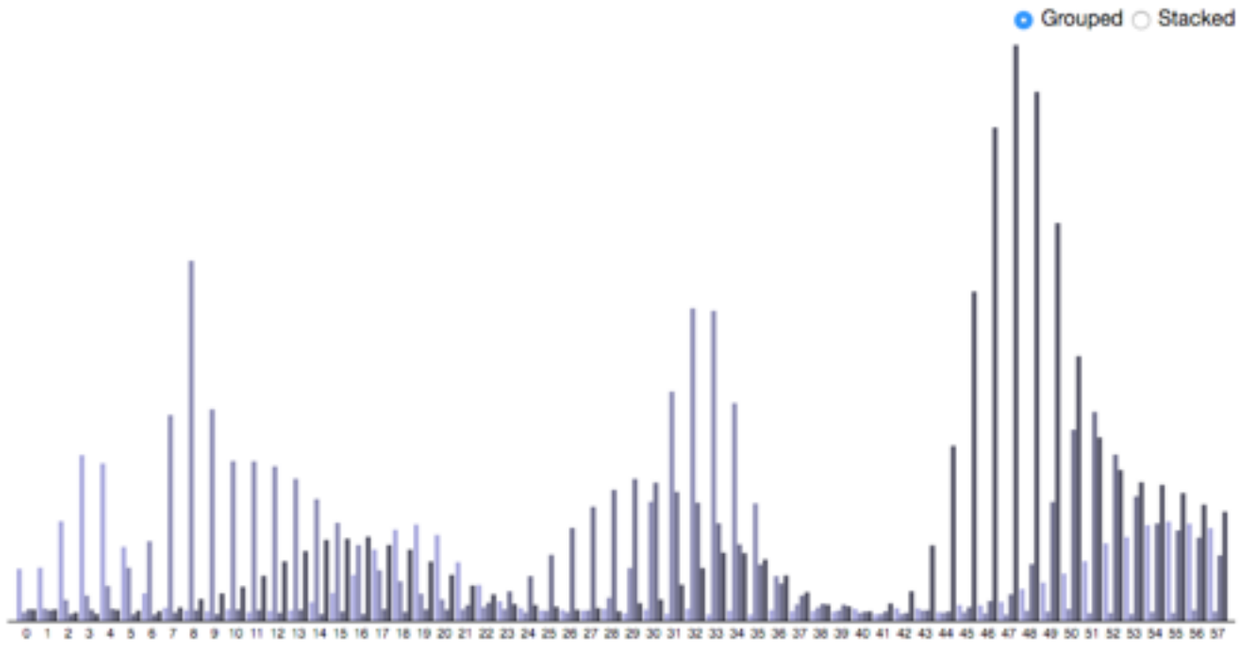
Understanding D3

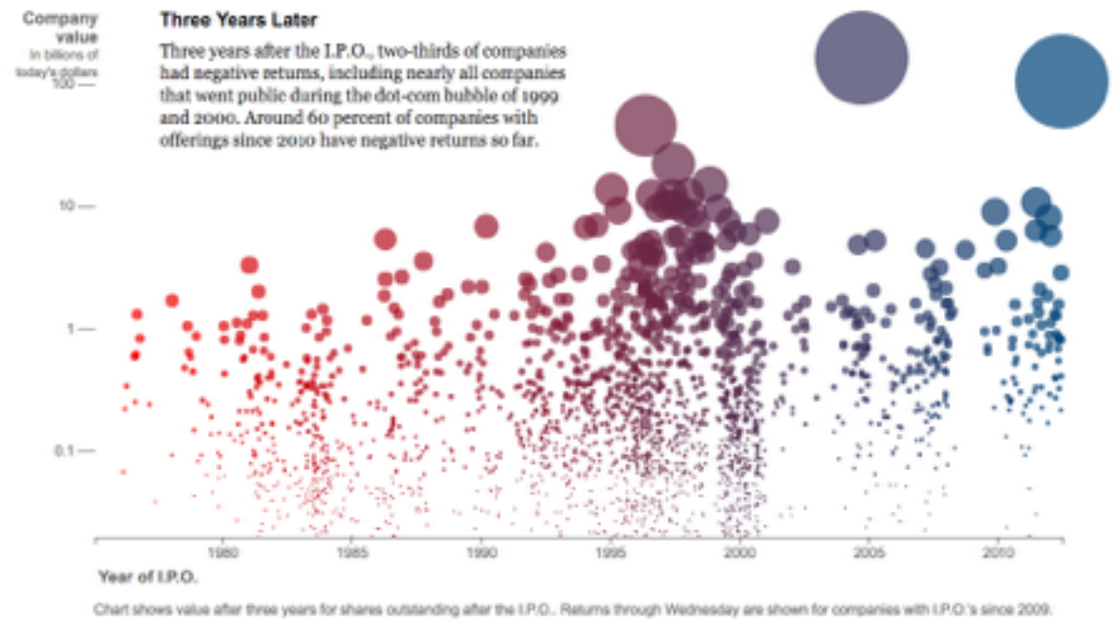
by Brian Lange for Do Good Data 2016

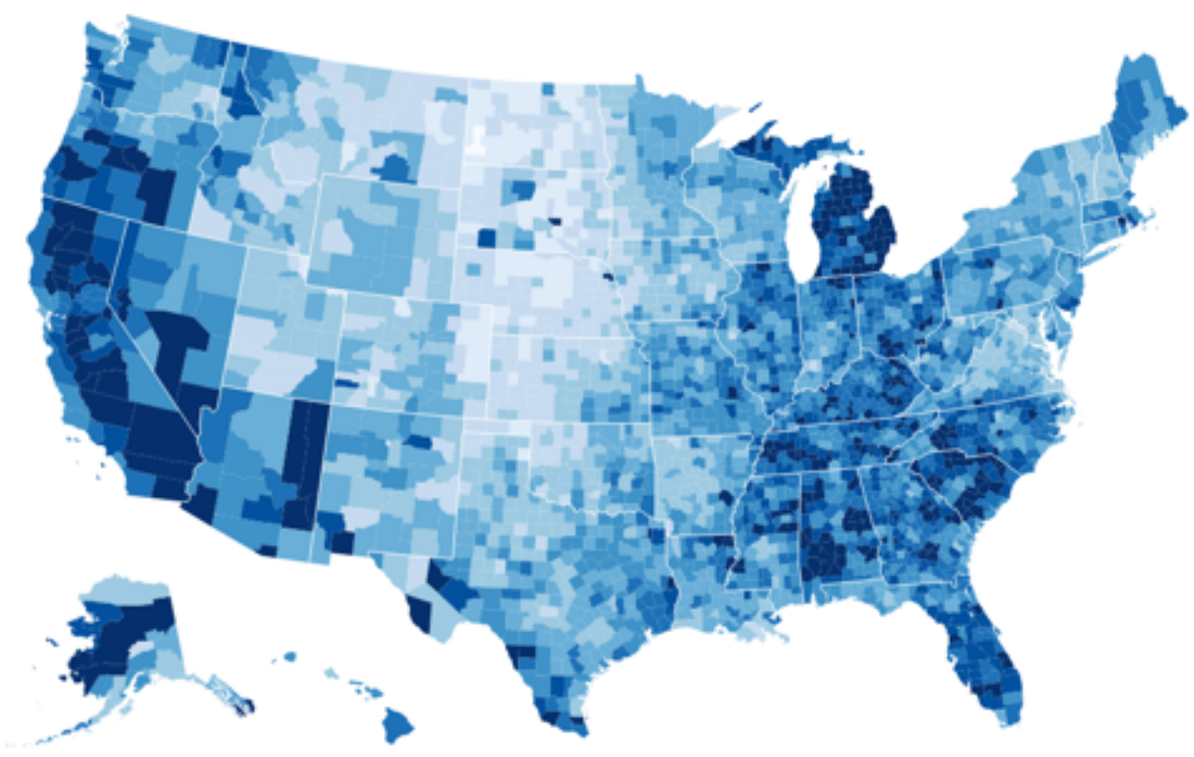
Hi, I’m Brian

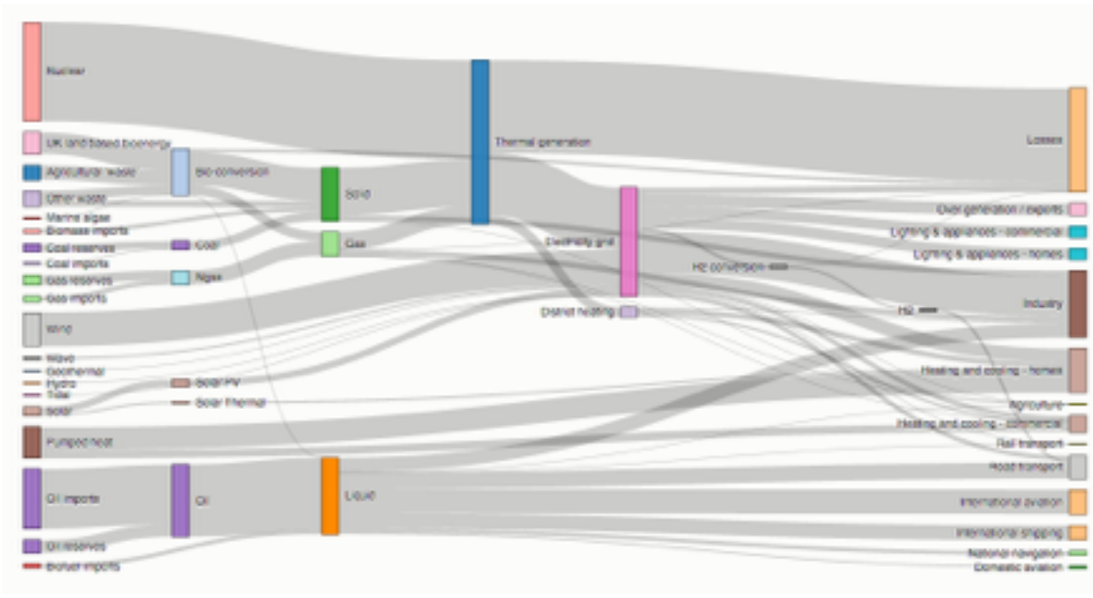
What is D3 **for**?


Cuisinart
Pro Custom 11™


Grouped
Stacked
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57


Company value
In billions of today's dollars
100
10
1
0.1
Three Years Later
Three years after the I.P.O., two-thirds of companies had negative returns, including nearly all companies that went public during the dot-com bubble of 1999 and 2000. Around 60 percent of companies with offerings since 2010 have negative returns so far.
1980
1985
1990
1995
2000
2005
2010
Year of I.P.O.
Chart shows value after three years for shares outstanding after the I.P.O.. Returns through Wednesday are shown for companies with I.P.O.'s since 2009.




Nuclear
UK land based bioenergy
Agricultural waste
Other waste
Marine algae
Biomass imports
Coal reserves
Coal imports
Gas reserves
Gas imports
