Python is an object-oriented programming language. In a very simplified definition, this means that the code is not just run in a straight line top to bottom, but is flexible and lends itself to developing isolated functions and data sets that can interact with and manipulate each other at various points during the program’s execution. Object-oriented languages also have built in protections for data, so that it can only be used appropriately. The language will warn you if you’ve done something wrong, and provide information on *why* something went wrong. From a physics standpoint, Python will complain if you attempt to calculate scalar and vector quantities together in an invalid manner.

All object-oriented languages have this sort of protected and flexible behavior, so why choose Python for this 3D simulation rather than something like Java or C++? The short answer is: it’s easier!

VPython (Visual Python) is an extension of the Python language which was created by and is continually developed by a group of students, professors, and industry professionals. It is free and open-source, just like Python. VPython handles all of the hard work of displaying and manipulating 3D animations behind the scenes, and makes it easy for Python programmers to cook up complex 3D animations. At the top of my code, when I tell Python I want a cylinder with certain properties, VPython takes over and creates the object with that single line of code. If I tried to use Python by itself without VPython installed, it would not understand what I was asking it to do, and nothing would be displayed – Python by itself has no idea how to draw pictures and display them on a screen!

In essence, VPython allows the programmer to worry about the data that drives the display, rather than worrying about how make the display happen.The vast majority of my program is working with physics data of objects in motion, very little of it has to do with making things show up and move around on the screen.VPython allowed me to turn hundreds of motion calculations per second into something a lot more stimulating and interesting. This is an incredibly simplistic program, but Python and VPython are very powerful and have been used in commercial and research settings.