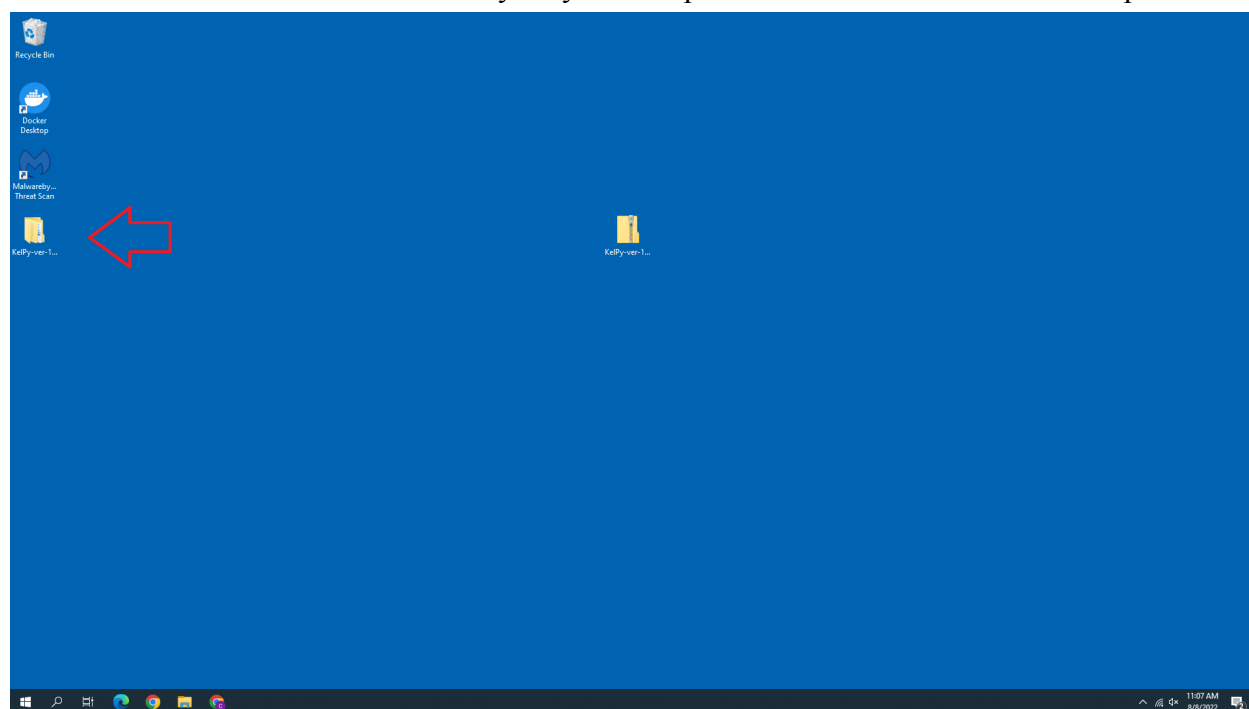
You will want to extract this zip file to use KelPy. Right click KelPy and click the “Extract All” button:



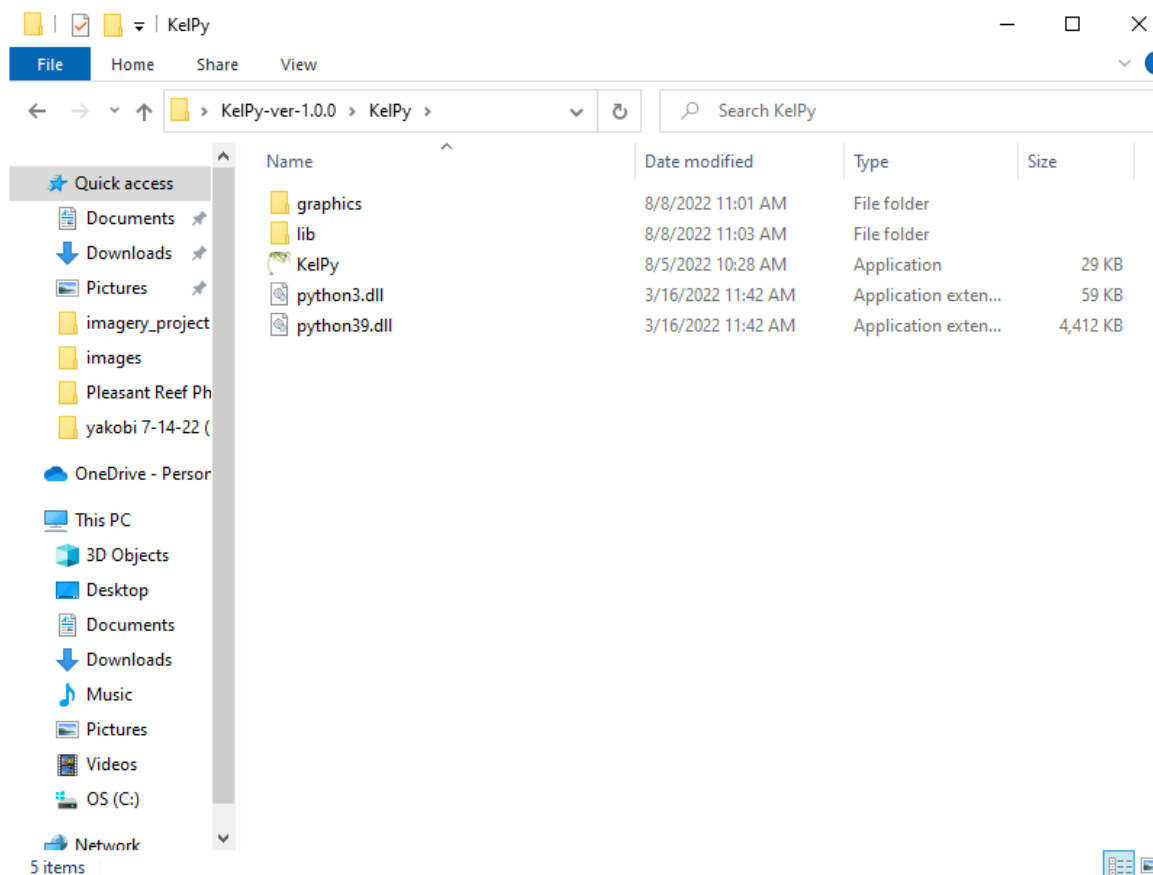
This should take a bit of time because Kelpy is fairly large.



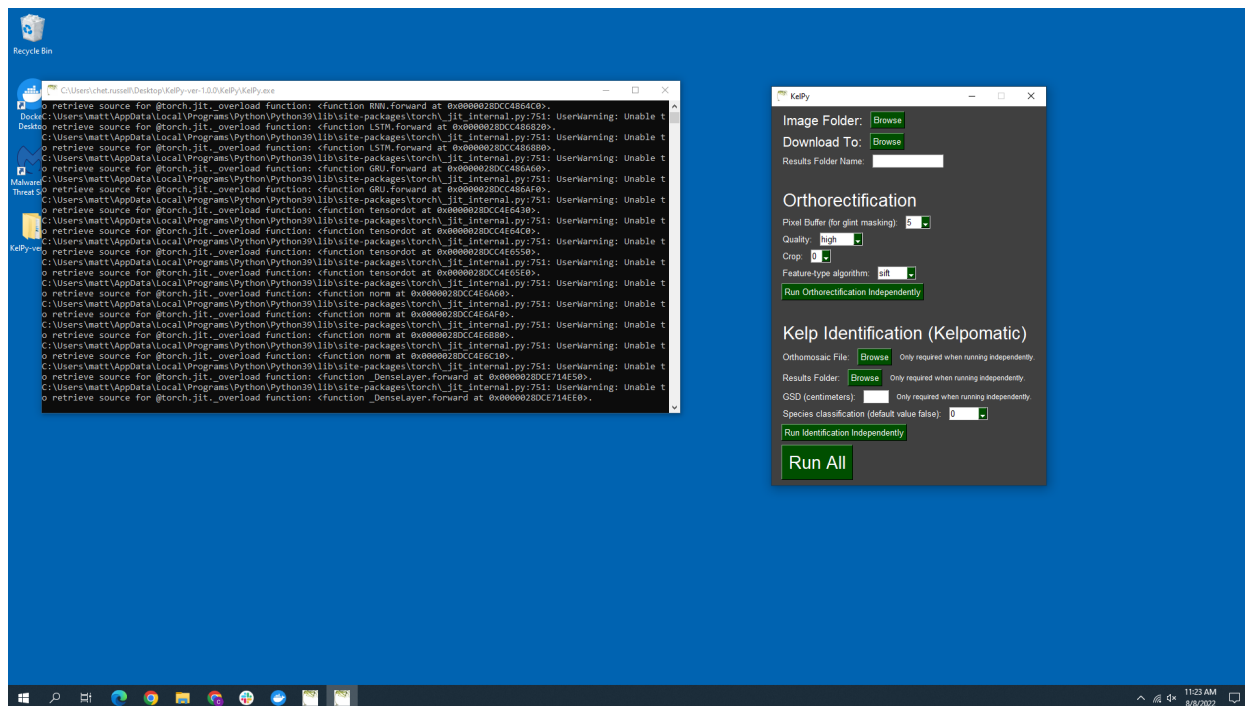
You should now see an extracted Kelpy on your computer. Double click this folder to open it:



You should now see this:



Double click on KelPy.exe. KelPy will start and look like this:



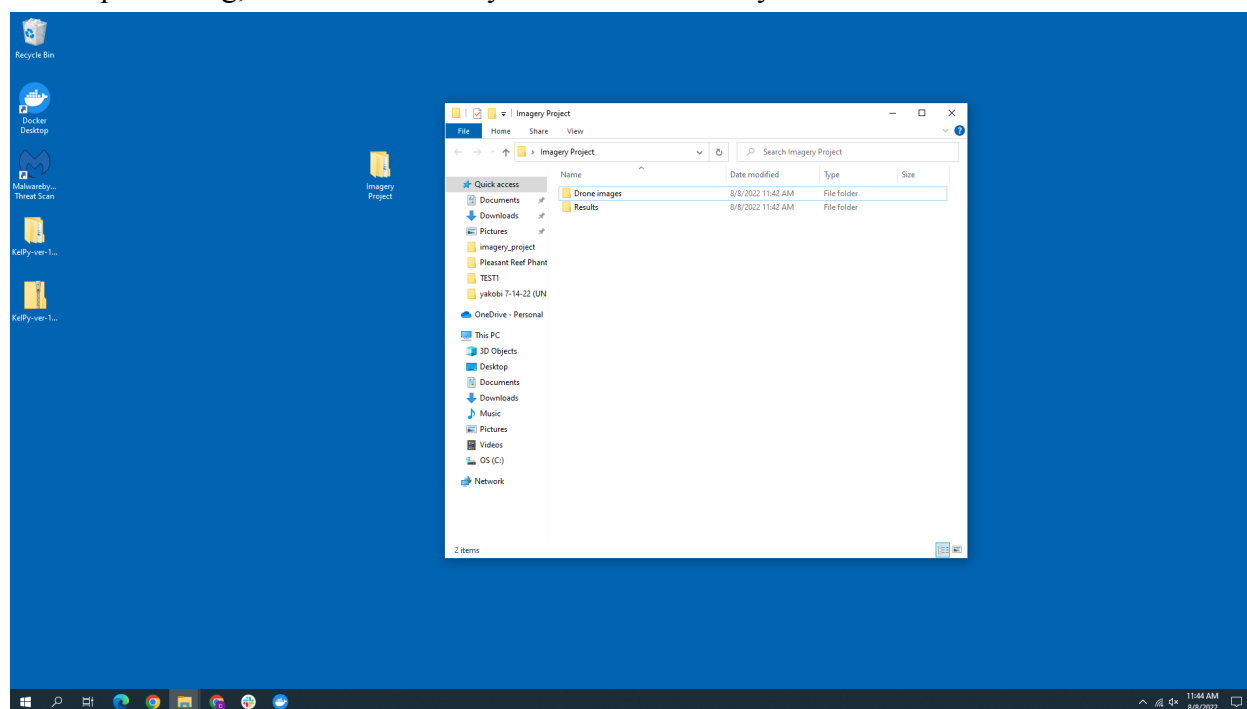


On launch, KelPy will have a console window accompanying it. It is a good way to check in on the progress of KelPy. On launch, this console window should have a couple warnings akin to this:

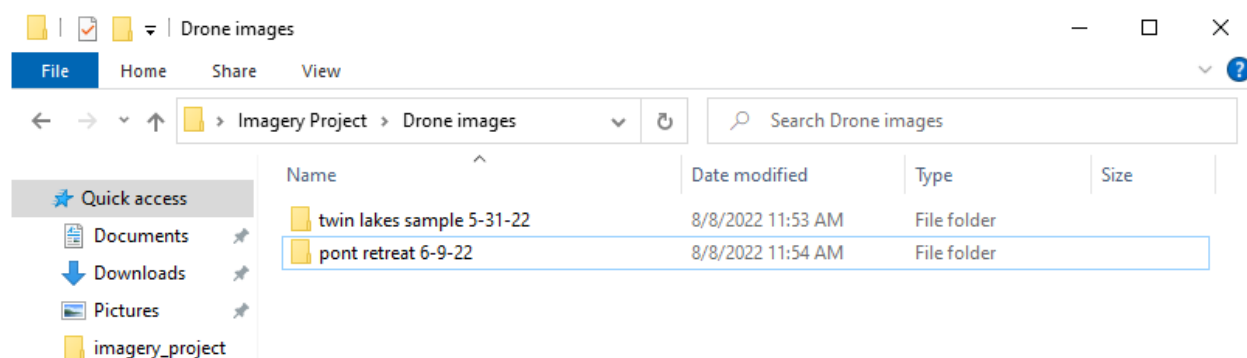
*C:\Users\matt\AppData\Local\Programs\Python\Python39\lib\site-packages\torch\\_jit\\_internal.py:751: UserWarning: Unable to retrieve source for @torch.jit.\_overload function: <function \_DenseLayer.forward at 0x0000028DCE714EE0>.*