Wind
Wave
Geothermal
Hydro
Tidal
Solar
Pumped heat
Oil imports
Oil reserves
Biofuel imports
Bio conversion
Coal
Gas
Solar PV
Solar Thermal
Oil
Solid
Gas
Liquid
Thermal generation
Electricity grid
District heating
H2 conversion
Losses
Over generation / exports
Lighting & appliances - commercial
Lighting & appliances - homes
H2
Industry
Heating and cooling - homes
Agriculture
Heating and cooling - commercial
Rail transport
Road transport
International aviation
International shipping
National navigation
Domestic aviation

D3 makes interactive visualizations in the browser easier

Things D3 *might* not be the best tool for

- Quick, exploratory visualizations
- Plots that:
    - Won’t need to be updated
    - Don’t need to be interactive
    - Are covered by a conventional style (line, bar, scatter plots)
    - Absolutely need to work in old, old browsers (IE8 and older)

Alternatives

- Highcharts (Javascript)
- Tools/Services built on D3
  - Vega/Vega-Lite
  - plot.ly
- ggplot2 (R)
- matplotlib + seaborn + pandas (Python)
- Tableau

Common workflow:

- Use plotting tool included with whatever we're using to do data exploration
- Sketch some ideas for effective visualizations
- If most compelling sketches can't be achieved using something simpler, use D3

OK, what *is* D3

a **JavaScript** **library**

programming language
that runs in web browsers

reusable pieces of code
usable while programming

the magic
of the
internet

"d3js.org"

the magic of the internet

"d3js.org"

the magic
of the
internet

web documents,
JavaScript code,
data

the magic
of the
internet

display page,
run JavaScript code

Data-Driven Documents

Data-

Driven

Documents

Use data

to make stuff

using web-based documents

“web based documents”

Here is some cat text

link to more cats

HTML - the skeleton

boxes, controls, text, images

“web based documents”

Here is some cat text

link to more cats

random cat button

HTML - the skeleton

boxes, controls, text, images

```
<button name=“random”>
  random cat button
</button>
```

“web based documents”

