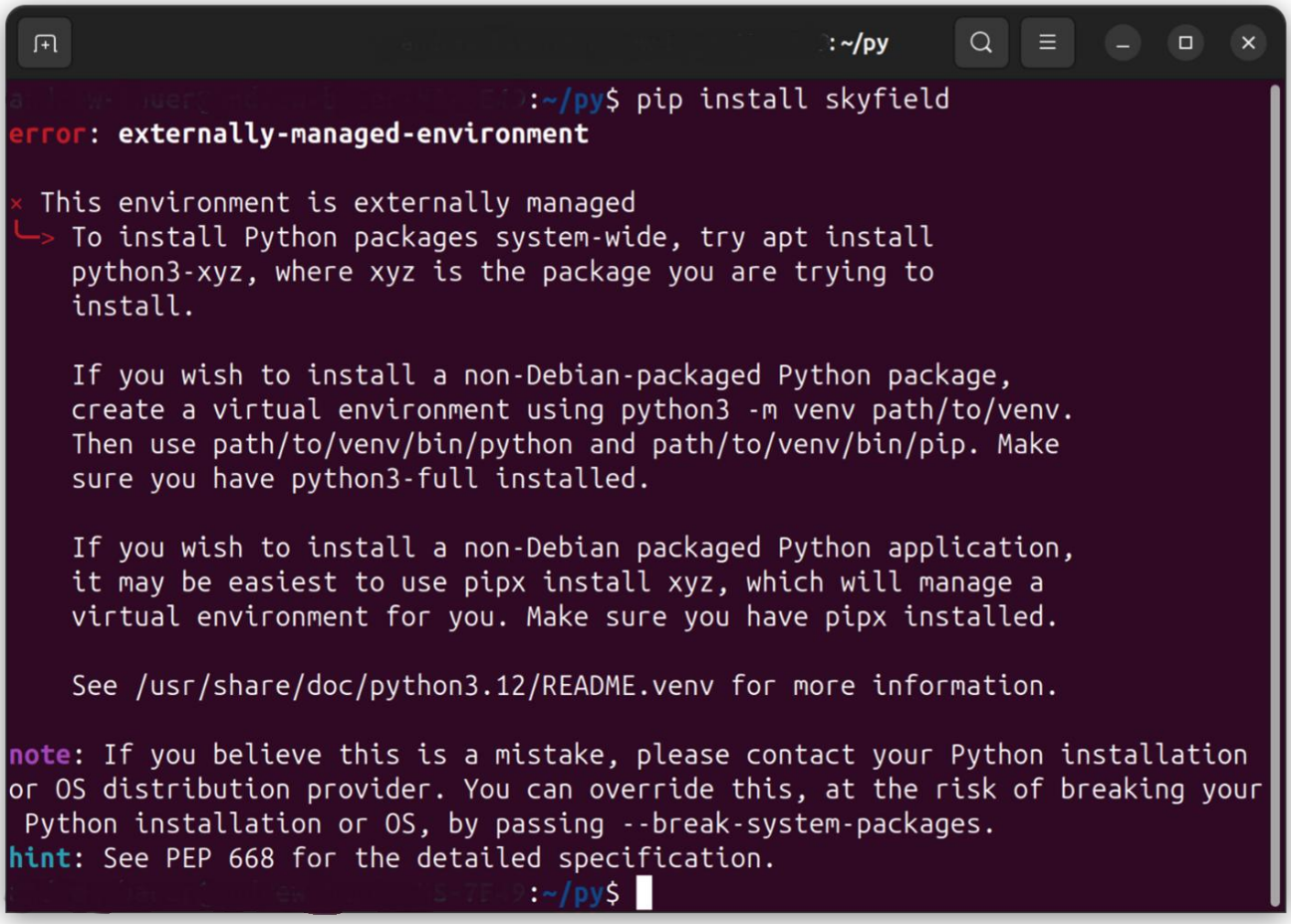
How to Install Skyalmanac on Linux

Previous versions of Linux were not critical regarding where PyPI packages are installed, however recent versions will display the following error message (which comes from Ubuntu Desktop 24.04):



Basically, it is warning the user not to install packages (with their dependencies) in the global system package area. Although this can be overridden, it is bad practice to do so. In Internet there are also suggestions to use **pipx**, however **pipx** only works with applications (not with libraries, such as Skyfield – the astronomical library). The only reliable solution is to make full use of a virtual environment. The following text illustrates the recommended installation process for PyPI packages to users that may be unfamiliar with virtual environments.

