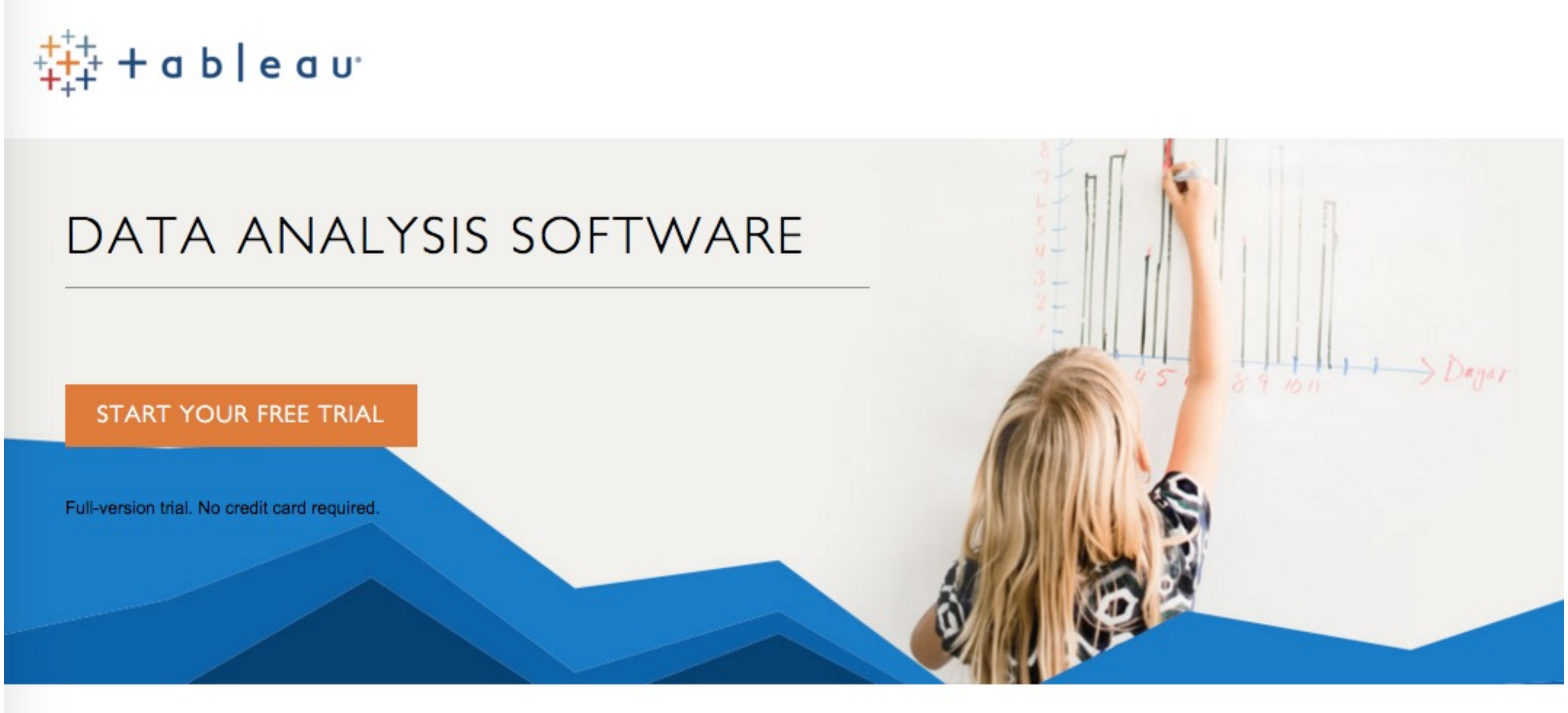
VISUALIZATION ON THE WEB

TABLEAU.COM



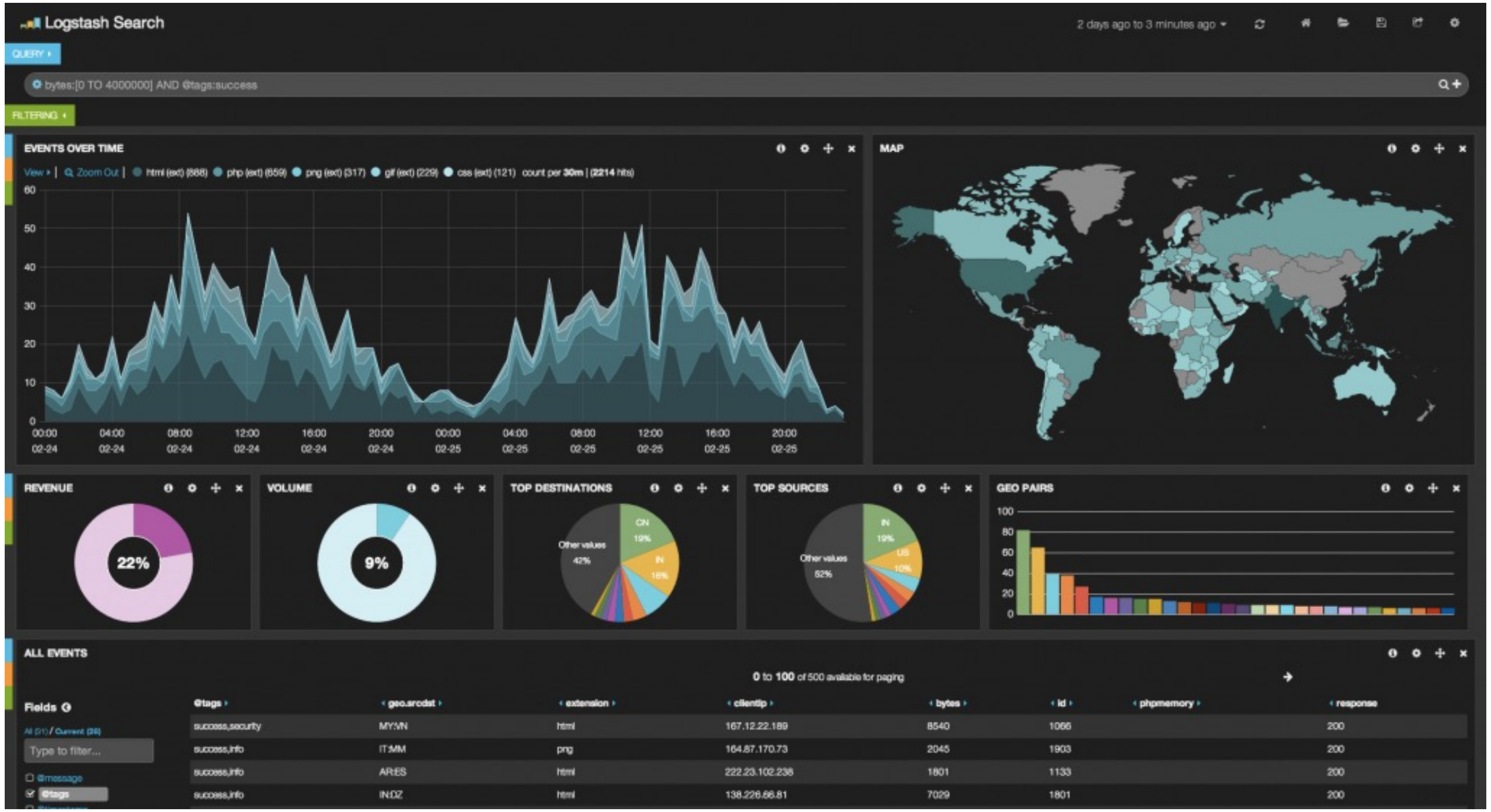
tableau

DATA ANALYSIS SOFTWARE

START YOUR FREE TRIAL

Full-version trial. No credit card required.

KIBANA GA

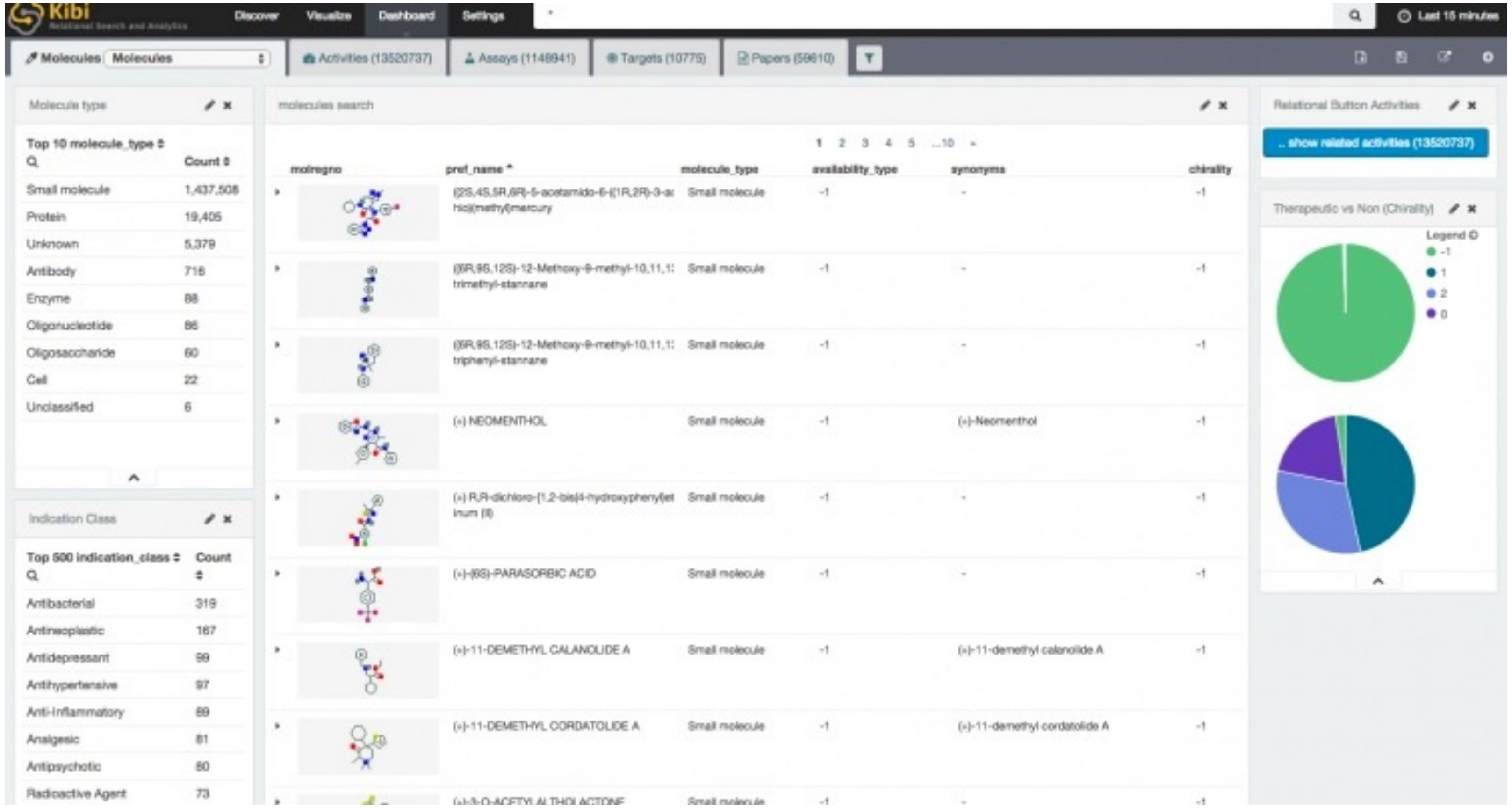


bytes:[0 TO 4000000] AND @tags:success

0 to 100 of 500 available for paging

@tags	geo.srcdst	extension	clientip	bytes	id	phpmemory	response
success,security	MY:VN	html	167.12.22.189	8540	1066		200
success,info	IT:MM	png	164.87.170.73	2045	1903		200
success,info	AR:ES	html	222.23.102.238	1801	1133		200
success,info	IN:DZ	html	138.226.66.81	7029	1801		200

