

# Graphics

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# About Me

- Linux user since ~1994
  - Started using for simulational physics
- Currently:
  - Computational Chemist, Glycosciences (carbohydrates)
  - Manage GLYCAM-Web (<http://glycam.org>)
  - Many hats: hardware, programming, sysadmin (currently lots of devops), chemistry, molecular modeling, graphic design, user support, etc.
  - I know a little about lots of things
    - Can exhaust my knowledge quickly
- All opinions mine, not necessarily Frita's or UGA's

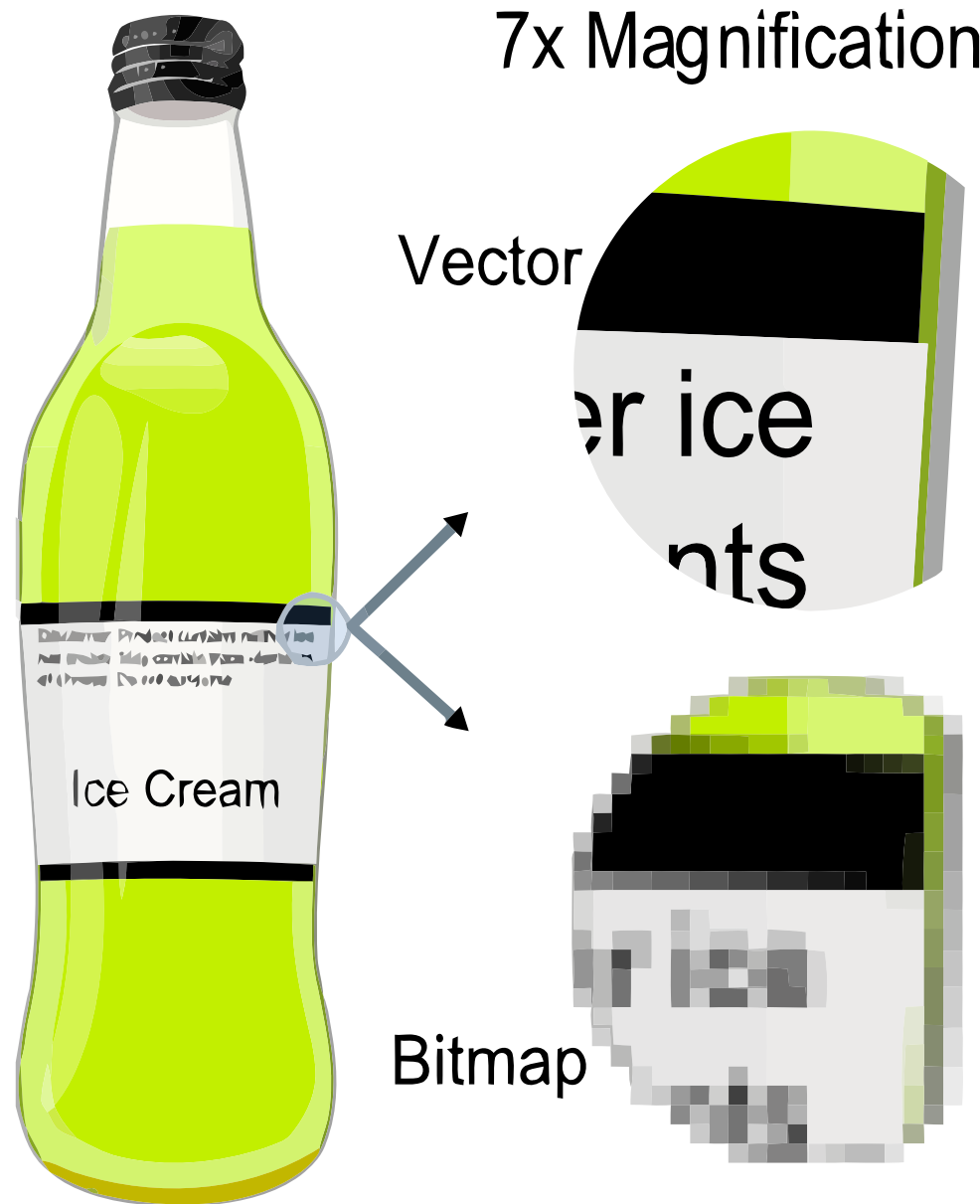
# Goals

- Learn relevant words, phrases
  - Search the internet
  - Find relevant sections in documentation
- Understand some basics of the technology
  - Find software for a specific task
  - Choose/convert file types
- Appreciate the breadth of options
  - Software for many applications
- Questions are good at any time

# Term: WYSIWYG

- What You See Is What You Get
- Most popular software is
- But not all!
  - HTML – a common non-wysiwyg format
  - More on this later
- Occasional graphics user? WYSIWYG is fine.
- Use graphics a lot? Be more flexible.
  - Automatically generate graphics
  - Process many files easily