A virtual environment is *good news* as then all the 'simple' pip commands work as expected (and your last installed Skyfield version is not lost). Note that none of the GitHub Skyalmanac files are required when installing packages from PyPI (the Python Package Index).

Although virtual environments are disposable in nature, they can indeed persist from session to session - they only need to be re-activated. This means that whatever you do in a virtual environment is not lost when the computer shuts down – it is only lost if the folder containing the virtual environment is deleted. Ergo – keep your virtual environment and update it with newer versions of Skyfield or Skyalmanac as they become available.

Here is a demonstration with a newly created virtual environment 'venv1'.
First create a parent folder, e.g. 'py', for all python projects including their virtual environments. So all the action begins in the 'py' folder that's directly under 'Home'.

Create a new virtual environment with **python3 -m venv <folder name>**, e.g. 'venv1' (this also creates a 'venv1' folder under 'py') - and activate it. Note: although **python3** is usually equivalent to **python,** in this case it's confused what you mean – it needs **python3**:

```
                                    :~/pp$ python -m venv venv1/
Command 'python' not found, did you mean:
  command 'python3' from deb python3
  command 'python' from deb python-is-python3
                                    :~/pp$
```

'Activation' also prepends the command prompt with '(venv1)' – the current folder remains 'py':

```
                                    :~/py$ python3 -m venv venv1/
                                    :~/py$ source venv1/bin/activate
(venv1)                             :~/py$ pip show skyfield
WARNING: Package(s) not found: skyfield
(venv1)                             :~/py$
```

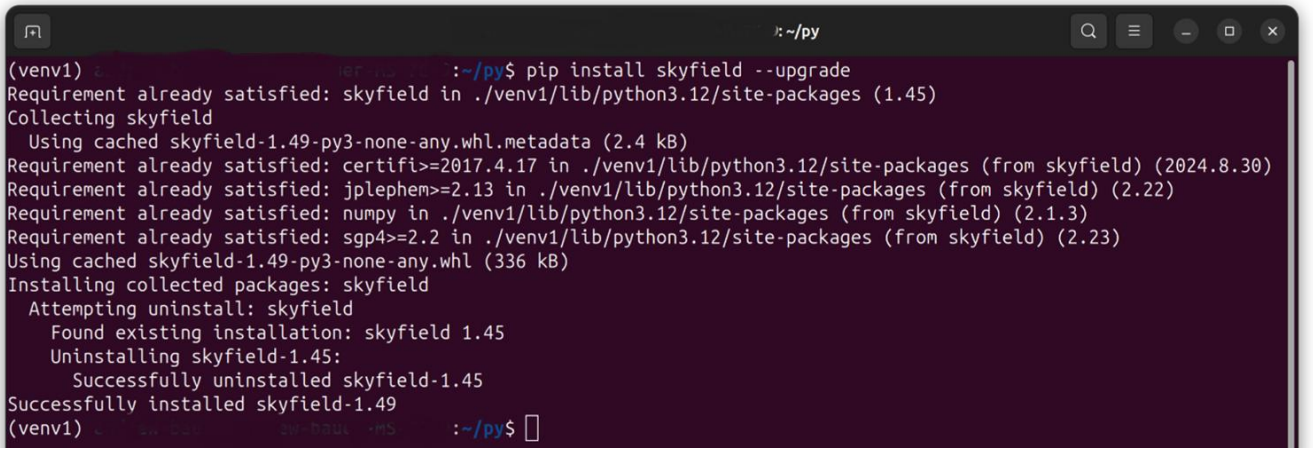
As you see, Skyfield is not installed (yet). For demonstration purposes only, install a specific Skyfield version (1.45):

```
(venv1)                             :~/py$ pip install skyfield==1.45
Collecting skyfield==1.45
  Using cached skyfield-1.45-py3-none-any.whl.metadata (2.4 kB)
Collecting certifi>=2017.4.17 (from skyfield==1.45)
  Using cached certifi-2024.8.30-py3-none-any.whl.metadata (2.2 kB)
Collecting jplephem>=2.13 (from skyfield==1.45)
  Using cached jplephem-2.22-py3-none-any.whl.metadata (22 kB)
Collecting numpy (from skyfield==1.45)
  Using cached numpy-2.1.3-cp312-cp312-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (62 kB)
Collecting sgp4>=2.2 (from skyfield==1.45)
  Using cached sgp4-2.23-cp312-cp312-manylinux_2_5_x86_64.manylinux1_x86_64.manylinux_2_17_x86_64.manylinux2014
_x86_64.whl.metadata (31 kB)
Using cached skyfield-1.45-py3-none-any.whl (442 kB)
Using cached certifi-2024.8.30-py3-none-any.whl (167 kB)
Using cached jplephem-2.22-py3-none-any.whl (47 kB)
Using cached sgp4-2.23-cp312-cp312-manylinux_2_5_x86_64.manylinux1_x86_64.manylinux_2_17_x86_64.manylinux2014_x
86_64.whl (232 kB)
Using cached numpy-2.1.3-cp312-cp312-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (16.0 MB)
Installing collected packages: sgp4, numpy, certifi, jplephem, skyfield
Successfully installed certifi-2024.8.30 jplephem-2.22 numpy-2.1.3 sgp4-2.23 skyfield-1.45
(venv1)                             :~/py$
```

