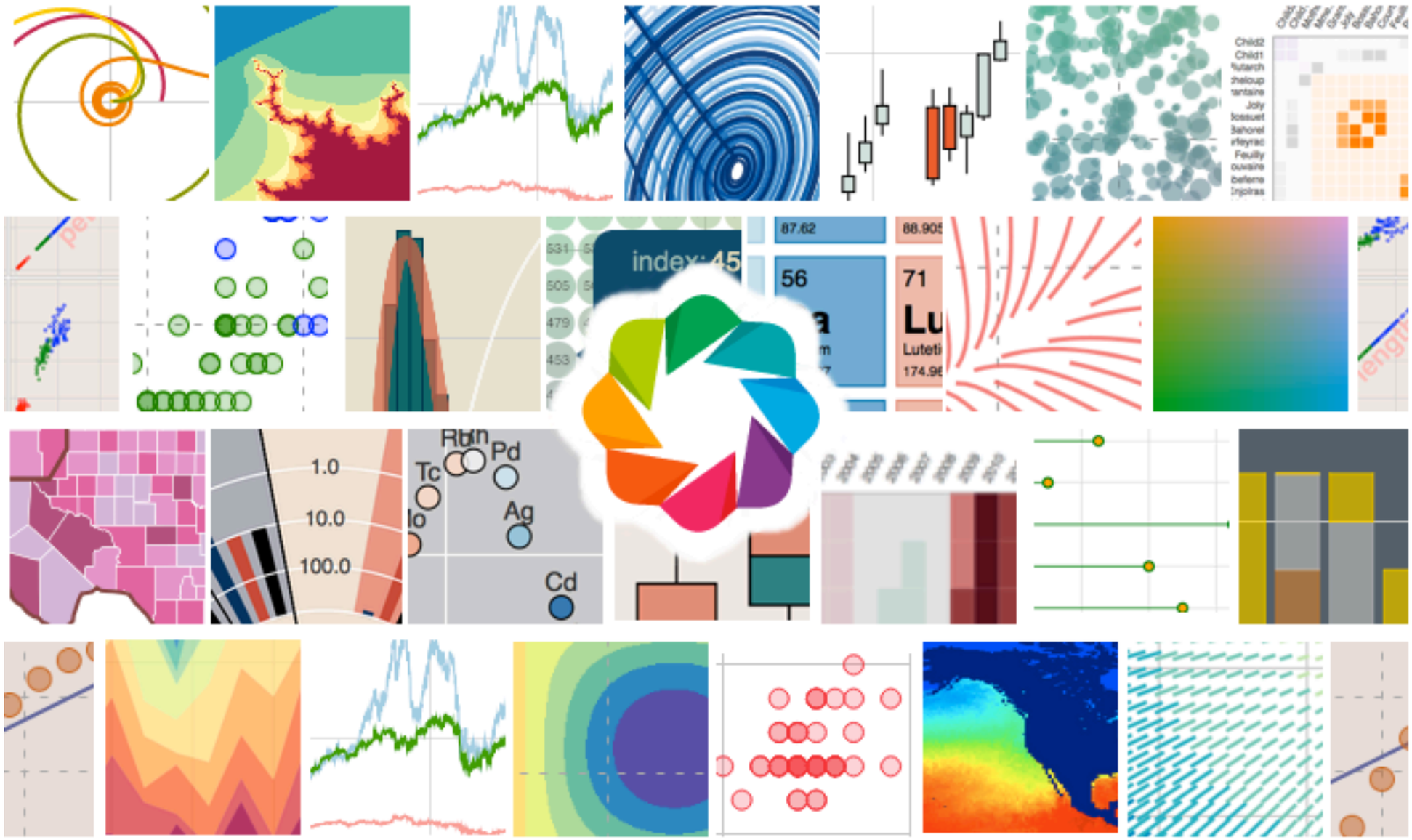
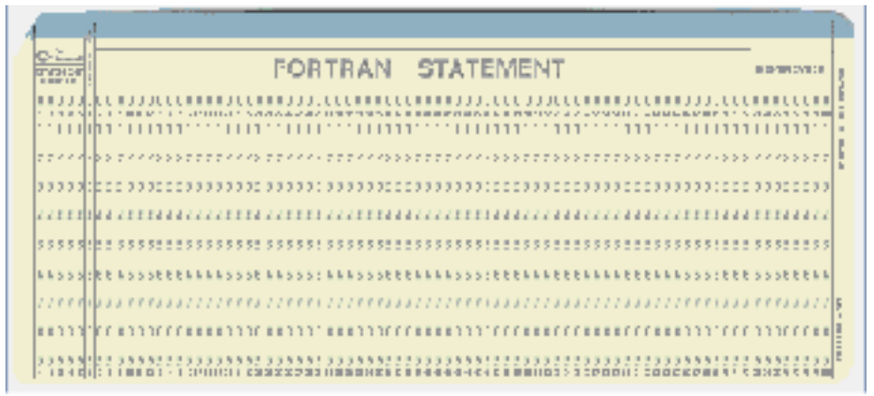