Here is some cat text

link to more cats

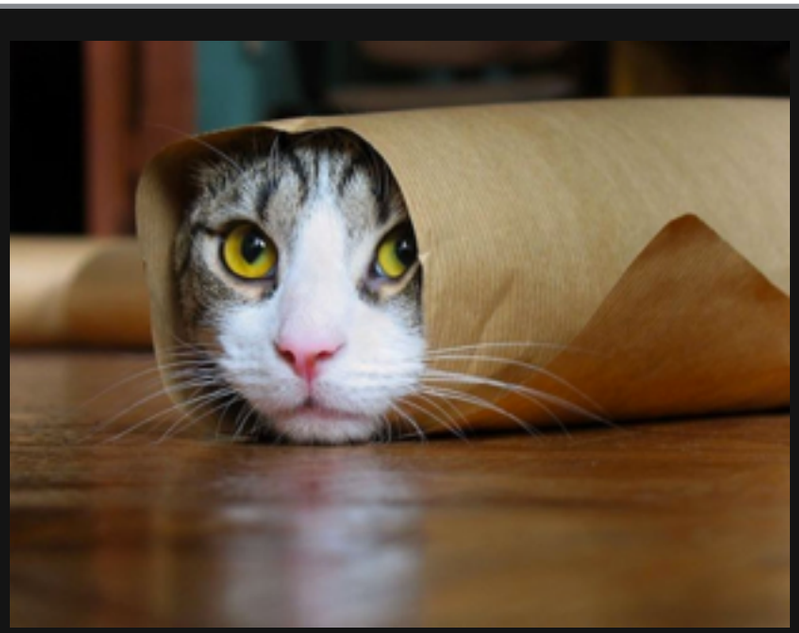
random cat button

HTML - the skeleton

boxes, controls, text, images

```
<div id=“controls”>
  <button name=“random”>
    random cat button
  </button>
</div>
```

“web based documents”