KIBI



Top 10 molecule_type ⇕	Count ⇕
Small molecule	1,437,508
Protein	19,405
Unknown	5,379
Antibody	716
Enzyme	88
Oligonucleotide	86
Oligosaccharide	60
Cell	22
Unclassified	6

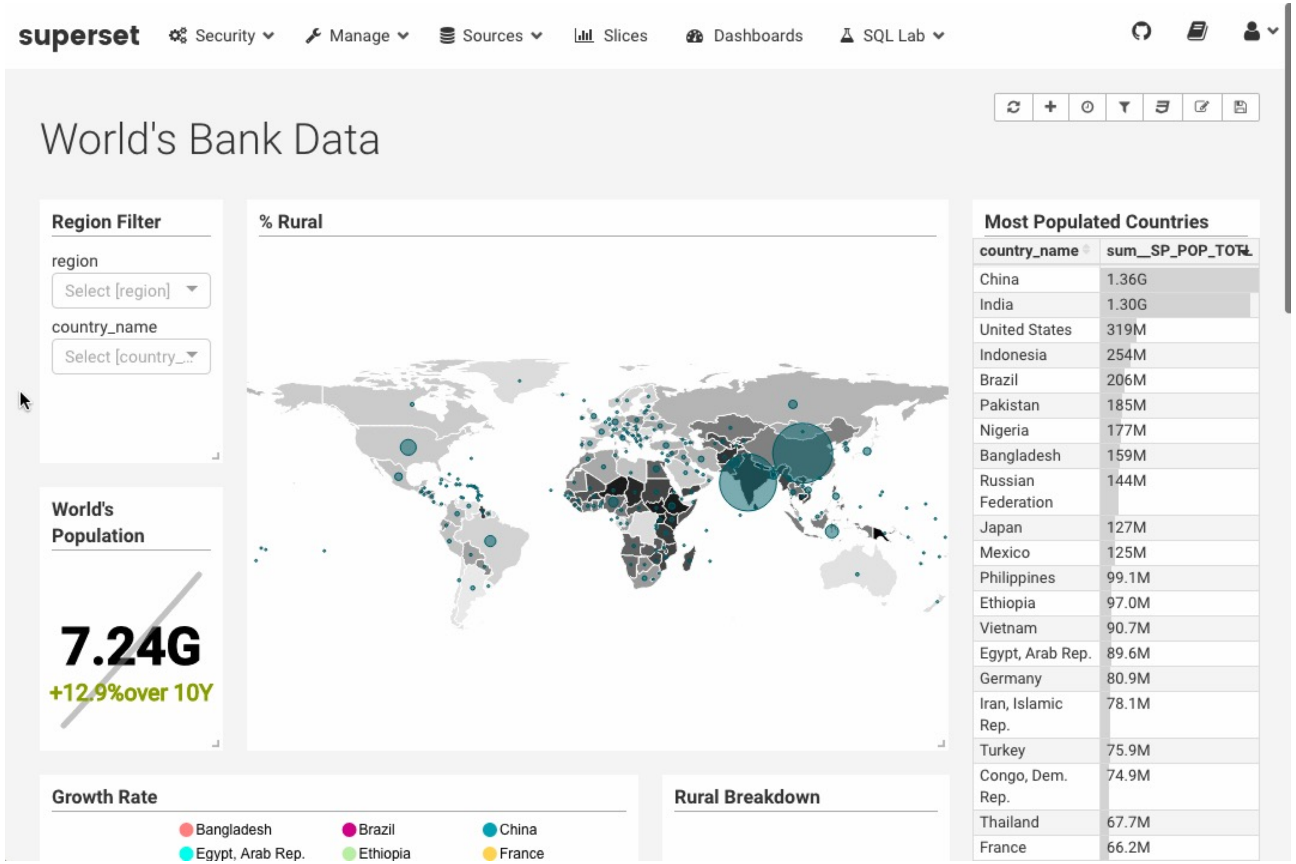
Top 500 indication_class ⇕	Count ⇕
Antibacterial	319
Antineoplastic	167
Antidepressant	99
Antihypertensive	97
Anti-Inflammatory	89
Analgesic	81
Antipsychotic	80
Radioactive Agent	73

molregno	pref_name ^	molecule_type	availability_type	synonyms	chirality
	((2S,4S,5R,6R)-5-acetamido-6-((1R,2R)-3-ac hio)(methyl)mercury	Small molecule	-1	-	-1
	((6R,9S,12S)-12-Methoxy-9-methyl-10,11,1: trimethyl-stannane	Small molecule	-1	-	-1
	((6R,9S,12S)-12-Methoxy-9-methyl-10,11,1: triphenyl-stannane	Small molecule	-1	-	-1
	(+) NEOMENTHOL	Small molecule	-1	(+)-Neomenthol	-1
	(+) R,R-dichloro-[1,2-bis(4-hydroxyphenyl)et hnum (II)	Small molecule	-1	-	-1
	(+)-(6S)-PARASORBIC ACID	Small molecule	-1	-	-1
	(+)-11-DEMETHYL CALANOLIDE A	Small molecule	-1	(+)-11-demethyl calanolide A	-1
	(+)-11-DEMETHYL CORDATOLIDE A	Small molecule	-1	(+)-11-demethyl cordatolide A	-1
	(+)-3-O-ACETYLALTHOLACTONE	Small molecule	-1	-	-1