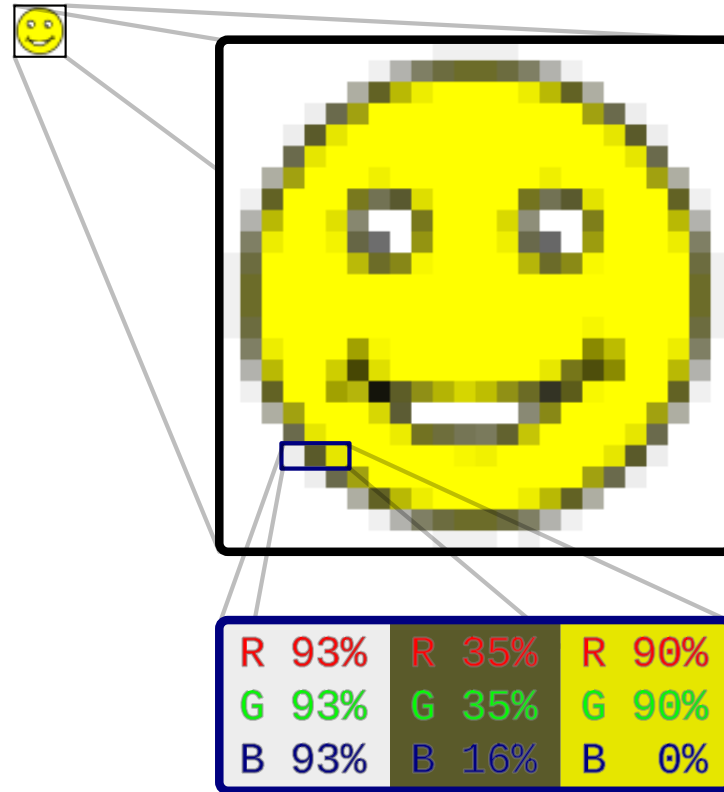
# Terms: Raster and Vector



By The original uploader was Darth Stabro at English Wikipedia [CC-BY-SA-3.0 (<http://creativecommons.org/licenses/by-sa/3.0/>)], via Wikimedia Commons

# Raster

- Big grid of pixels, each with a color

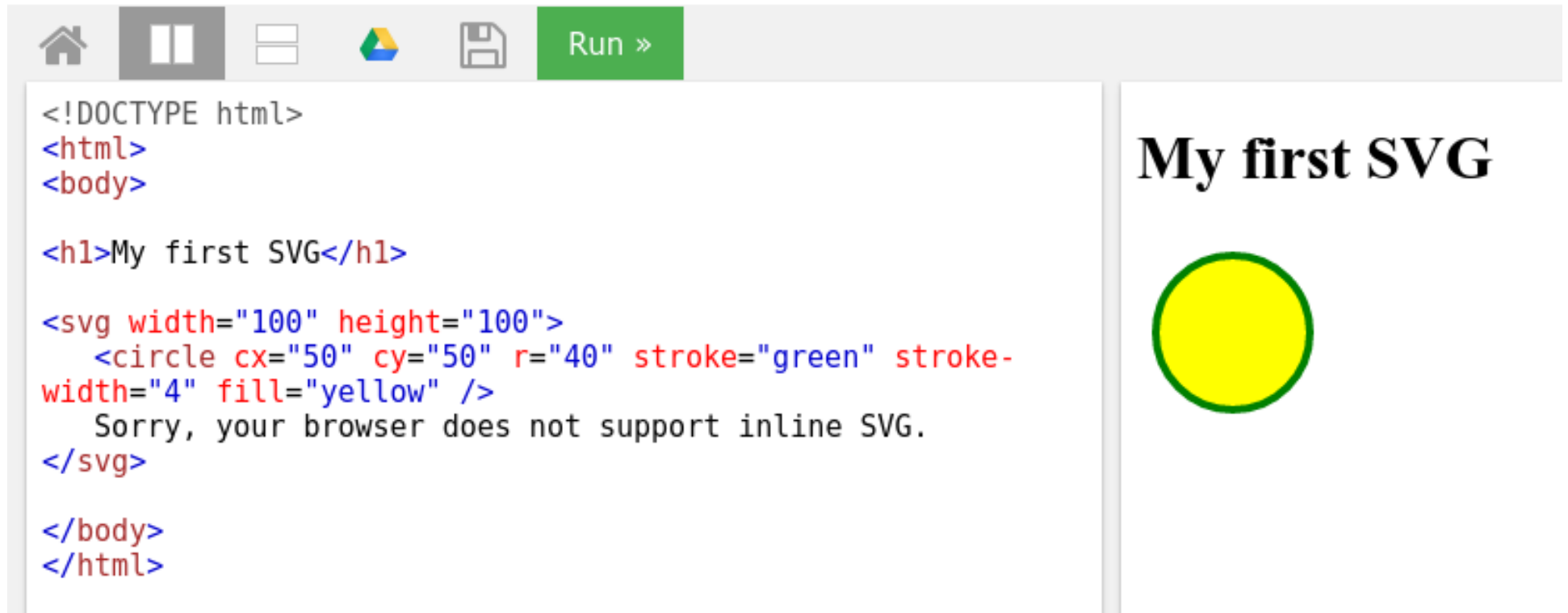


By Gringer (Own work) [CC0], via Wikimedia Commons

[https://en.wikipedia.org/wiki/Raster\\_graphics](https://en.wikipedia.org/wiki/Raster_graphics)

# Vector

- Saves descriptions of shapes
- Scales infinitely
- Always use vector formats when possible



