The right and wrong way to set Python 3 as default on a Mac

There are several ways to get started with Python 3 on macOS, but one way is better than the others.

There are a lot of ways to configure Python 3. TL;DR if you're looking for a quick answer, jump down to this section to set yourself up for success.

I've been dipping my toe back into Python development as I get ready to head to PyCon US. (If you're headed there as well and want to share your Python story, let me know!) When I installed a module to tinker around with, I got a reminder that I needed to install Python 3 soon.

```
$ pip install todoist-python
DEPRECATION: Python 2.7 will reach the end of its life
```

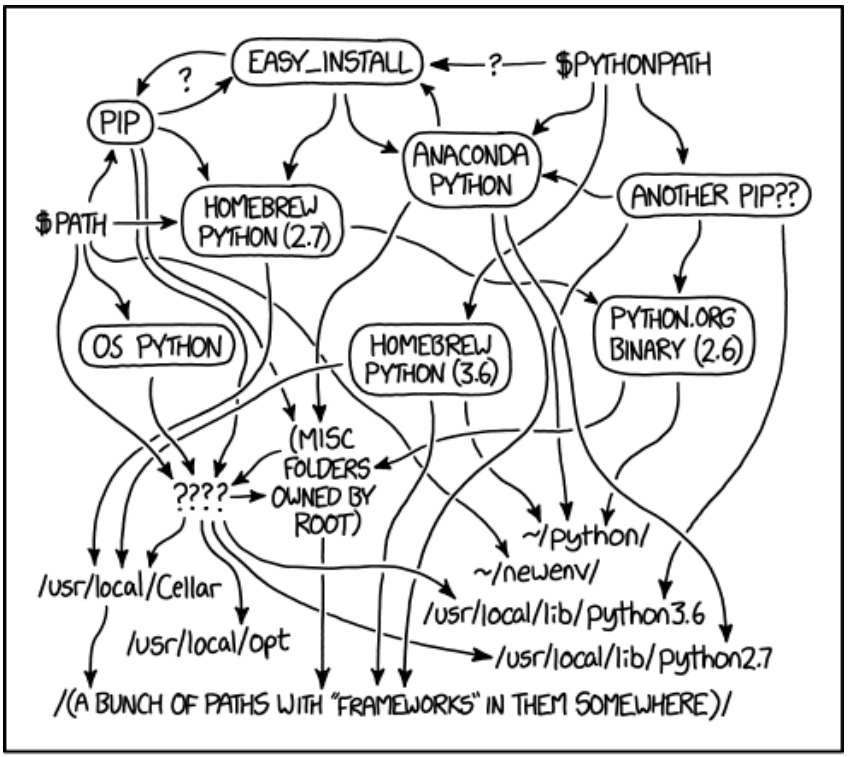
So, I did what any of us would do and googled around looking for a guide to update my development environment, which runs on Mac (the macOS operating system, formerly known as OS X). To my surprise, I found only a handful of StackOverflow posts, and they pointed me to partial solutions. Here's the full story of how to set up your environment without breaking anything built into the macOS operating system.

A word to the wise: if you're looking to install Python 3 the "right" way, skip down to that section. I will start by covering other ways that seem right but are not a good idea. Skip to the end of this article if you're short on time and just want the recommended way.

What's so hard about this?

The version of Python that ships with macOS is well out of date from what Python recommends using for

development. Python runtimes are also comically challenging at times, as noted by XKCD.



MY PYTHON ENVIRONMENT HAS BECOME SO DEGRADED THAT MY LAPTOP HAS BEEN DECLARED A SUPERFUND SITE.

So what's the plan? I have dozens of Python interpreters on my computer already, and I have no idea how to manage them effectively. I didn't want to download the latest release, move it into my path, and call it a day (or use **brew install python3**, which would do something similar). I figured it would cause breakages down the line in a really frustrating

way that I wouldn't know how to troubleshoot. I thought the best path forward was to rip and replace whatever version of Python I was running to make a clear and definitive switch to the latest and greatest.