Python Visualization

Or How I Learned to Stop Worrying and Love Pandas

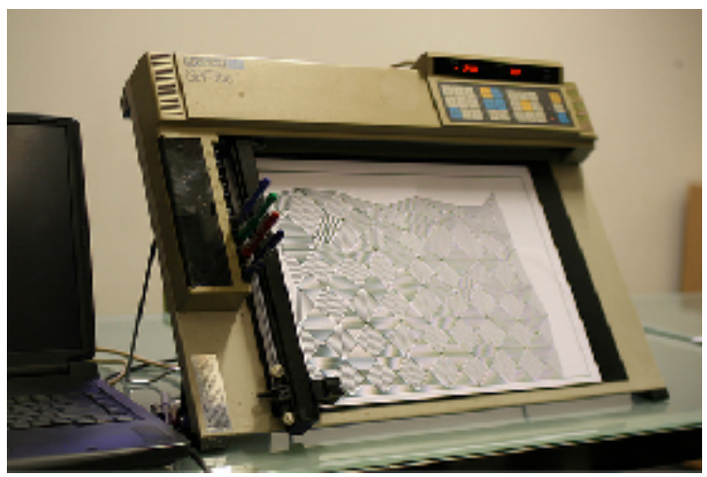
“Computers” circa 1890

Computers become machines

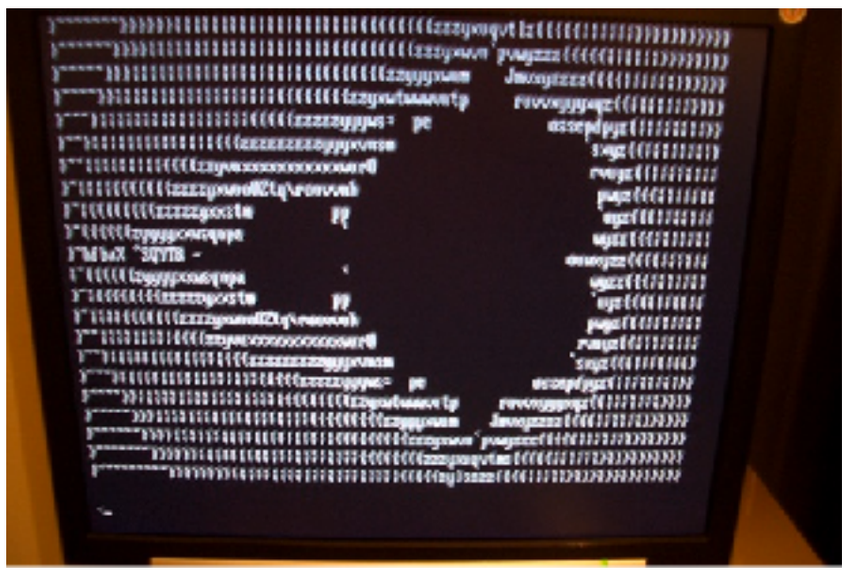


Punch cards and readers

VT100 “dumb" terminal attached to a mainframe



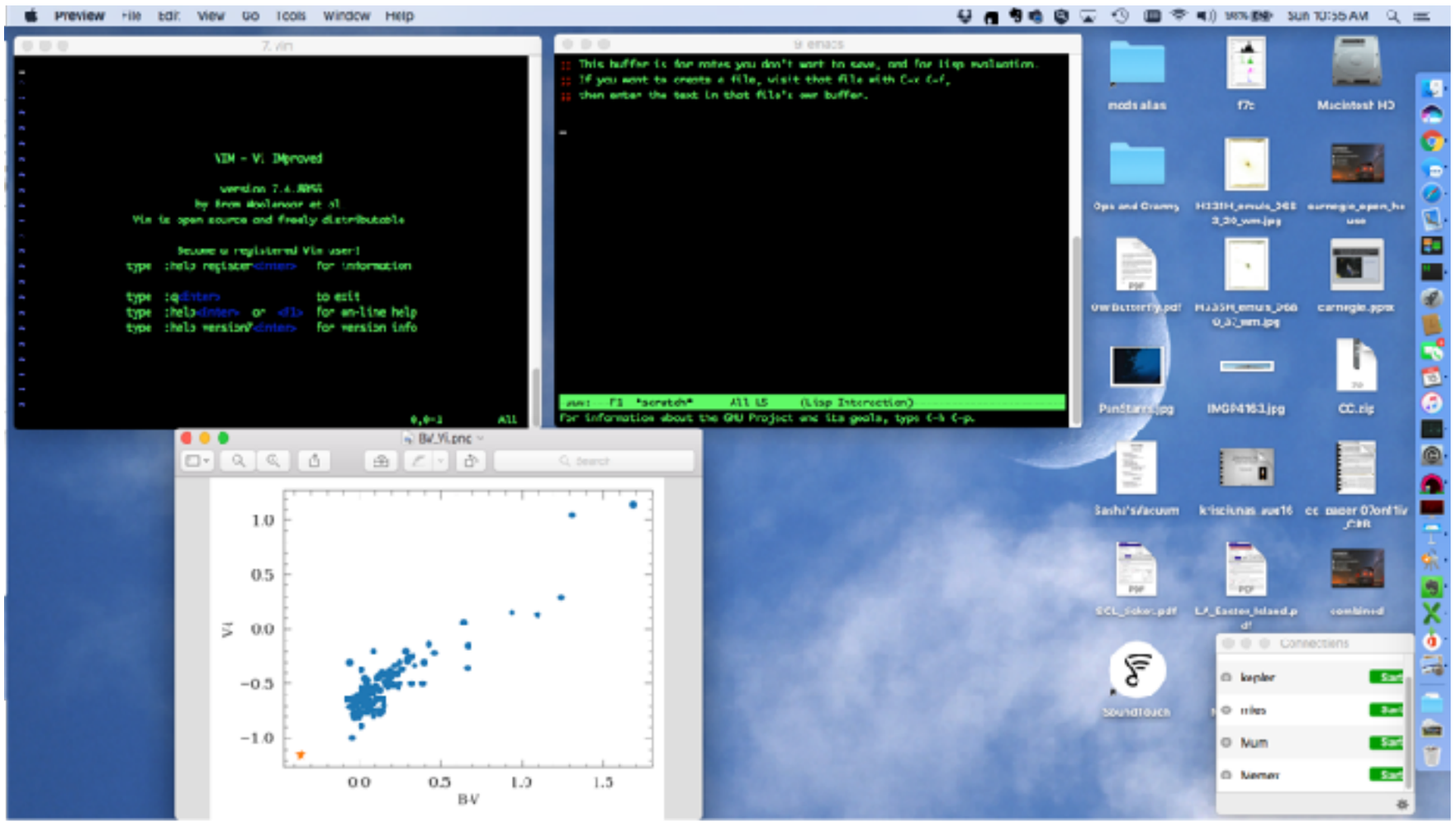
Pen plotter



Mandelbrot on PDP-11

Commodore vic-20

We've Come a Long Way… but

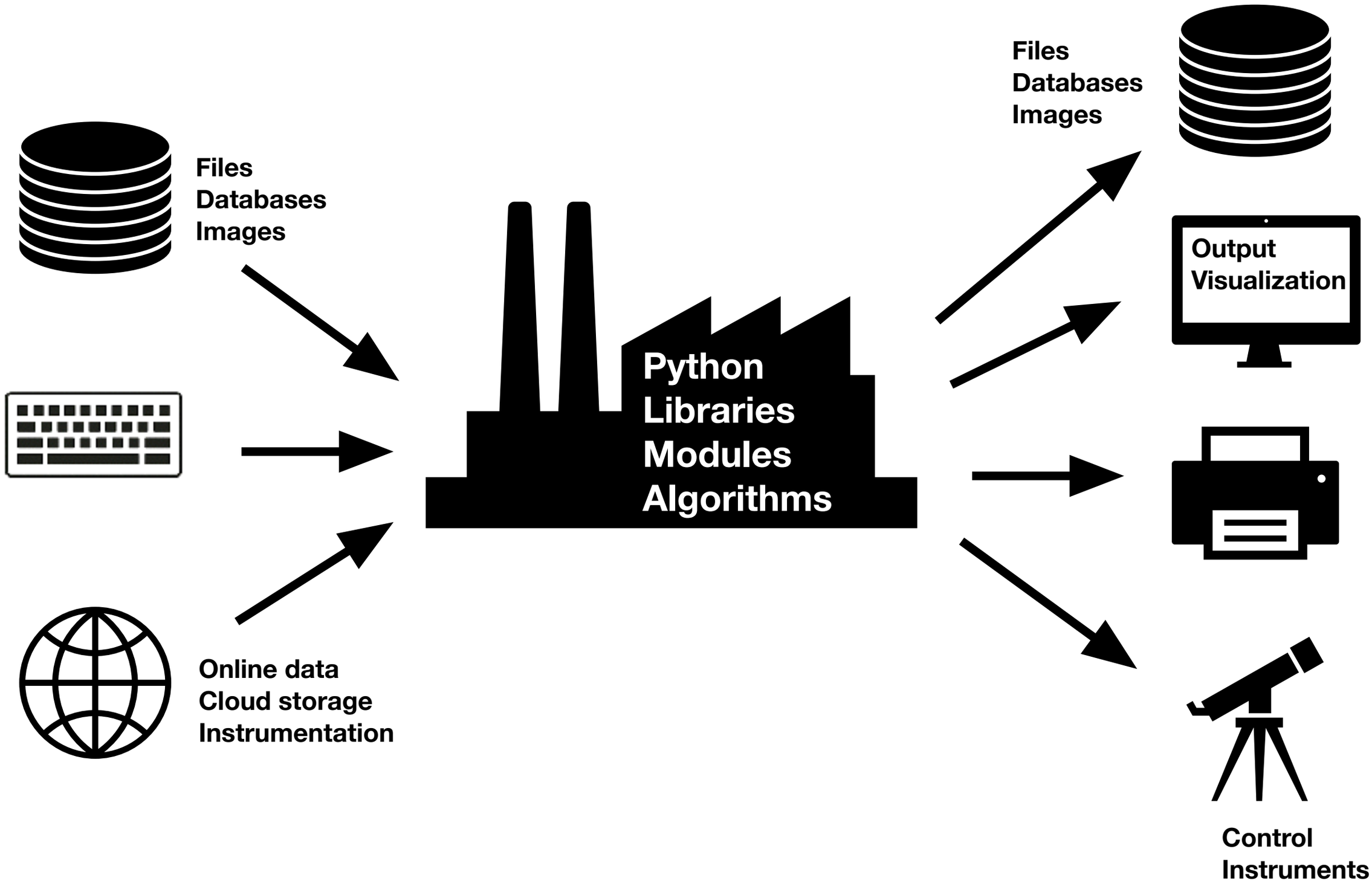


OSX Sierra still has a built-in VT100 terminal emulator and runs on top of a UNIX operating system (Darwin).

It comes with (*and I still use*) the vi text editor, written in 1976.

You can still ruin your life with `rm -rf *`

Nevertheless, Programming is still the same basic concept



Why Python?

- Fast to code (though not fastest to execute)
- Both GUI and CLI interfaces are built in and don't depend on OS (in principle)
- Forces you to write readable code.
- (Relatively) easy to debug: excellent trace-backs
- Vast (ever increasing) library of modules (110,300 on pypi), though one could argue this is a disadvantage!
- (Relatively) easy to extend using C/C++/Fortran libraries
- Named after Monty Python's Flying Circus.

Top Data Visualization Modules

- **Matplotlib:** 2D and limited 3D plots. Fast becoming primary plotting library. http://matplotlib.org

- **Bokeh:** 2D plots via HTML. Emphasis on interactivity. Fairly new, but so far looks very promising. http://bokeh.pydata.org

- **Mayavi:** 3D visualization. GUI interface as well as scripting from python. http://mayavi.sourceforge.net

- **VTK:** High-performance imaging (used for medical imaging). Interface is very low-level (practically C++) http://vtk.org

- **Vpython*:** "3D Programming for Ordinary Mortals". Scenes, ray-tracing, animation. http://vpython.org