The screenshot shows a web browser interface. The top toolbar includes icons for home, window management, and a green 'Run' button. The main content area is split into two panels. The left panel displays the following HTML code:

```
<!DOCTYPE html>
<html>
<body>

<h1>My first SVG</h1>

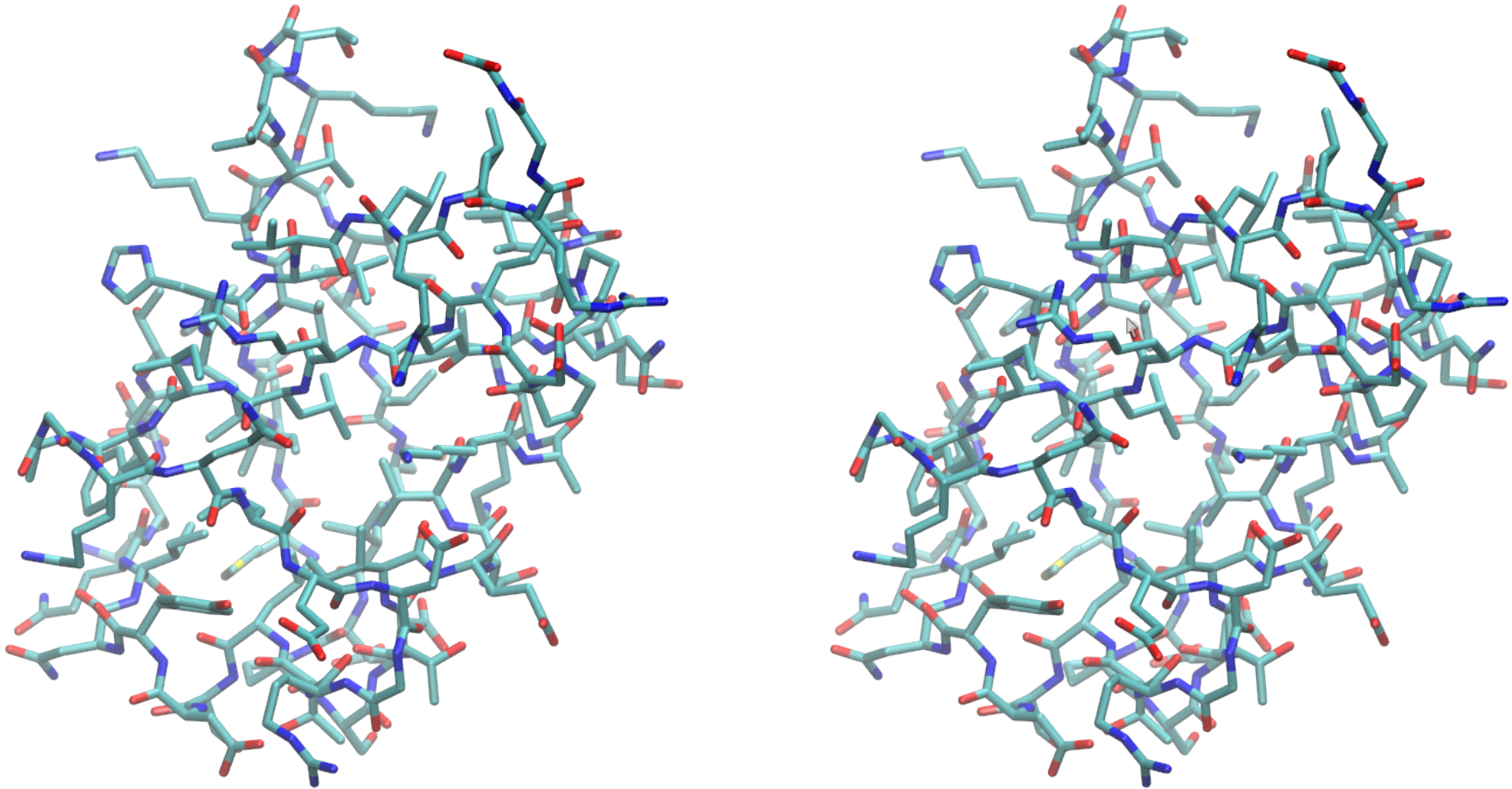
<svg width="100" height="100">
  <circle cx="50" cy="50" r="40" stroke="green" stroke-
width="4" fill="yellow" />
  Sorry, your browser does not support inline SVG.
</svg>

</body>
</html>
```

The right panel displays the rendered output, which consists of the text "My first SVG" in a large, bold, black serif font, followed by a yellow circle with a green border.

# There Are Many Formats

- [https://en.wikipedia.org/wiki/Image\\_file\\_formats](https://en.wikipedia.org/wiki/Image_file_formats)
- Also 3D, as in movie, and other oddities, like:

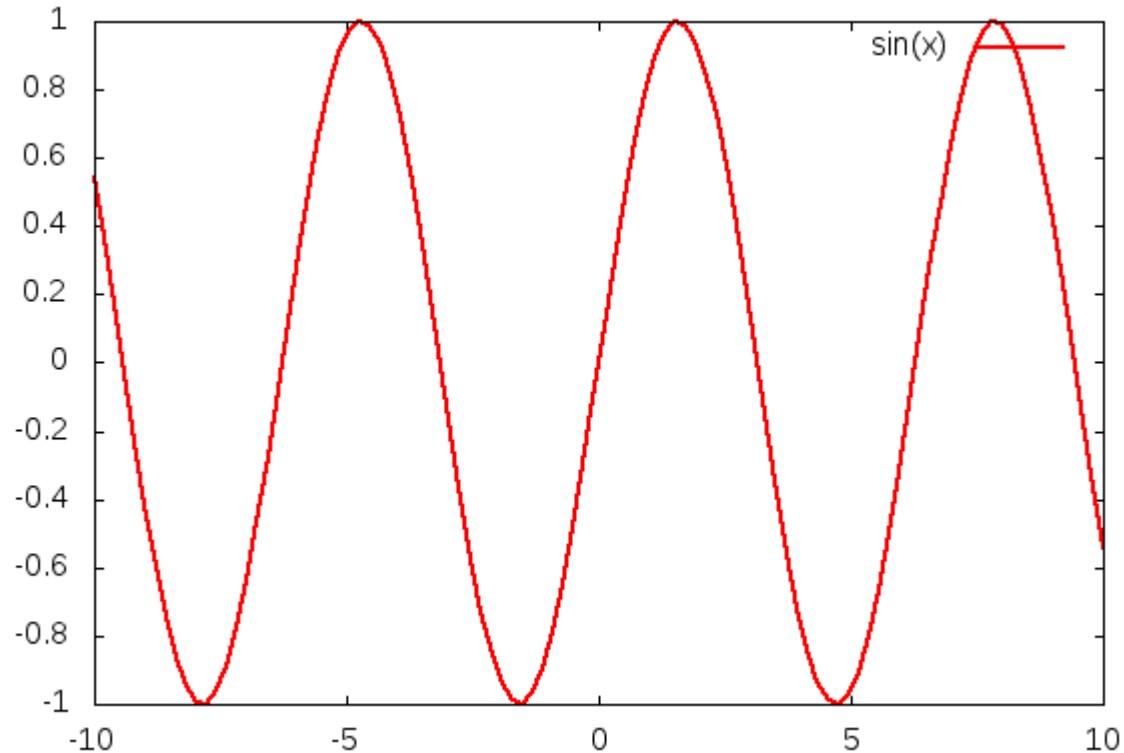


PDB ID 1UBQ (<http://rcsb.org>); Image generated using VMD (<http://www.ks.uiuc.edu/Research/vmd>)  
Cross eyes until the images overlap, then focus on the overlapping image.

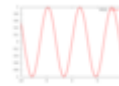
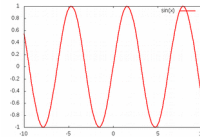


# Style note: design for size

- Consider this plot of a sine wave:



- Make it really small:



- Graphical elements disappear

# Hardware Note

- Some graphics software integrates tightly with your video card
- Normally ok, but special setups can cause trouble
- New card? Try the manufacturer drivers
- LTSP? Try VirtualGL

# GNU/Linux Has Graphics

- ...in spades
- Two programs as examples today:
  - Inkscape
    - Vector-based graphics generation
    - SVG is native format
  - GIMP
    - GNU Image Manipulation Program
    - Raster graphics
      - Superpower: manipulate existing photographs
      - Also can generate raster graphics
- Mention others later
  - Some easy, some advanced

# Inkscape

- <https://inkscape.org>
- Vector graphics
- Very powerful
- Has a little learning curve, but well worth it!
- Loads of online documentation
- Let's try it now!

# GIMP

- <https://www.gimp.org/>
- Raster graphics
- Also very powerful
- Has a little learning curve, but well worth it!
- Loads of online documentation
- Let's try it now!

# Non-WYSIWYG Graphics

- Powerful automatic graphics generation
  - Present others shortly
- Inkscape:
  - Option 1: Just write out the SVG file!
    - This is really what Inkscape is: an SVG file generator!
  - Option 2: Has some command-line capability
    - See “--verb” at:  
<https://inkscape.org/en/doc/inkscape-man.html>
- GIMP:
  - Have 100 images that need the same correction?
  - Batch Mode:  
[https://www.gimp.org/tutorials/Basic\\_Batch/](https://www.gimp.org/tutorials/Basic_Batch/)

# Other Easy Graphics

- Pinta - raster
- Xfig - vector
- LibreOffice
  - Draw, Impress – vector & text
  - Writer – text
  - Math – equations
- Convert – convert formats on the command line

# Text – TeX, LaTeX

- Not WYSIWYG
- There is a semi-wysiwyg editor LyX
- Beloved of the American Mathematical Society
  - But does lots more than math

```
%&pdflatex
\documentclass[12pt]{article}
\usepackage{amsmath}
\begin{document}
$$
y=\sin{\bigr(12x+30 {\rm e}^x\bigl)}
\bigl[{\rm e}^{(-\pi x^2 + {\rm e} x )}\bigr]
$$
\end{document}
\end
```