What NOT to do

My first idea on how to make Python 3 the default Python on my system was to move the old version and add the new one:

```
# what I thought would work
# first, I'll find my python binary
$ which python
/usr/bin/python
# next, I'll move it to an unused name
$ sudo mv /usr/bin/python /usr/bin/python2
# lastly, I'll move the new binary to the previous pat
$ sudo mv $PATHTOBINARY/python3 /usr/bin/python
```

The pattern followed what **/usr/bin/** usually does between major releases of Python, but I quickly learned it was the wrong move:

```
$ sudo mv /usr/bin/python /usr/bin/python2
mv: rename /usr/bin/python to /usr/bin/python2: Operat
```

Thankfully, macOS protected me from breaking something I don't fully understand. Further research proves this is exactly what we shouldn't do.

What we could do (but also shouldn't)

Now that we know what not to do, let's look at what we *could* do. There are a couple options when we think about common installation patterns for applications on macOS.

Use Python 3 as the macOS default

Python's website has a macOS Python 3 installer we can download and use. If we use the package installation, a **python3** fill will be available in **/usr/local/bin/**.

Aliasing is a must since the Python binary stored in **/usr/bin/** can't be changed. What's nice about an alias is that it's specific to our command-line shell. Since I use **zsh** by default, I put the following into the **.zshrc**file:

```
$ echo "alias python=/usr/local/bin/python3.7" >> ~/.z
```

If you are using the default Bash shell, you can append this same text to your **.bashrc**:

```
$ echo "alias python=/usr/local/bin/python3.7" >> ~/.b
```

This strategy works, but it isn't ideal for making future updates to Python. It means we have to remember to check the website and download the new files since Python doesn't include a command-line way to update.

Have Homebrew manage Python 3

The Homebrew project provides a free and open source package manager for macOS that many people rely on. It gives Apple users a power similar to **apt-get** or **yum**. If you are a Homebrew user, you may already have Python installed. To quickly check, run:

```
$ brew list | grep python
python
```

If Python shows up under the command, it's installed. What version is it? Let's check:

```
$ brew info python
python: stable 3.7.3 (bottled), HEAD
Interpreted, interactive, object-oriented programming
https://www.python.org/
/usr/local/Cellar/python/3.7.2_1 (8,437 files, 118MB)
## further output not included ##
```

Okay, great! The Homebrew maintainers have updated the default Python bottle to point to the latest release. Since the Homebrew maintainers are more dependable at updating the release than most

of us, we can use Homebrew's version of Python 3 with the following command:

```
$ brew update && brew upgrade python
```

Now we want to point our alias (from above) to the copy of Python that Homebrew manages:

```
# If you added the previous alias, use a text editor t
alias python=/usr/local/bin/python3
```

To make sure the path above points to where Homebrew installed Python in our environment, we can run **brew info python** and look for the path information.

This method, of using Homebrew to manage our Python environment, is a good starting place, and it made sense to me at the time.

What if we still need Python 2?

It makes sense for anyone new to Python to begin with Python 3. But those of us who still need Python 2—for example, to contribute to a Python project

that's only available in Python 2—can continue to use the default macOS Python binary available in **/usr/bin/python**:

```
$ /usr/bin/python
>>> print("This runtime still works!")
This runtime still works!
```

Homebrew is so wonderful, it even offers a different formula for Python 2:

```
# If you need Homebrew's Python 2.7 run
$ brew install python@2
```

At any time, we can remove the aliases from our shell's configuration file to go back to using the default copy of Python on the system.

Don't forget to update pip to pip3!

The **pip** command is the default package manager specifically for Python packages. Although we changed our default Python command to be version 3, we have to alias our **pip** command separately if it's on the previous version. First, we need to check what version we're on:

```
# Note that this is a capital V (not lowercase)
$ pip -V
pip 19.0.3 from /Library/Python/2.7/site-packages/pip-
```

To ensure we're installing packages compatible with our new version of Python, we'll use another alias to point to the compatible version of pip. Since we're using Homebrew as our package manager in this situation, we know it installed pip3 when we installed Python 3. The default path should be the same as Python 3, but we can confirm this by asking the shell to find it:

```
$ which pip3
/usr/local/bin/pip3
```