Here is some cat text

link to more cats

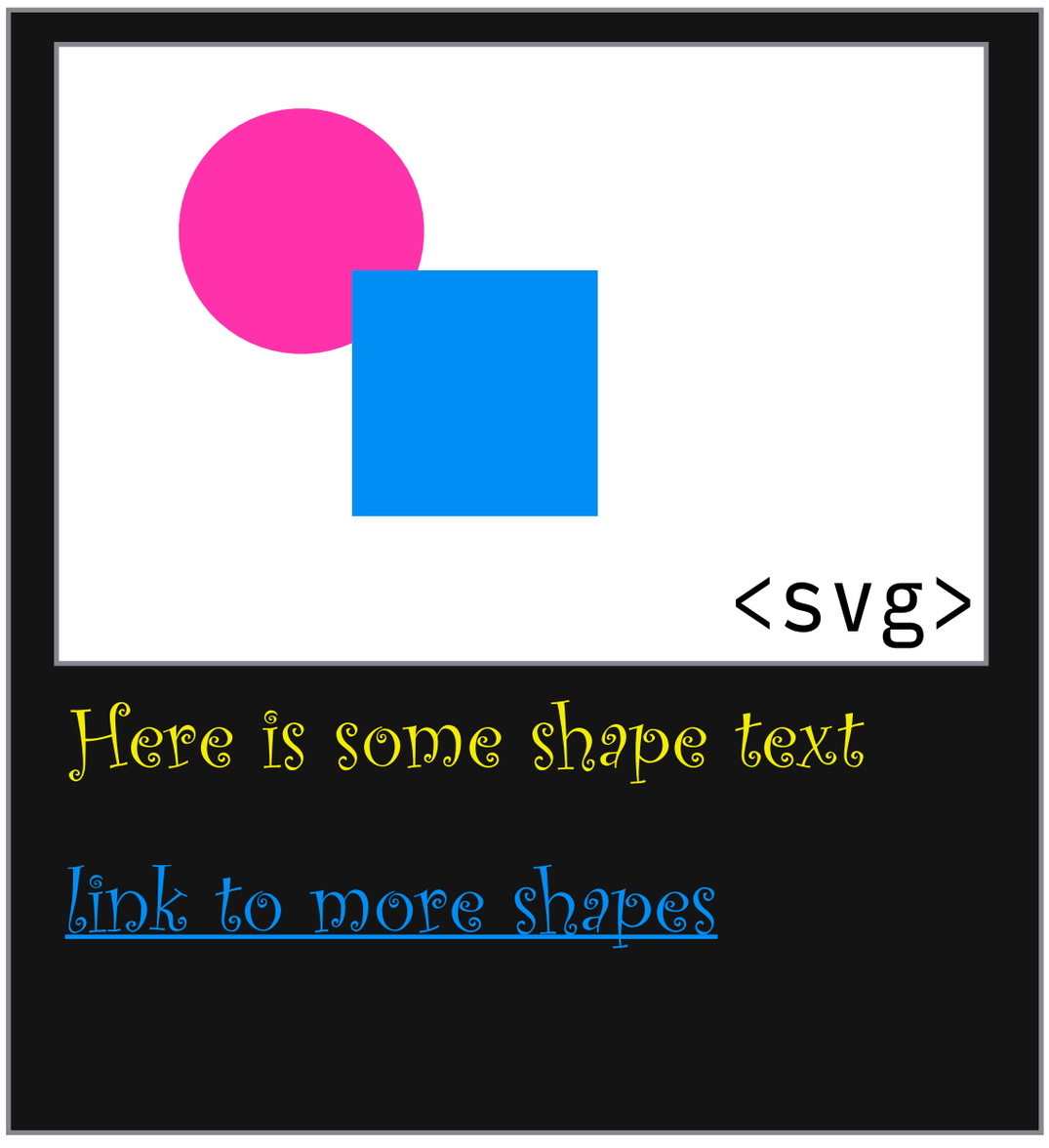
HTML - the skeleton

boxes, controls, text, images

CSS - styles for the skeleton

definitions that change the looks of the page

“web based documents”



HTML - the skeleton

CSS - styles for the skeleton

SVG - language for drawing

- kinda like HTML, but can be embedded inside it
- can be styled with CSS
- no worries about resolution with vectors

“web based documents”

HTML - the skeleton

CSS - styles for the skeleton

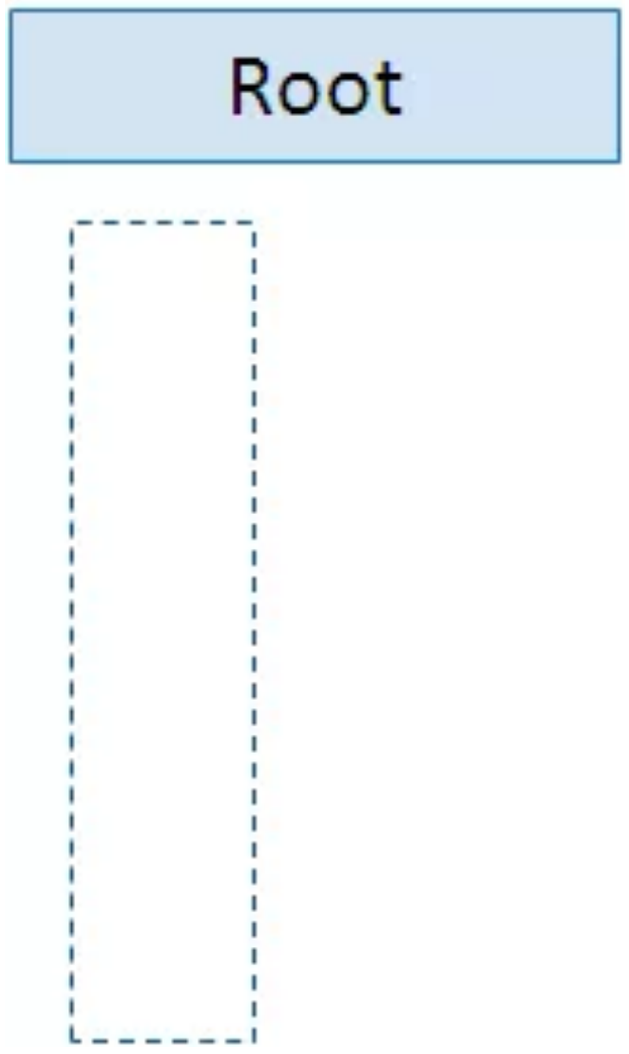
SVG - language for drawing

```
<circle r=“10”>
</circle>
```

A JavaScript library
that makes it easier
to use HTML, SVG, and CSS
to make interactive visualizations
in the browser