$$y = \sin (12x + 30e^x) \left[ e^{(-\pi x^2 + ex)} \right]$$

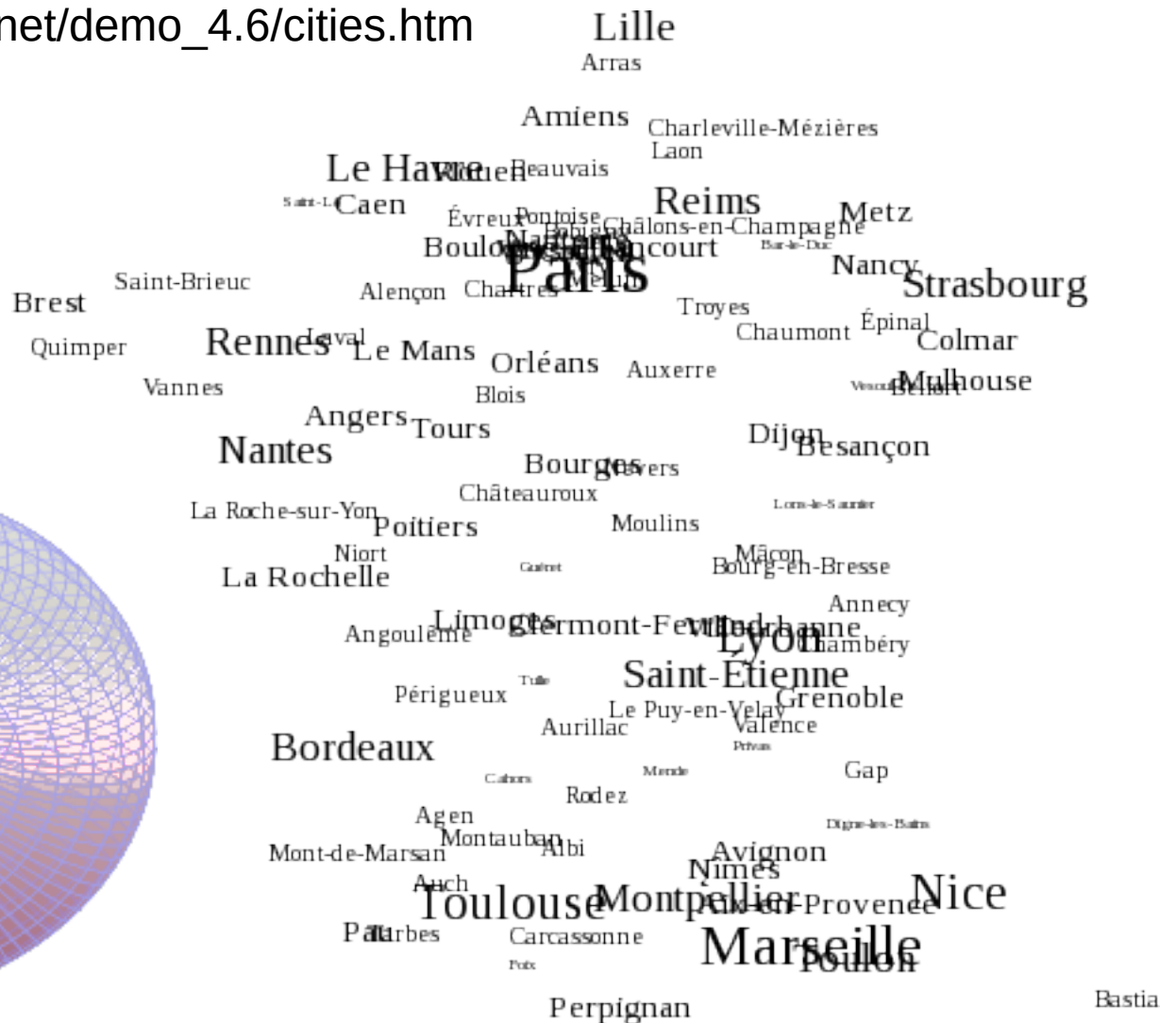
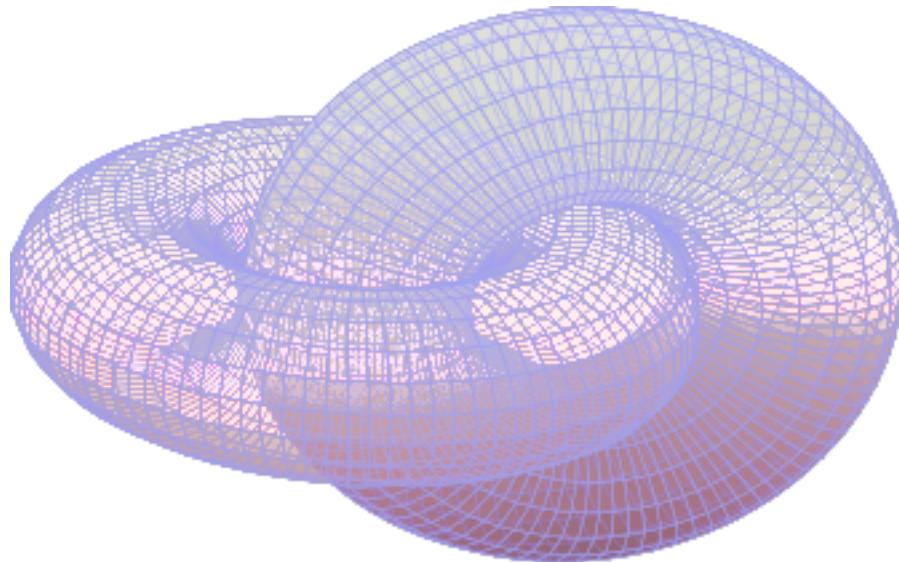


# Graphs (Math) - Gnuplot

- Very versatile, very powerful

[http://gnuplot.sourceforge.net/demo\\_4.6/cities.htm](http://gnuplot.sourceforge.net/demo_4.6/cities.htm)