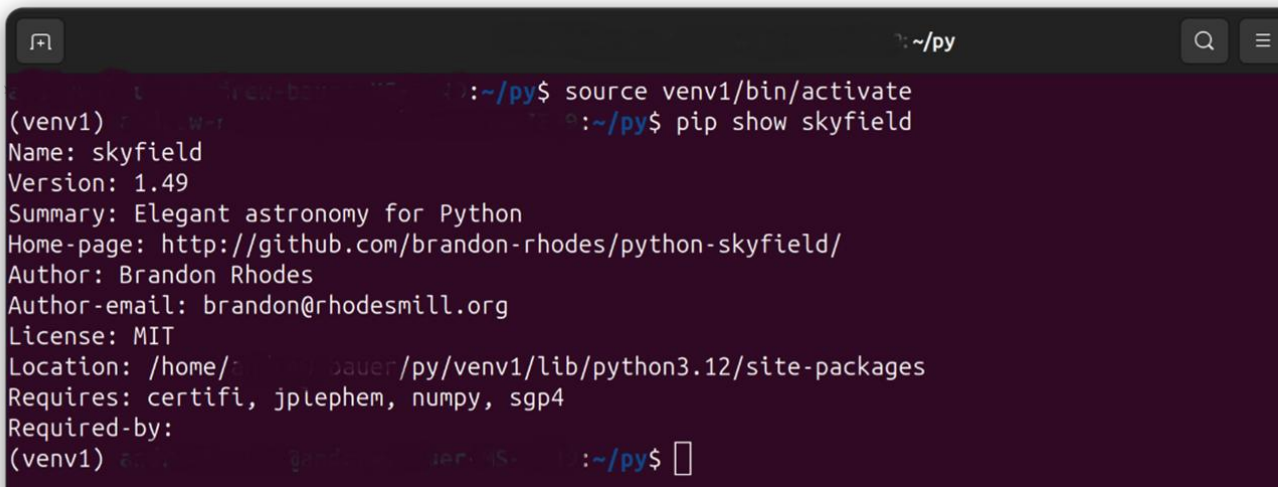
And verify Skyfield 1.45 is installed:

```
(venv1)                             :~/py$ pip show skyfield
Name: skyfield
Version: 1.45
Summary: Elegant astronomy for Python
Home-page: http://github.com/brandon-rhodes/python-skyfield/
Author: Brandon Rhodes
Author-email: brandon@rhodesmill.org
License: MIT
Location: /home/                    /py/venv1/lib/python3.12/site-packages
Requires: certifi, jplephem, numpy, sgp4
Required-by:
(venv1)                             :~/py$
```