- **YT:** Visualizing volumetric data. http://yt-project.org

- 1000's of usage-specific modules that use the above. http://pypi.python.org

*** Only in Python 3**

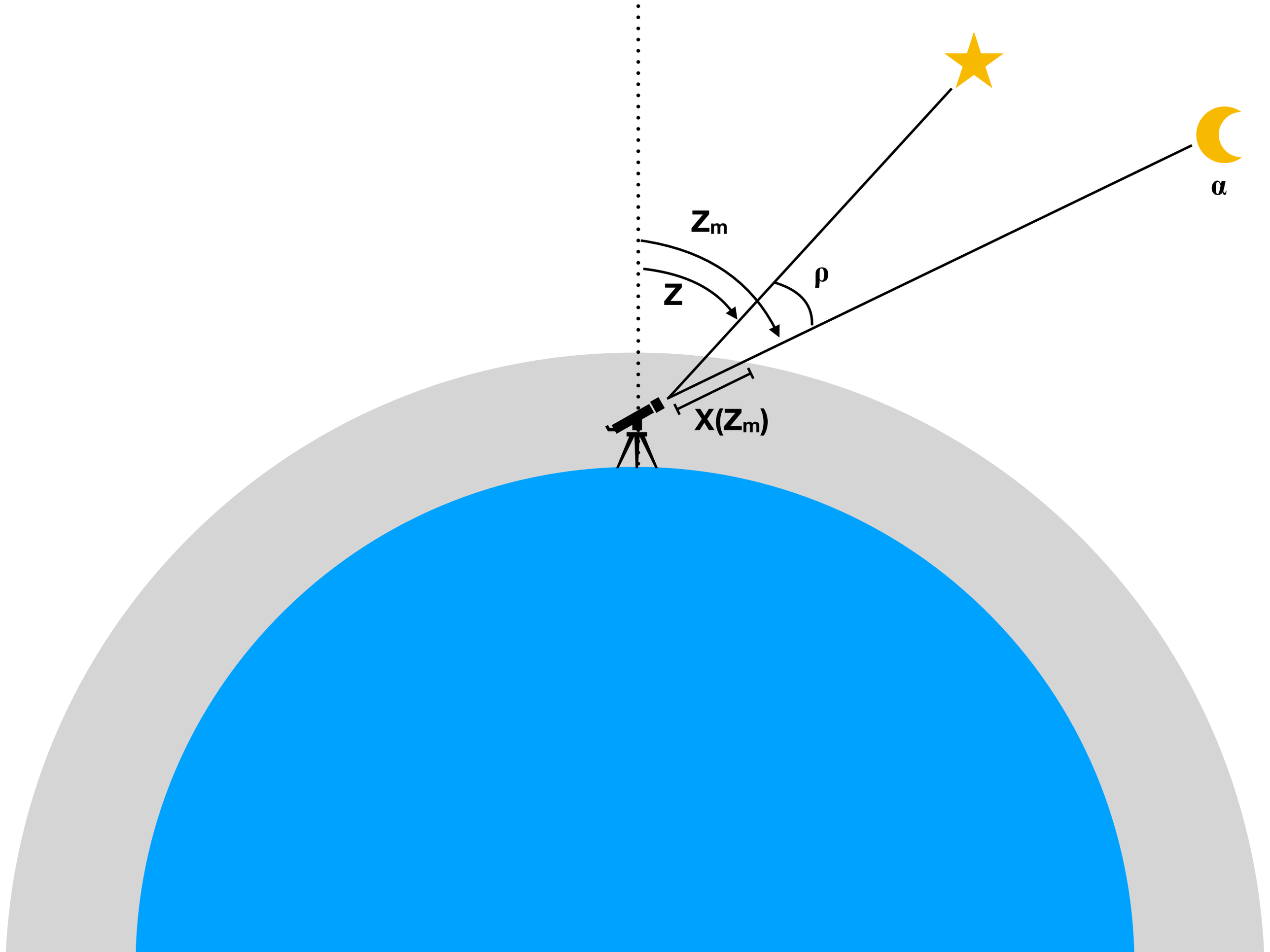
Warning: Py3K

If you can: use python 3.x

At the very least: use as much 3.x syntax in 2.x as you can

Some Case Studies

- CLI and GUI combined: SNooPy
- Pure GUI: Shannon's spectrum tool
- Bokeh example: Skywin tool
- Django/SQLAlchemy/Ephem/Django mashup: RRL tool
- Data exploration: training a sky background tool.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