|

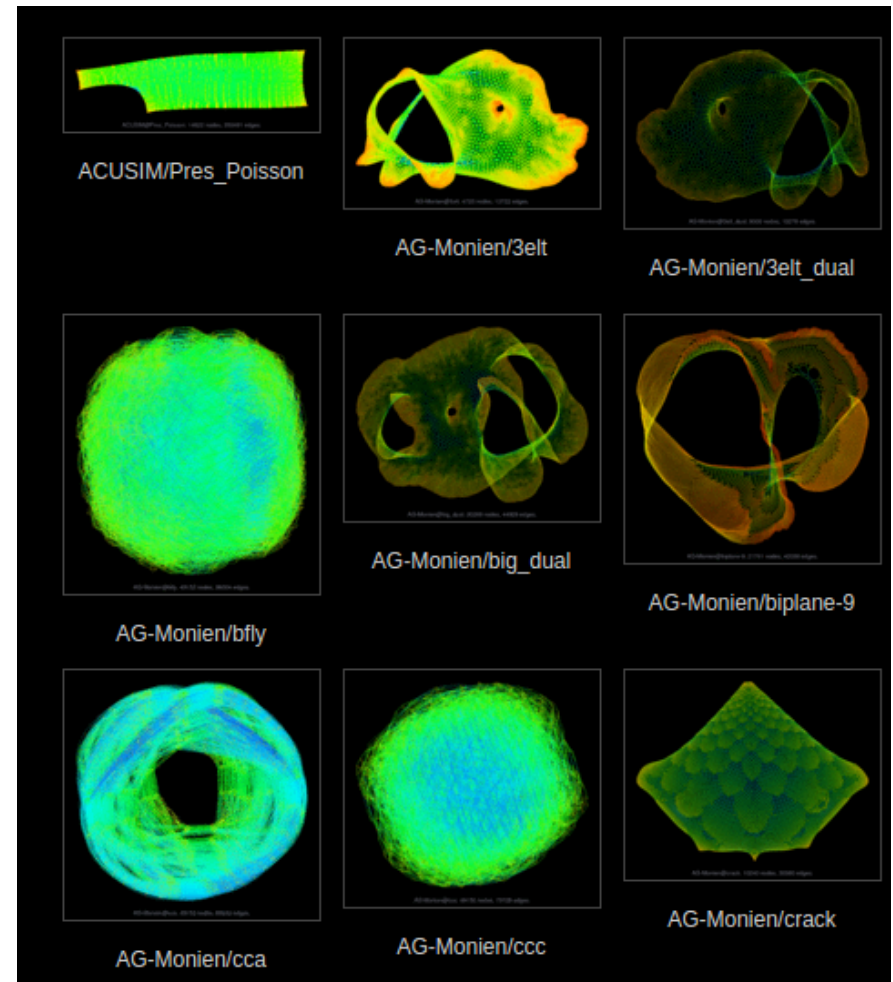
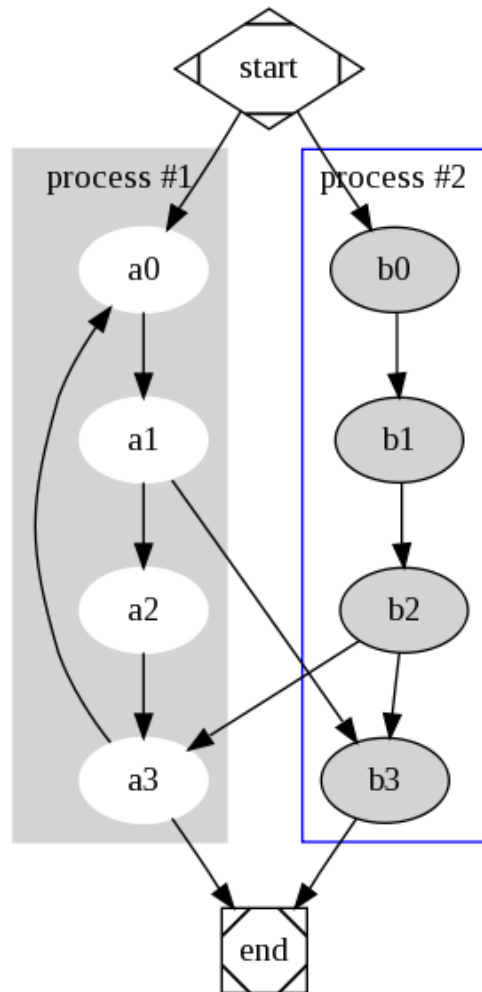


[http://gnuplot.sourceforge.net/demo\\_5.0/transparent\\_solids.htm](http://gnuplot.sourceforge.net/demo_5.0/transparent_solids.htm)