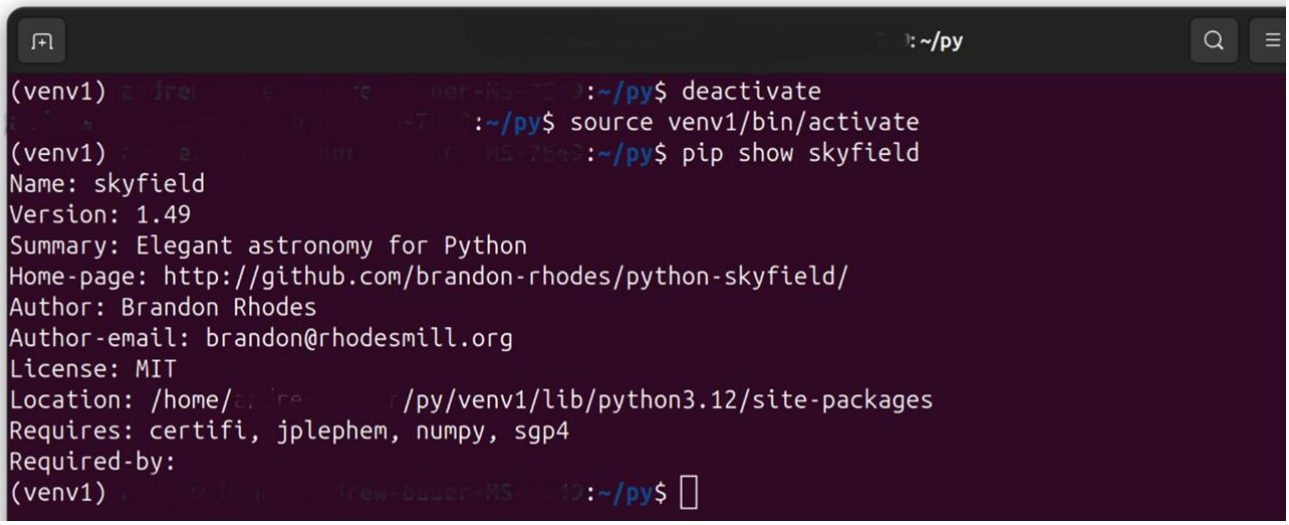
It could be uninstalled with "**pip uninstall skyfield**" but upgrade it instead to the latest version with "**pip install skyfield --upgrade**" (note the double hyphens):



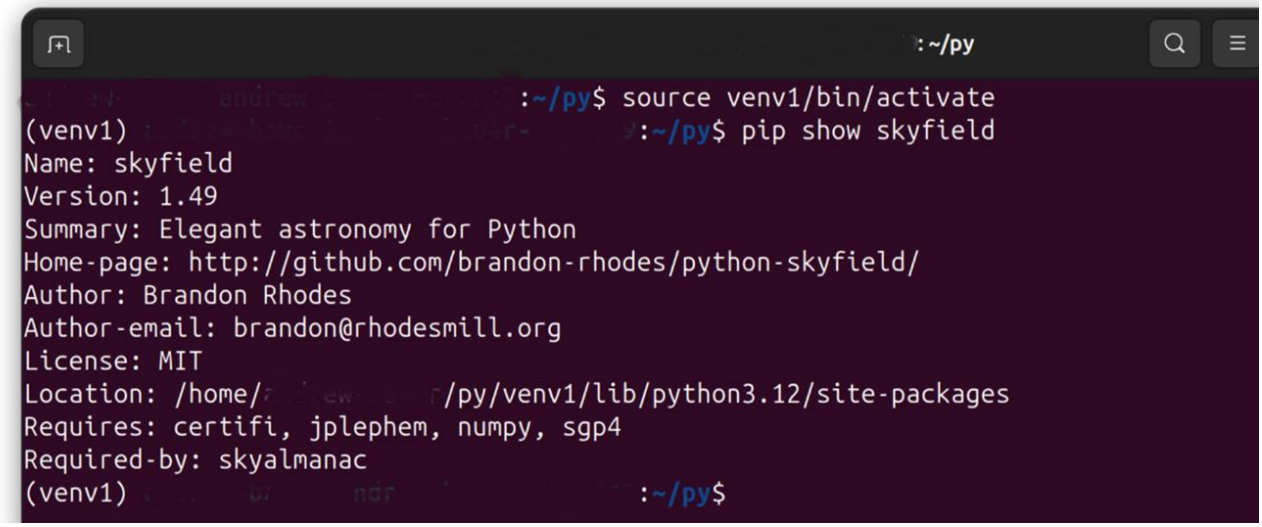
The current terminal session was closed and re-opened (for demonstration purposes only), and the same virtual environment is activated again from within the 'py' folder:



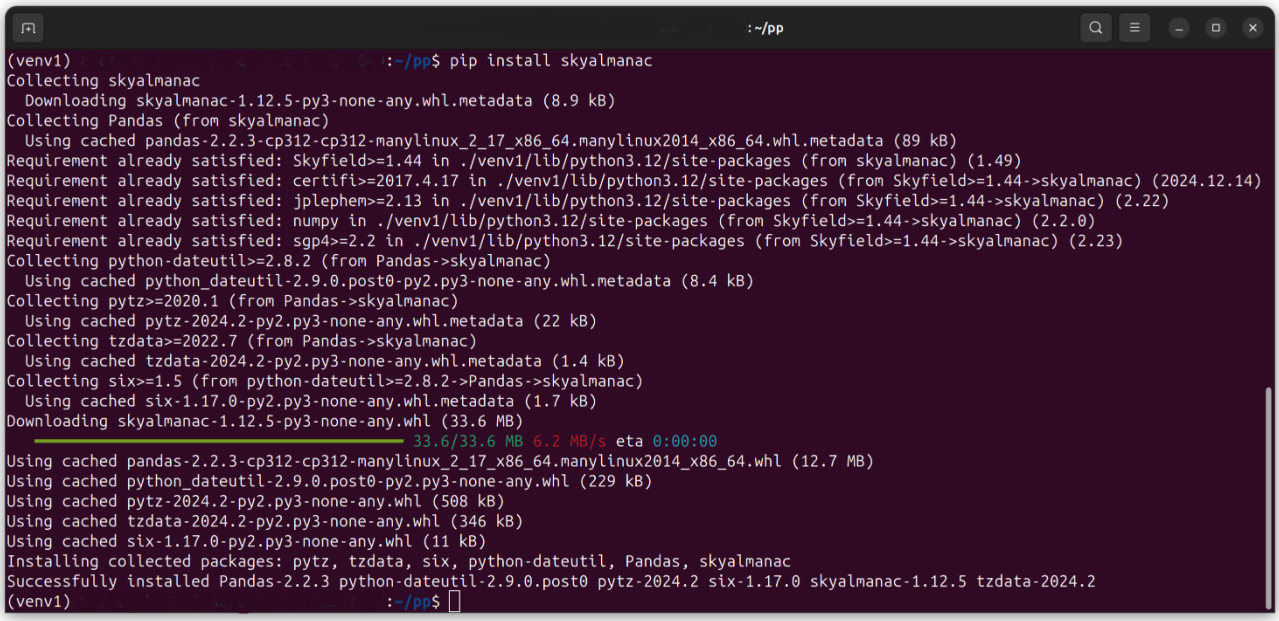
This verifies that Skyfield 1.49 is still installed.
One can also **deactivate** the virtual session .... and reactivate it (and Skyfield 1.49 is still there):



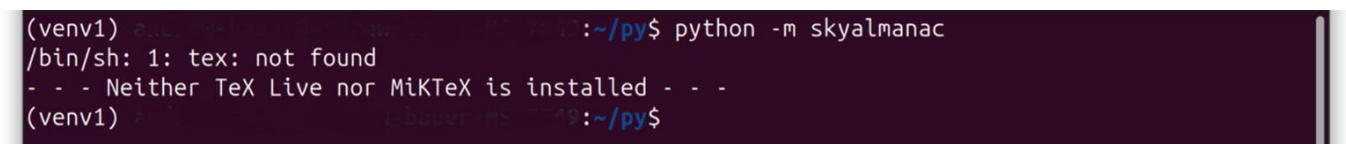
Start again with a new 'Terminal' session in the folder that contains the virtual environment(s) and activate the same VENV in which Skyfield is installed.
Note: *multiple* virtual environments can be stored in the current folder - each VENV has its own parent folder name (e.g. venv0, venv1, venv2) which is within the current folder (e.g. py).