https://siren.solutions/kibi/

SUPERSET

Superset



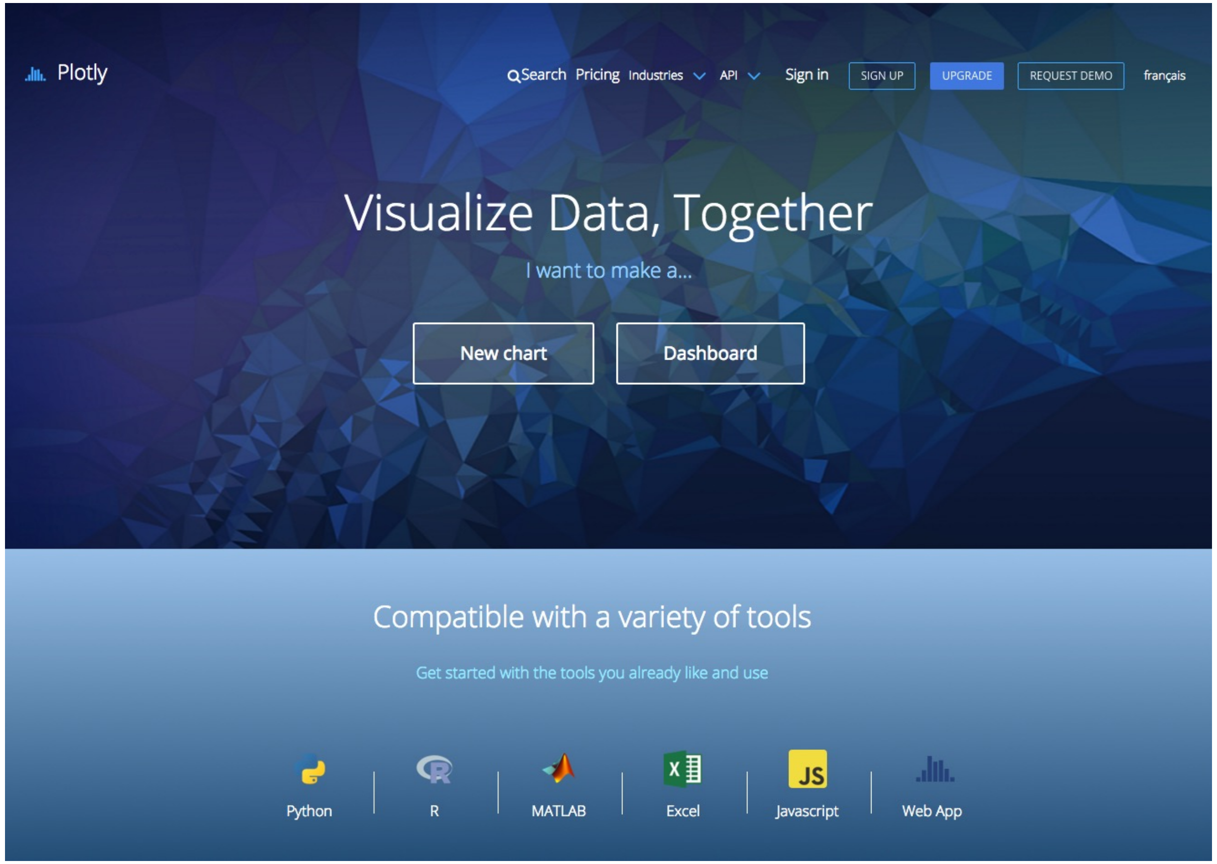
World's Bank Data

Most Populated Countries

country_name	sum__SP_POP_TOTL
China	1.36G
India	1.30G
United States	319M
Indonesia	254M
Brazil	206M
Pakistan	185M
Nigeria	177M
Bangladesh	159M
Russian Federation	144M
Japan	127M
Mexico	125M
Philippines	99.1M
Ethiopia	97.0M
Vietnam	90.7M
Egypt, Arab Rep.	89.6M
Germany	80.9M
Iran, Islamic Rep.	78.1M
Turkey	75.9M
Congo, Dem. Rep.	74.9M
Thailand	67.7M
France	66.2M

https://github.com/airbnb/superset

PLOT.LY



Plotly

Search Pricing Industries API Sign in SIGN UP UPGRADE REQUEST DEMO français

Visualize Data, Together

I want to make a...