|

# Graphs (CS) – Graphviz

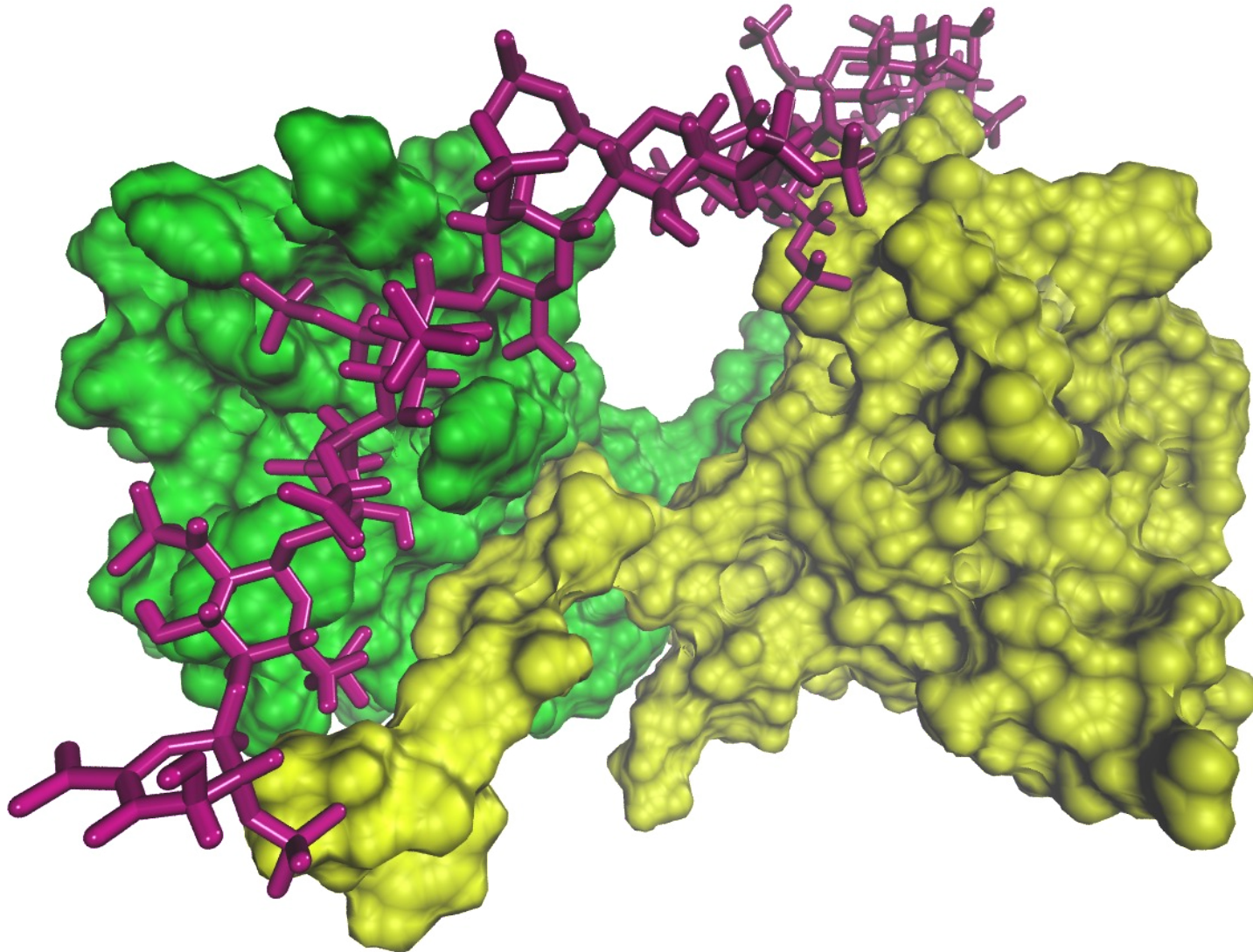
- Easy graph-making language:
- <http://www.graphviz.org/>



<http://yifanhu.net/GALLERY/GRAPHS/index.htm>

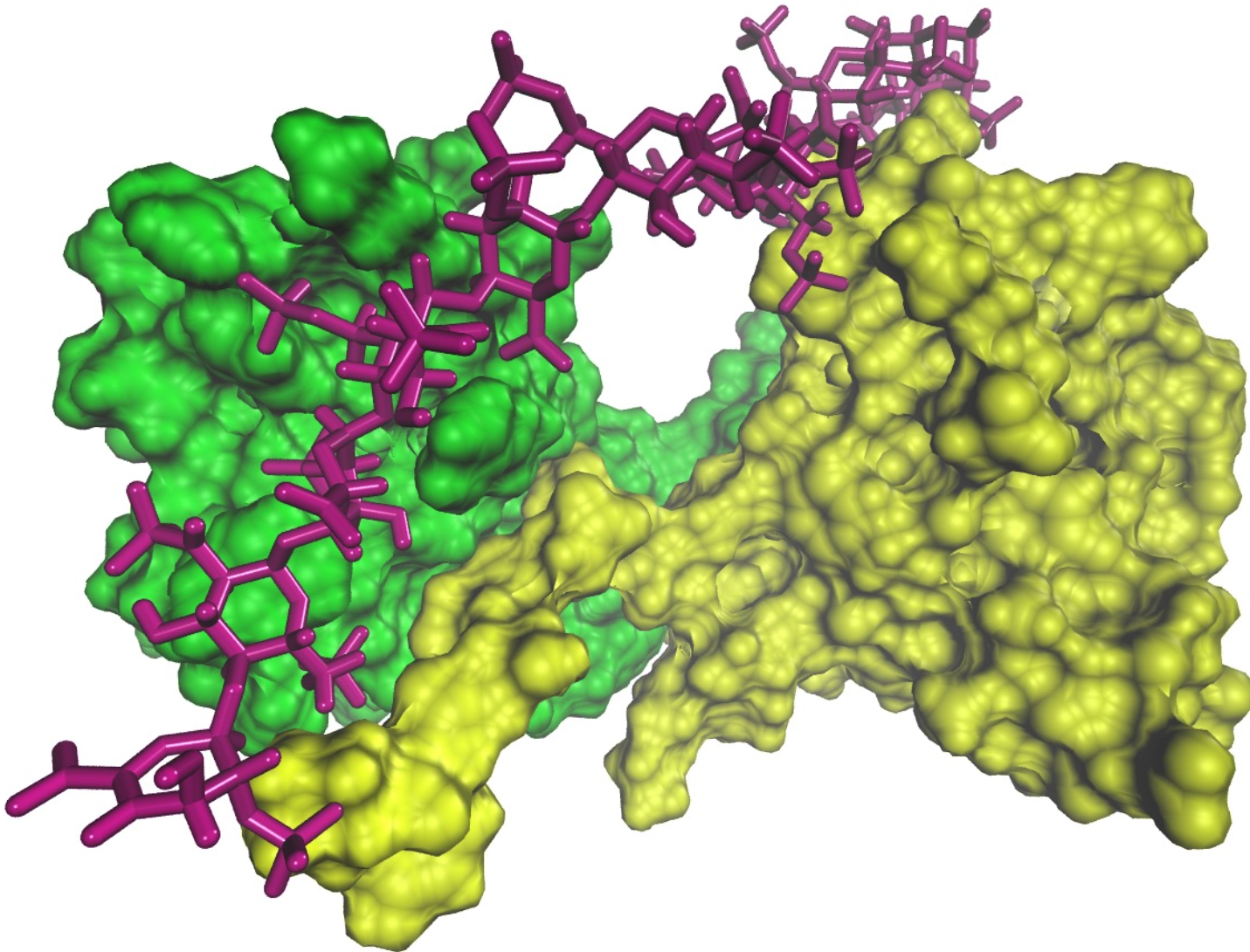
# Molecular Modeling

- VMD, Chimera, Pymol, Jmol, etc...