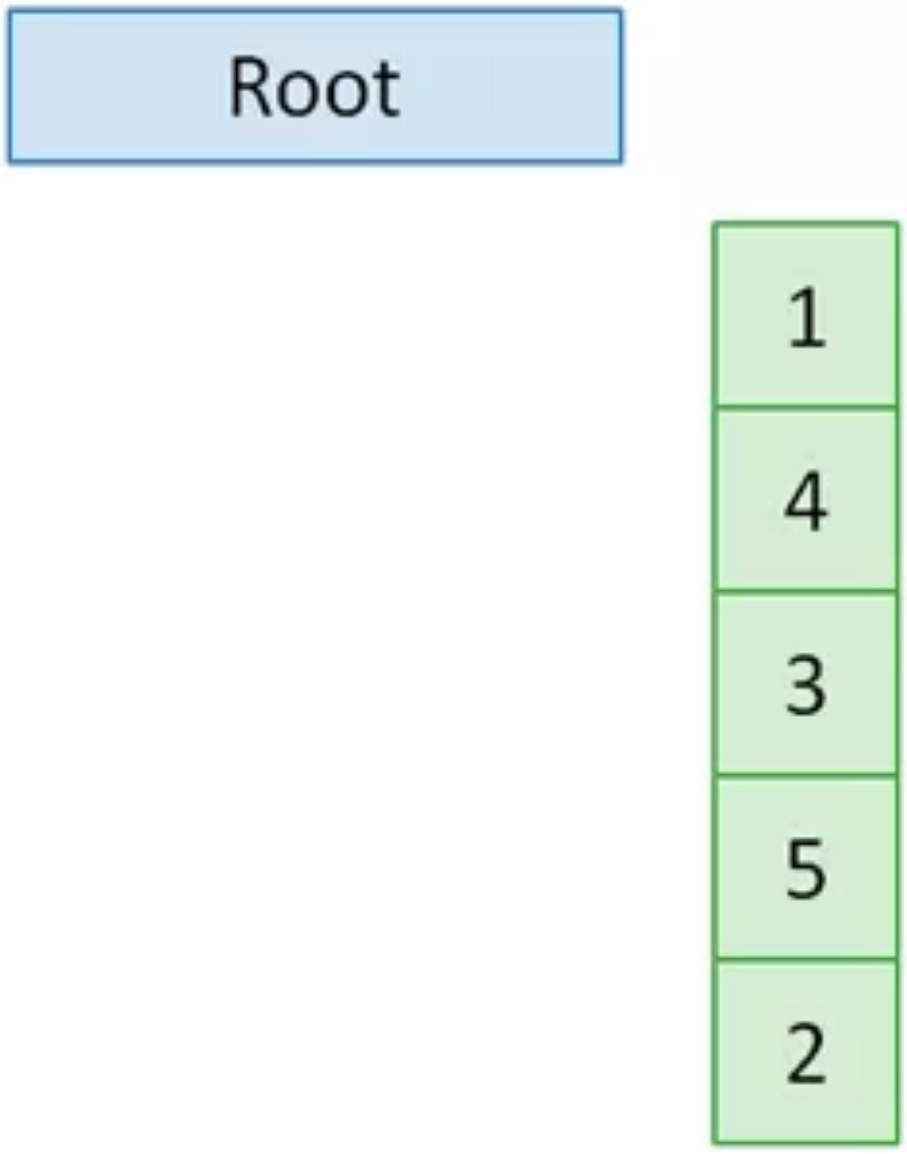
Let’s try it out!

.selectAll()