Now that we know the location, we will add it to our shell configuration file, as we did before:

```
$ echo "alias pip=/usr/local/bin/pip3" >> ~/.zshrc
# or for Bash
$ echo "alias pip=/usr/local/bin/pip3" >> ~/.bashrc
```

Last, we can confirm that running pip points to pip3 by opening a new shell or by resetting our current shell and seeing what we point to:

```
# This command reloads the current shell without exiti
# Alternatively, exit the shell and start a new one
$ exec $0
# Now we can look to see where pip points us
$ which pip
pip: aliased to /usr/local/bin/pip3
```

We can avoid using Homebrew to update pip, but that requires a much longer tutorial from the Python documentation.

What we should do

When asking for a technical review of this article, Moshe Zadkagave me a warning that my solution could result in an unreliable idea of which Python is running that depends too closely on shells loading aliases. I knew Moshe was familiar with Python, but I didn't know is that he is an author of *many* Python tutorials as well as an upcoming book on Python development on macOS. He helped 40 colleagues develop Python safely and consistently on macOS systems following one core principle:

> "The basic premise of all Python development is to never use the system Python. You do not *want* the Mac OS X 'default Python' to be 'python3.' You want to never care about default Python."

How do we stop caring about the default? Moshe recommends using **pyenv** to manage Python environments (for a deeper dive on configuring pyenv, see this article). This tool will manage multiple versions of Python and is described as "simple, unobtrusive, and follows the Unix tradition of single-purpose tools that do one thing well."

While other installation options are available, the easiest way to get started is with Homebrew:

```
$ brew install pyenv
🍺  /usr/local/Cellar/pyenv/1.2.10: 634 files, 2.4MB
```

Now let's install the latest Python version (3.7.3 as of this writing):

```
$ pyenv install 3.7.3
python-build: use openssl 1.0 from homebrew
python-build: use readline from homebrew
```

```
Downloading Python-3.7.3.tar.xz...
-> https://www.python.org/ftp/python/3.7.3/Python-3.7.
Installing Python-3.7.3...
## further output not included ##
```

Now that Python 3 is installed through pyenv, we want to set it as our global default version for pyenv environments:

```
$ pyenv global 3.7.3
# and verify it worked
$ pyenv version
3.7.3 (set by /Users/mbbroberg/.pyenv/version)
```

The power of pyenv comes from its control over our shell's path. In order for it to work correctly, we need to add the following to our configuration file (**.zshrc** for me, possibly **.bash_profile** for you):

```
$ echo -e 'if command -v pyenv 1>/dev/null 2>&1; then\
```

After that command, our dotfile (**.zshrc** for zsh or **.bash_profile** for Bash) should look include these lines:

```
if command -v pyenv 1>/dev/null 2>&1; then
  eval "$(pyenv init -)"
fi
```

We also need to **remove the aliases we used in the sections above** since they would prevent using pyenv correctly. After removing them, we can confirm pyenv is managing our Python 3 version:

```
# I start by resetting the current shell
# Alternatively, start a new terminal instance
$ exec $0
$ which python
/Users/mbbroberg/.pyenv/shims/python
$ python -V
Python 3.7.3
$ pip -V
pip 19.0.3 from /Users/mbbroberg/.pyenv/versions/3.7.3
```

Now we know for certain that we're using Python 3.7.3 and pip will update alongside it without any manual aliasing between versions. Using Moshe's recommendation to use a version manager (pyenv) enables us to easily accept future upgrades without getting confused about which Python we are running at a given time.

What's next to configure Python

As you get comfortable with this workflow, you can use pyenv to manage multiple versions of Python. It's also essential, for dependency management, to use virtual environments. I mention how to use the built in venv library in the article, and Moshe recommends virtualenvwrapper for managing virtual environments.

Do it right from the start

If you are just getting started with Python development on a macOS, do the necessary configurations to make sure you're using the right version of Python from the start. Installing Python 3, with or without Homebrew, and using alias will let you start coding, but it's not a good strategy for the long run. Using pyenv as a simple version management solution to get you off to a good start.