This is normal. The warnings are coming from a library that KelPy uses, and do not affect the program whatsoever.

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:



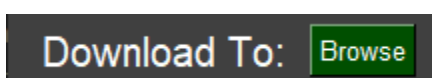
# KelPy Options

## Image Folder

A dark gray rectangular box containing the text "Image Folder:" in white, followed by a green button with the word "Browse" in white.

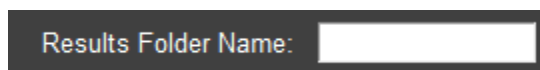
This is how you select your drone images. Make sure that the only images in the folder are the drone images from the bed you want to process. Do not put in any other files in this folder besides images.

## Download To

A dark gray rectangular box containing the text "Download To:" in white, followed by a green button with the word "Browse" in white.

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

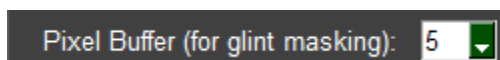
## Results Folder Name

A dark gray rectangular box containing the text "Results Folder Name:" in white, followed by a white text input field.

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.

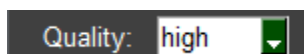
## Orthorectification options

### Pixel buffer

A dark gray rectangular box containing the text "Pixel Buffer (for glint masking):" in white, followed by a white input field showing the number "5" and a green dropdown arrow.

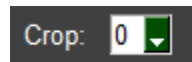
This is the pixel buffer selector. The default is 5. The higher the pixel buffer, the longer the processing.

### Quality

A dark gray rectangular box containing the text "Quality:" in white, followed by a white input field showing the word "high" and a green dropdown arrow.

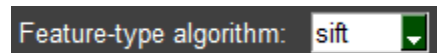
This is the quality selector. Higher quality orthomosaics will take more time to process. The default is high.

### Crop


 A dark grey rectangular box containing the text "Crop:" followed by a white dropdown menu showing the number "0" and a small downward arrow.

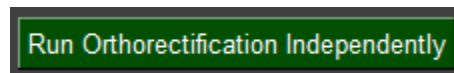
This is the crop option. Ideally, it will crop the orthomosaic to make it look nice and clean. Unfortunately, it tries to crop out all the water in a photo, including the kelp. Use at your own risk. The default is 0.

### Feature-type algorithm


 A dark grey rectangular box containing the text "Feature-type algorithm:" followed by a white dropdown menu showing the word "sift" and a small downward arrow.

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

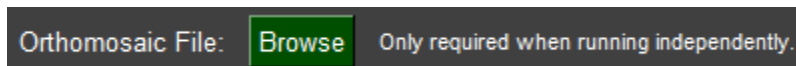
### Run Orthorectification Independently Button


 A green rectangular button with a black border and the text "Run Orthorectification Independently" in black.

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

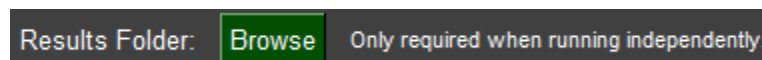
### Kelp Identification (Kelpomatic) options

#### Orthomosaic File


 A dark grey rectangular box containing the text "Orthomosaic File:" followed by a green "Browse" button and the text "Only required when running independently."

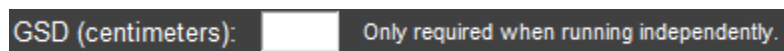
The orthomosaic file selector. Use this when you want to run kelp identification on an orthomosaic. As the text implies, this is only necessary when you are running identification independently.

#### Results Folder


 A dark grey rectangular box containing the text "Results Folder:" followed by a green "Browse" button and the text "Only required when running independently."


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


 A dark grey rectangular box containing the text "GSD (centimeters):" followed by a white input field and the text "Only required when running independently."

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

Species classification (default value false):  

The selector to determine whether the species classification should run during kelp identification. The default value will be False but show up as 0.

### 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

## Error-Checking

This program is in its infancy, so there will be a lot of bugs. 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.