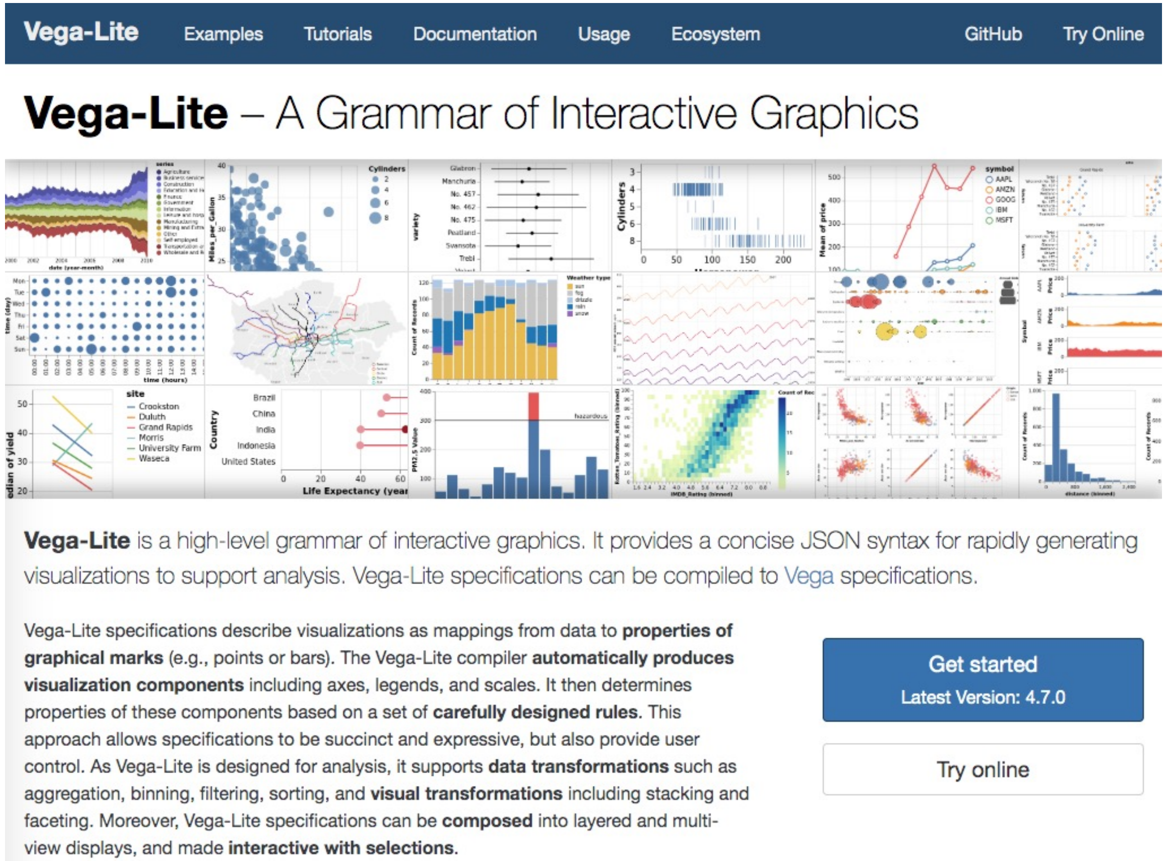
New chart

Dashboard

Compatible with a variety of tools

Get started with the tools you already like and use

VEGA AND VEGA-LITE



Vega-Lite – A Grammar of Interactive Graphics

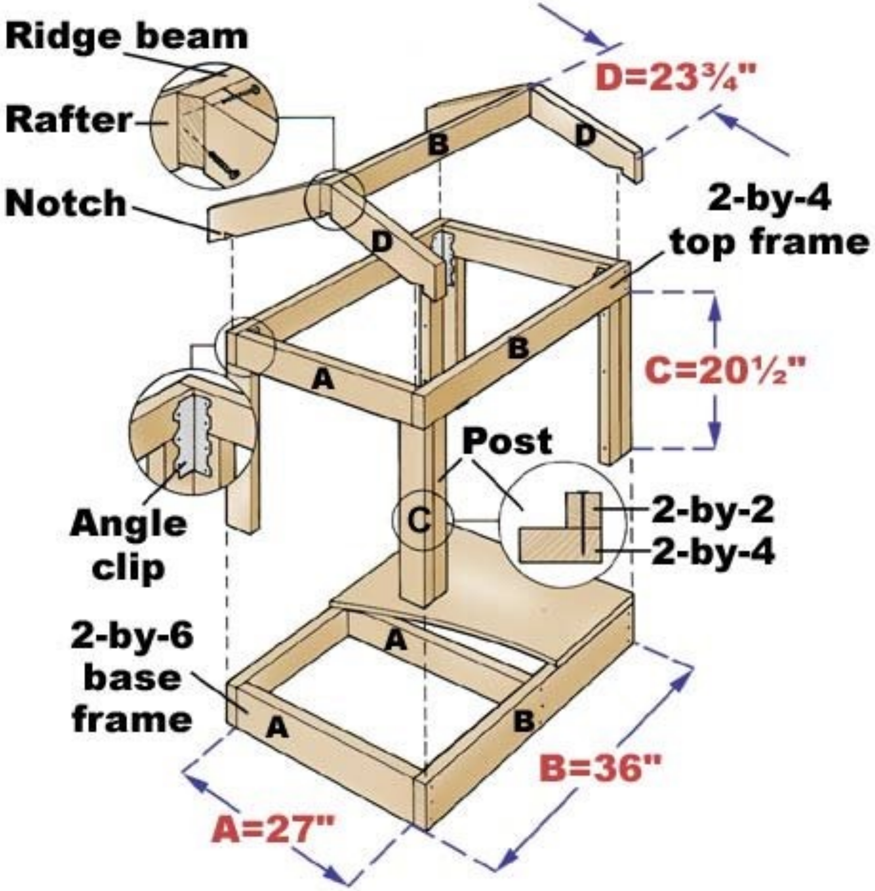
Vega-Lite is a high-level grammar of interactive graphics. It provides a concise JSON syntax for rapidly generating visualizations to support analysis. Vega-Lite specifications can be compiled to Vega specifications.

Vega-Lite specifications describe visualizations as mappings from data to **properties of graphical marks** (e.g., points or bars). The Vega-Lite compiler **automatically produces visualization components** including axes, legends, and scales. It then determines properties of these components based on a set of **carefully designed rules**. This approach allows specifications to be succinct and expressive, but also provide user control. As Vega-Lite is designed for analysis, it supports **data transformations** such as aggregation, binning, filtering, sorting, and **visual transformations** including stacking and faceting. Moreover, Vega-Lite specifications can be **composed** into layered and multi-view displays, and made **interactive with selections**.