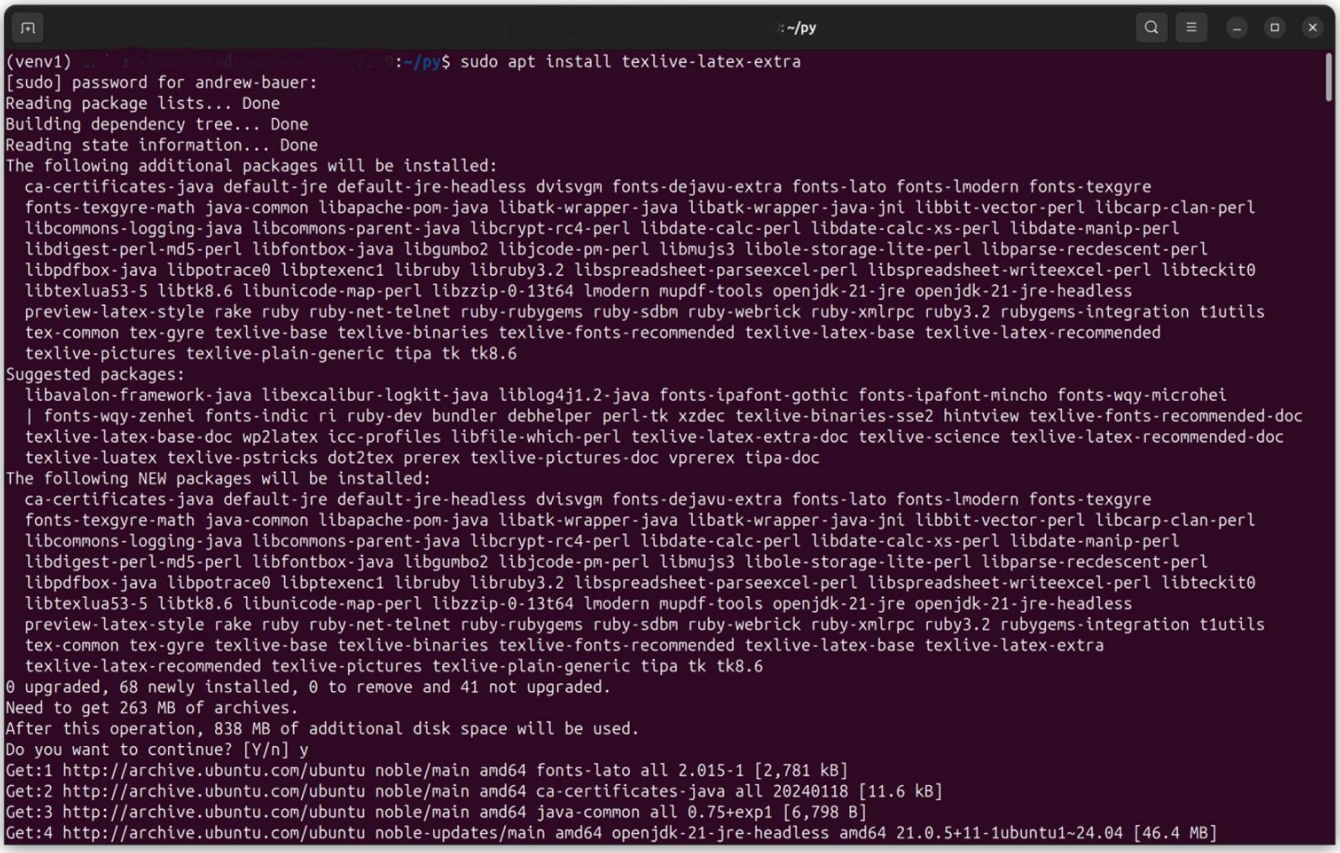
Note 'Location' above ... Skyfield is installed in a sub-folder of the virtual environment (venv1) that is currently activated.
Now install Skyalmanac (the latest version) with **pip install skyalmanac**:



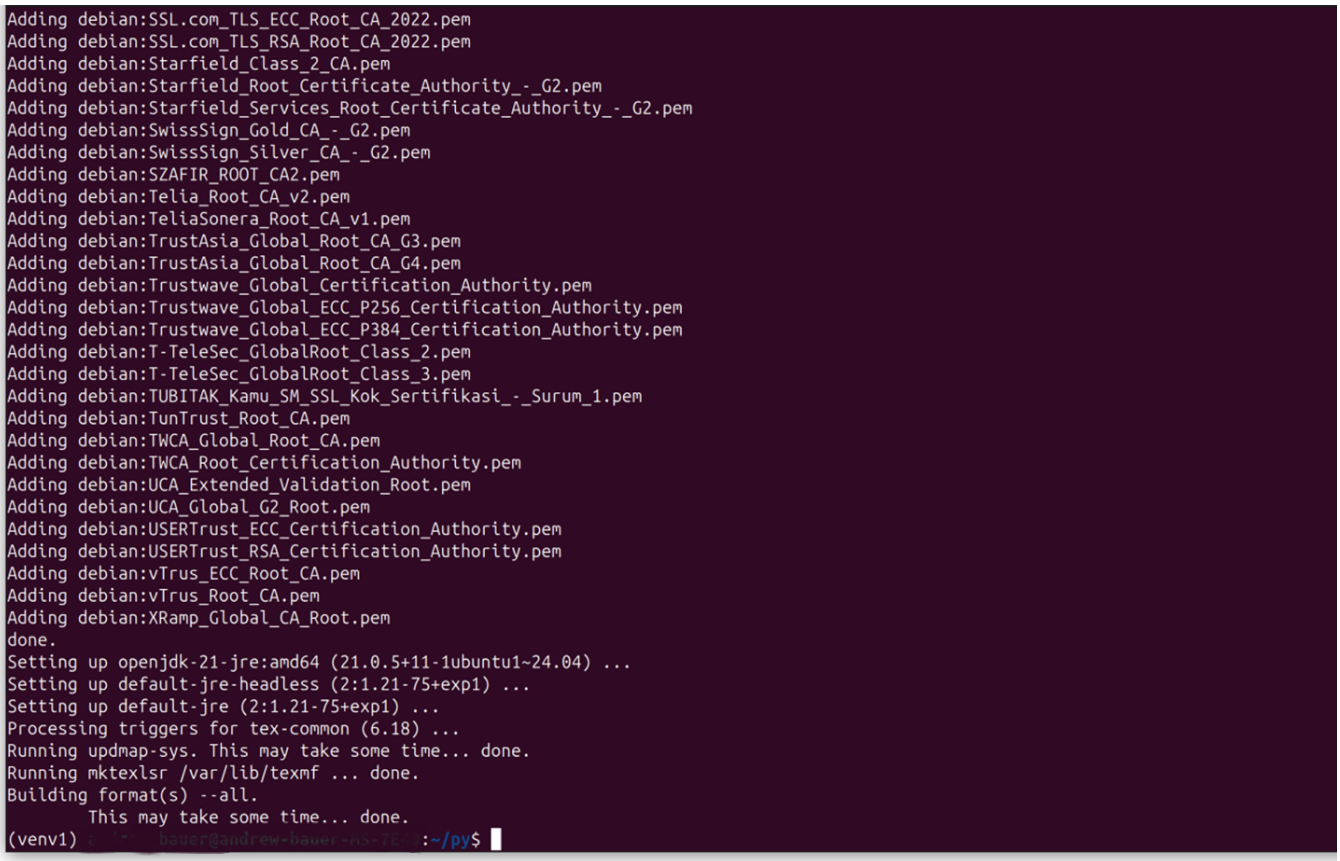
Note that it also installs 'numpy' and 'pandas' if necessary.
PyPI packages are executed using **$ python -m <package name> <optional arguments>**
However, Skyalmanac is not yet ready to run ...