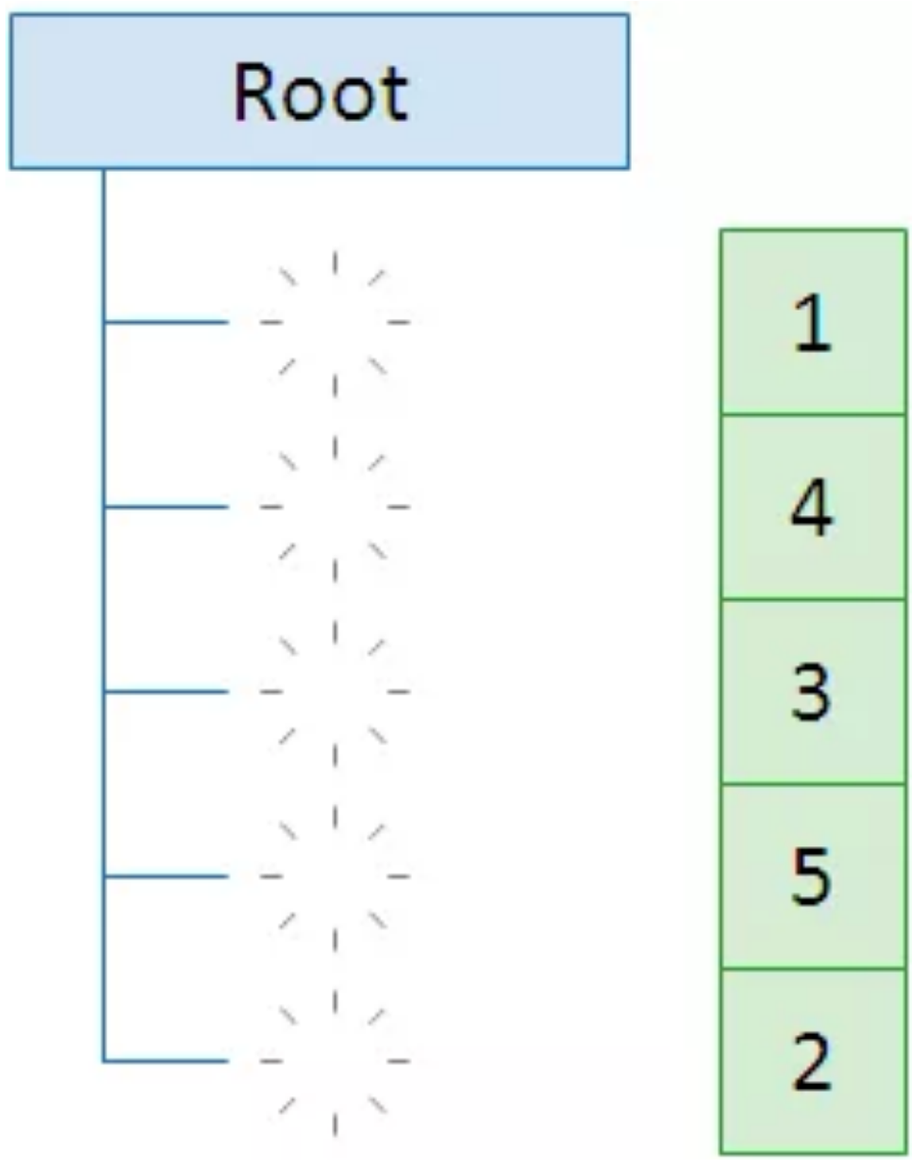
credit to Jerome Cukier

.data()



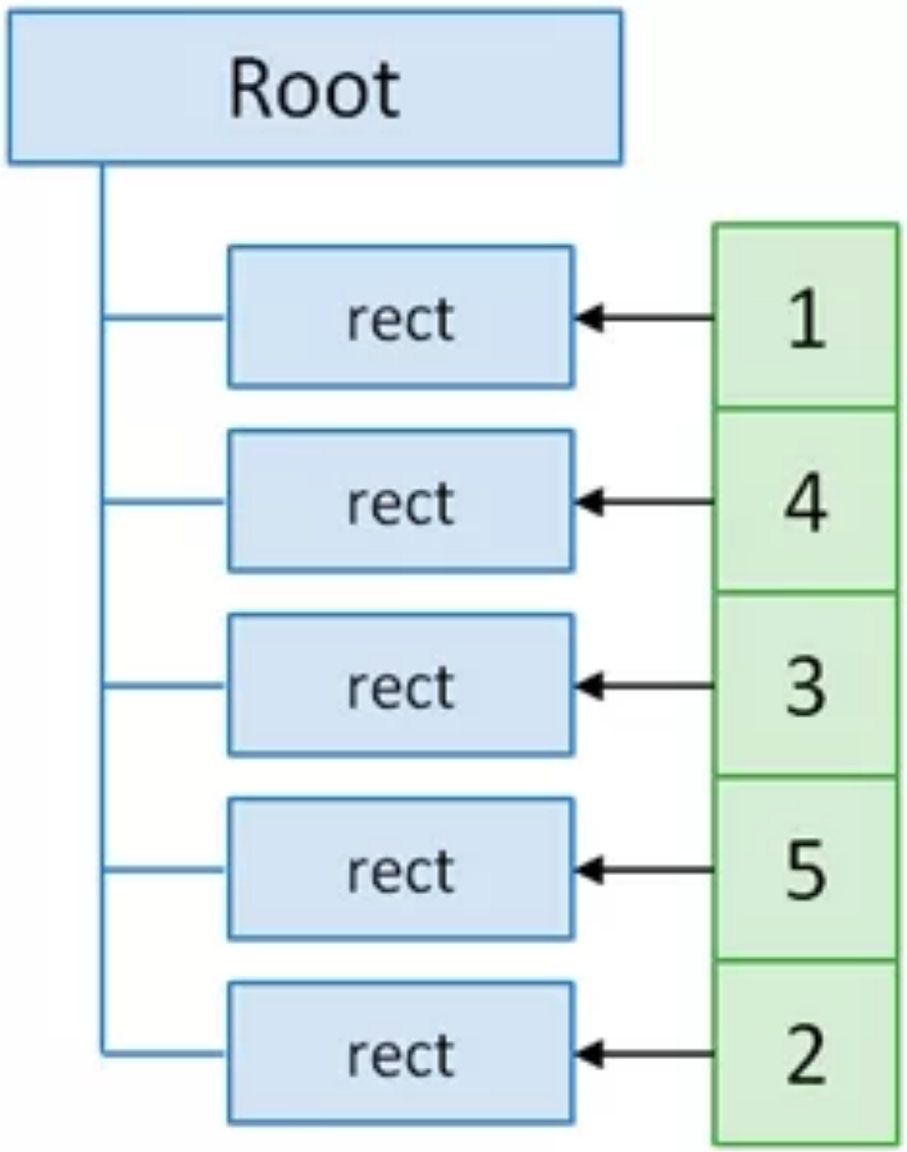
credit to Jerome Cukier

.enter()