Data-Driven Documents

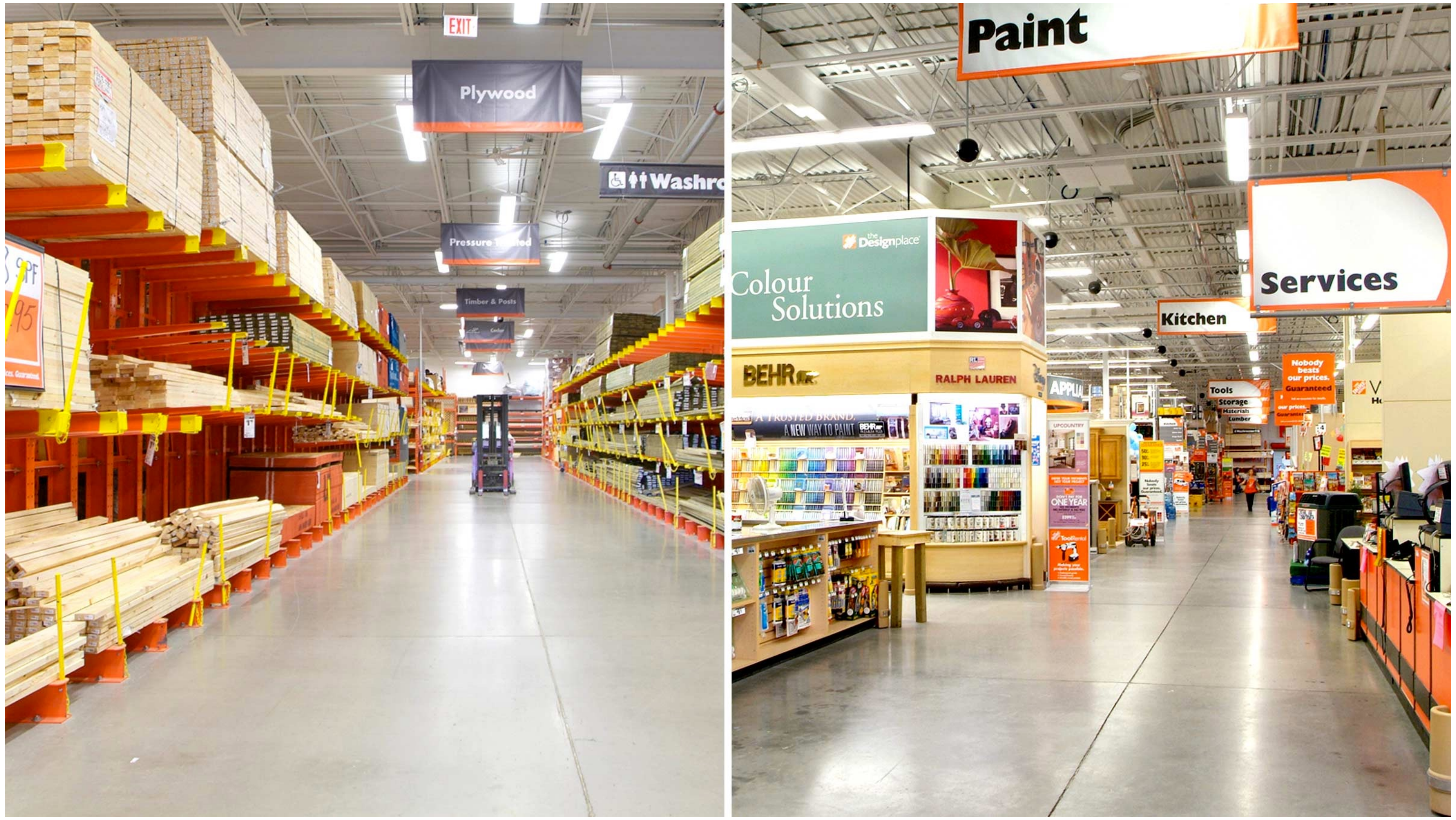
VISUAL ANALYTICS
D3.JS

WHAT IS D3?



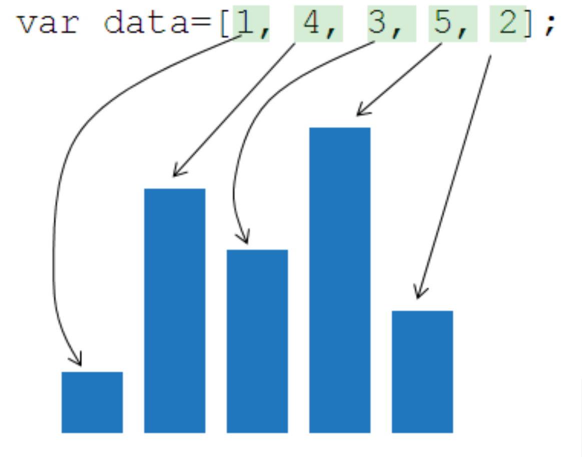
Ridge beam
Rafter
Notch
D=23¾"
2-by-4 top frame
C=20½"
Post
2-by-2
2-by-4
Angle clip
2-by-6 base frame
A=27"
B=36"
A
B
C
D

WHAT IS D3?


EXIT
Plywood
Washro
Pressure Treated
Timber & Posts
Paint
the Designplace
Colour Solutions
BEHR
RALPH LAUREN
Kitchen
Services
Tools
Storage
Nobody beats our prices. Guaranteed

WHAT IS D3?