# Ray Tracing

- Tachyon, POV-Ray, etc.
- [https://en.wikipedia.org/wiki/List\\_of\\_ray\\_tracing\\_software](https://en.wikipedia.org/wiki/List_of_ray_tracing_software)

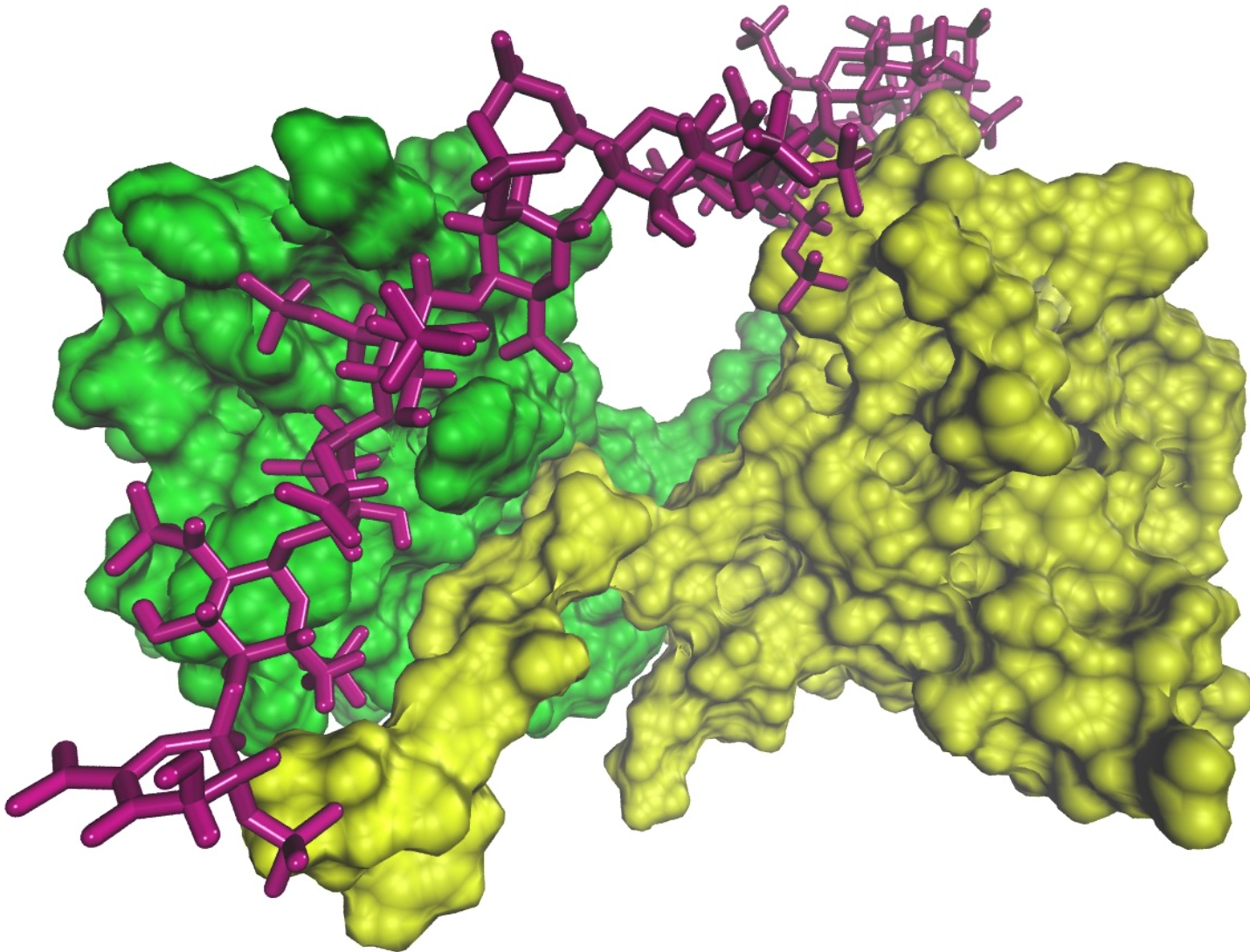


# Video Editing

- Not something I know lots about, but it exists:
- <https://itsfoss.com/best-video-editing-software-linux/>
  - KDENLIVE <https://kdenlive.org/>
  - OPENSHOT <http://www.openshot.org/>
  - FLOWBLADE MOVIE EDITOR <http://jliljeb1.github.io/flowblade/>
  - LIGHTWORKS <https://www.lwks.com/>
  - BLENDER <https://www.blender.org/download/>
    - Blender was apparently used for Spider Man

# Languages

- TCL and others
- I know TCL from VMD...



# Probably Lots More

- The point is that there are many options with Linux
- Questions? Want to explore something more?