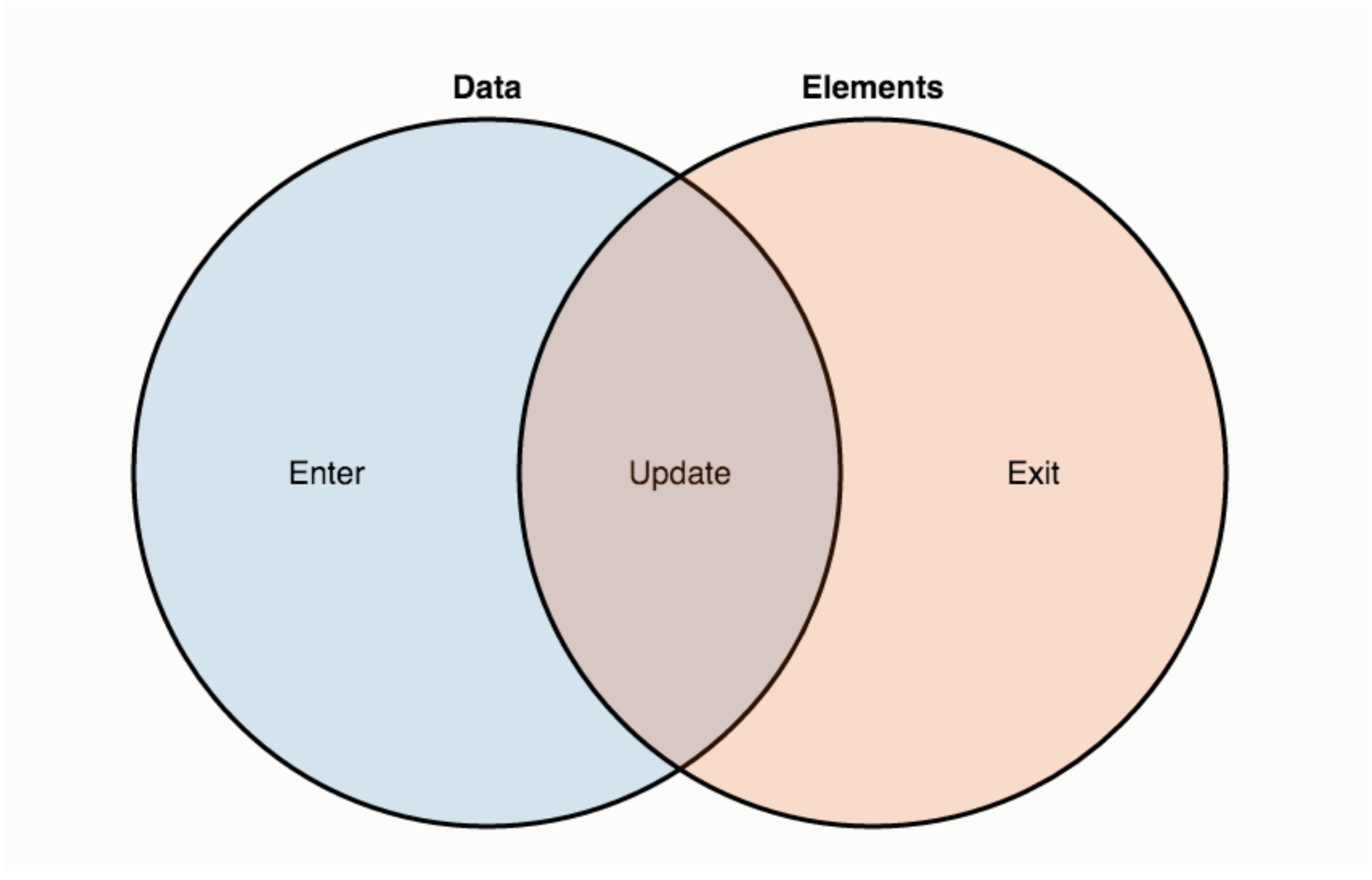
credit to Jerome Cukier

.append()



credit to Jerome Cukier

“the data join”



Among the things we didn't cover

d3.axes

updating/removing data

.transition() for animating changes

d3.time

d3.layouts

d3.color

adding listeners for interactivity

d3.geo

Resources for learning more

- Scott Murray (alignedleft)
  - Interactive Data Visualization for the Web
- D3 for Mere Mortals
- Mike Bostock's Blog Posts