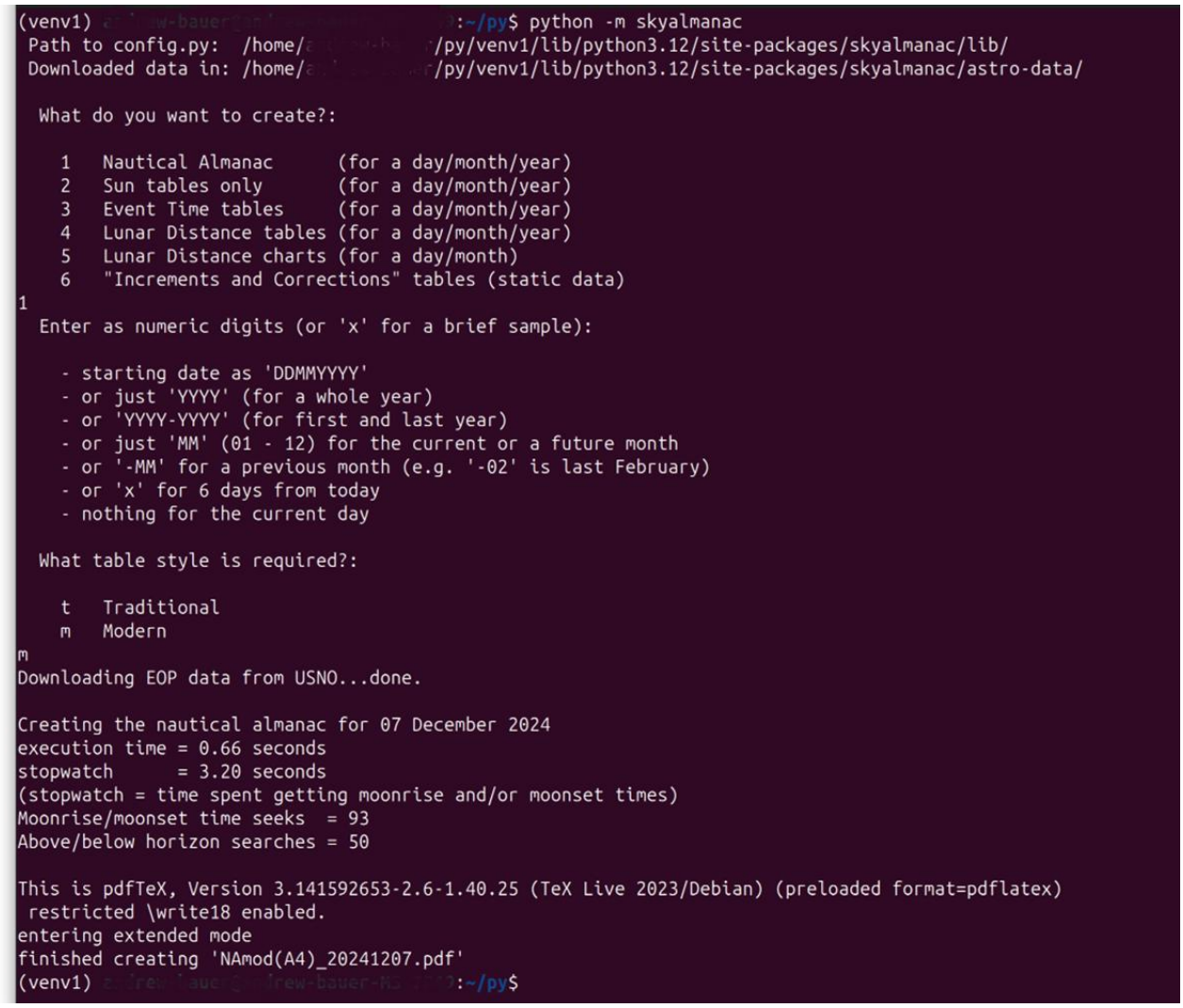
Tex Live needs to be installed to create the PDF files. Take care to install "**texlive-latex-extra**". Installation begins as follows.....



..... and eventually ends like this:



Now Skyalmanac executes fully. The first two lines printed show the folders in which 'config.py' and the necessary astronomical data files reside. The file 'config.py' can be edited to change user options. A few questions need to be answered before Skyalmanac knows what to process.



The line "Downloading EOP data from USNO...done." refers to the file '*finals2000A.all*' that contains the Earth Orientation Parameters from the International Earth Rotation and Reference Systems Service (IERS), which is one of the required astronomical data files. It only needs to be downloaded occasionally. The PDF output file appears in your current folder [which otherwise only contains your virtual environment folder(s)].

Operation	Command
Create a virtual environment (and its folder)	$ python3 -m venv <VENV folder>
Activate the virtual environment	$ source <VENV folder>/bin/activate
Deactivate the virtual environment	$ deactivate
Show the installed package version (if any)	$ pip show <package name>
Install the latest version if a package	$ pip install <package name>
Install an older package version	$ pip install <package name>==<version>
Uninstall a package	$ pip uninstall <package name>
Upgrade a package to the latest version	$ pip install <package name> --upgrade
Execute an installed package (from PyPI)	$ python -m <package name> <options>