- JavaScript library to make beautiful, interactive, browser-based data visualizations.
- D3 stands for **D**ata **D**riven **D**ocuments
- D3.js is a low level visualization library based on Web standards (HTML, CSS, JS, SVG)
- D3.js is Open Source library written by Mike Bostok
- [Mike Bostock Github Profile]()
- d3js.org

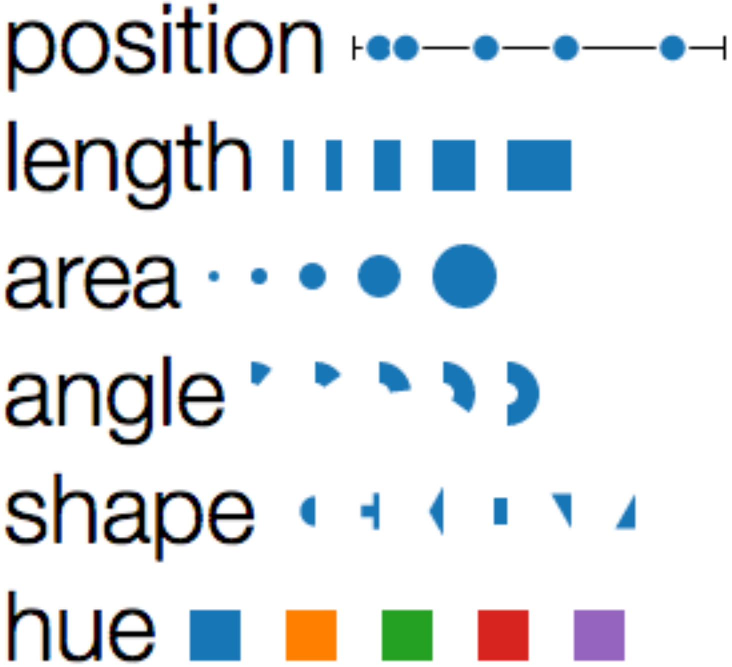


VISUALIZATION AND DATA GRAPHICS

Data Types

- Categorical
- Ordinal
- Quantitative

Visual Variables



VISUAL VARIABLES -> DOCUMENTS

- Datum -> Element
  - Associate a graphical mark to each data point
- Data Attribute -> Element Attribute
  - Adjust properties of mark to encode properties of datum

GETTING STARTED

SELECTIONS

CSS SELECTORS

- CSS provides an efficient way to refer to specific elements in a DOM

- #foo // <any id=“foo”>
- foo // <foo>…</foo>
- .foo // <any class=“foo”>
- [foo=bar] // <any foo=“bar”>
- foo bar //<foo><bar/></foo>

SELECTOR FUNCTIONS

W3C

- `document.querySelectorAll(“h1”)`

D3.js / JQuery

- `d3.selectAll(“h1”)`

Selections are Arrays.

Explore selections with Developer Tools

attr AND style METHODS

```
// select all <h1> elements
var H1s = d3.selectAll(“H1”);

H1s.attr(“class”,”newClass”);
H1s.style(“fill”,”yellow”);
H1s.style(“font-color”,”black”);
```

CHAINING METHODS

```
d3.selectAll(“H1”)
     .attr(“class”,”newClass”)
     .style(“fill”,”yellow”)
     .style(“font-color”,”black”);
```

APPEND NEW ELEMENTS

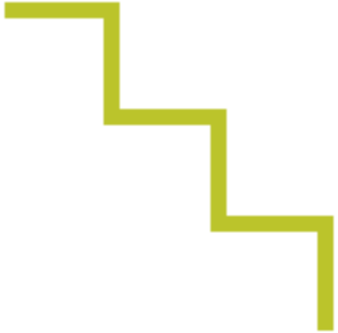
```
var body = d3.select(“body”);

var h1 = body.append(“h1”);
h1.text(“Hello!”);
```

MODIFY EXISTING ELEMENTS

```
var section = d3.selectAll(“section”);

var h1 = section.append(“h1”);
h1.text(“Hello!”);
```

EXERCISE #1

- Create the ladder design of the previous lesson, using only D3.js manipulation of DOM



```
<!DOCTYPE html>
<html>
<head>
  <meta charset="utf-8">
  <title>Stairs example - Multiple implementation</title>
  <style>
    svg{
      background:#fff;
    }

    svg circle{
      fill:#e34a33
    }
  </style>
</head>
<body>
  <!--
  Draw a polyline using the polyline element
  -->
  <svg width="200" height="200">
    <polyline points="0,40 40,40 40,80 80,80 80,120 120,120 120,160" fill="white"
stroke="#BBC42A" stroke-width="6" />
  </svg>
</body>
</html>
```

DATA TO ELEMENTS

SELECTION SHOULD CORRESPOND TO DATA

```
var numbers =
[5,10,15,20,25];

var lines =
svg.selectAll(”line")

      .data(numbers)

      .enter().append(”line
");
```

Data

SVG

SELECTION SHOULD CORRESPOND TO DATA

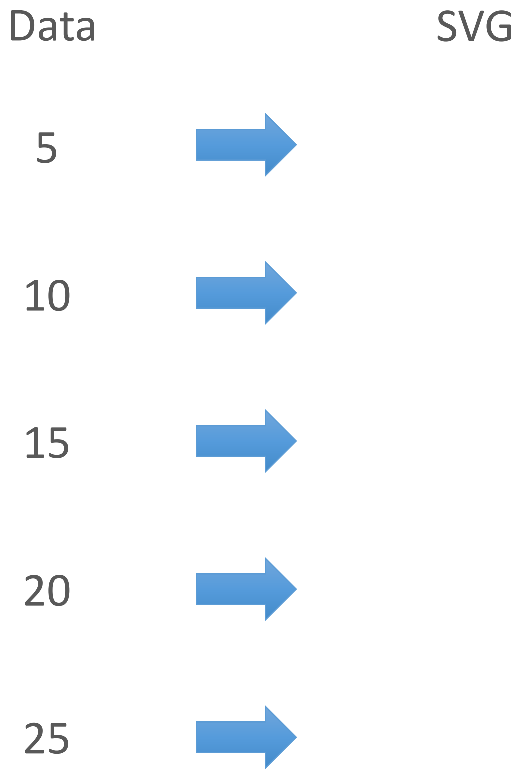
```
var numbers =
[5,10,15,20,25];

var lines =
svg.selectAll(”line")

      .data(numbers)

      .enter().append(”line
");
```

Data	SVG
5	
10	
15	
20	
25	

Method data joins data with document elements

SELECTION SHOULD CORRESPOND TO DATA

```
var numbers =
[5,10,15,20,25];
var lines =
svg.selectAll(”line")
      .data(numbers)
      .enter().append(”line
");
```



Data

SVG

5

10

15

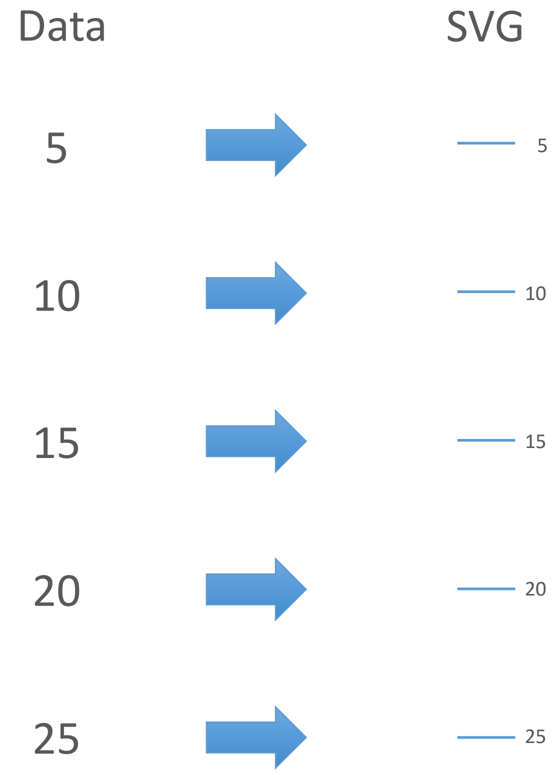
20

25

Method enter specifies the action for missing elements

SELECTION SHOULD CORRESPOND TO DATA

```
var numbers =
[5,10,15,20,25];
var lines =
svg.selectAll(”line")
      .data(numbers)
      .enter().append(”line
");
```



Data

SVG

5

10

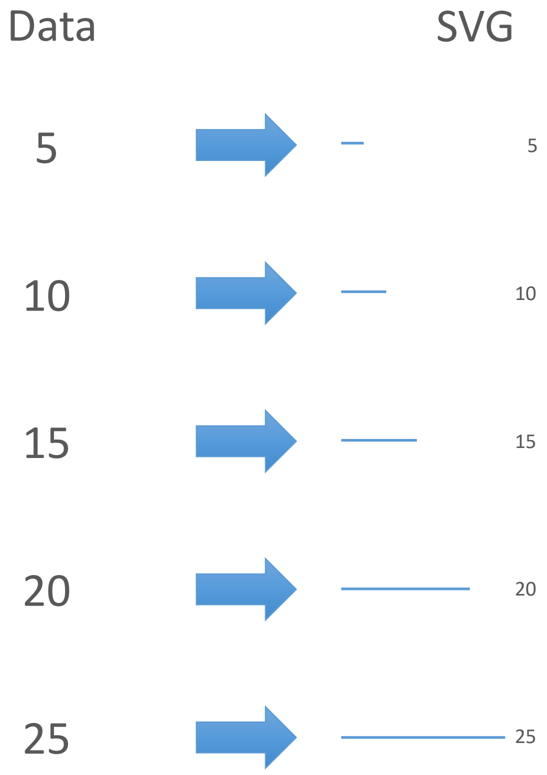
15

20

25

SELECTION SHOULD CORRESPOND TO DATA

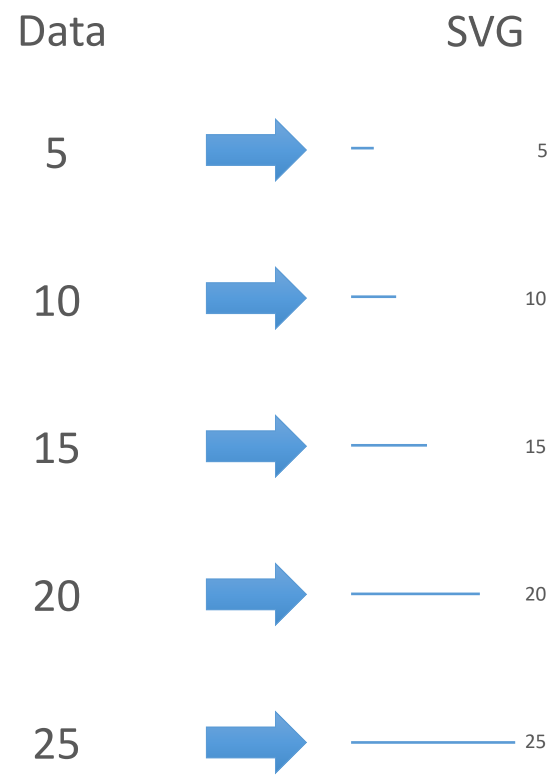
```
var numbers =
[5,10,15,20,25];
var lines =
svg.selectAll(”line")
        .data(numbers)
        .enter().append(”line
");

lines.attr(“x1”,10)
        .attr(“y1”,posy(d,i))
        .attr(“x2”,posx(d,i))
        .attr(“y2”,posy(d,i))
```



The new elements are bound to data. Data can be used to compute attributes

SELECTION SHOULD CORRESPOND TO DATA

```
lines.attr(“x1”,10)
      .attr(“y1”,posy(d,i))
      .attr(“x2”,posx(d,i))
      .attr(“y2”,posy(d,i));

var posy = function(d,i){
      return i*10;
}

var posx = function(d,i){
      return d * 10;
}
```



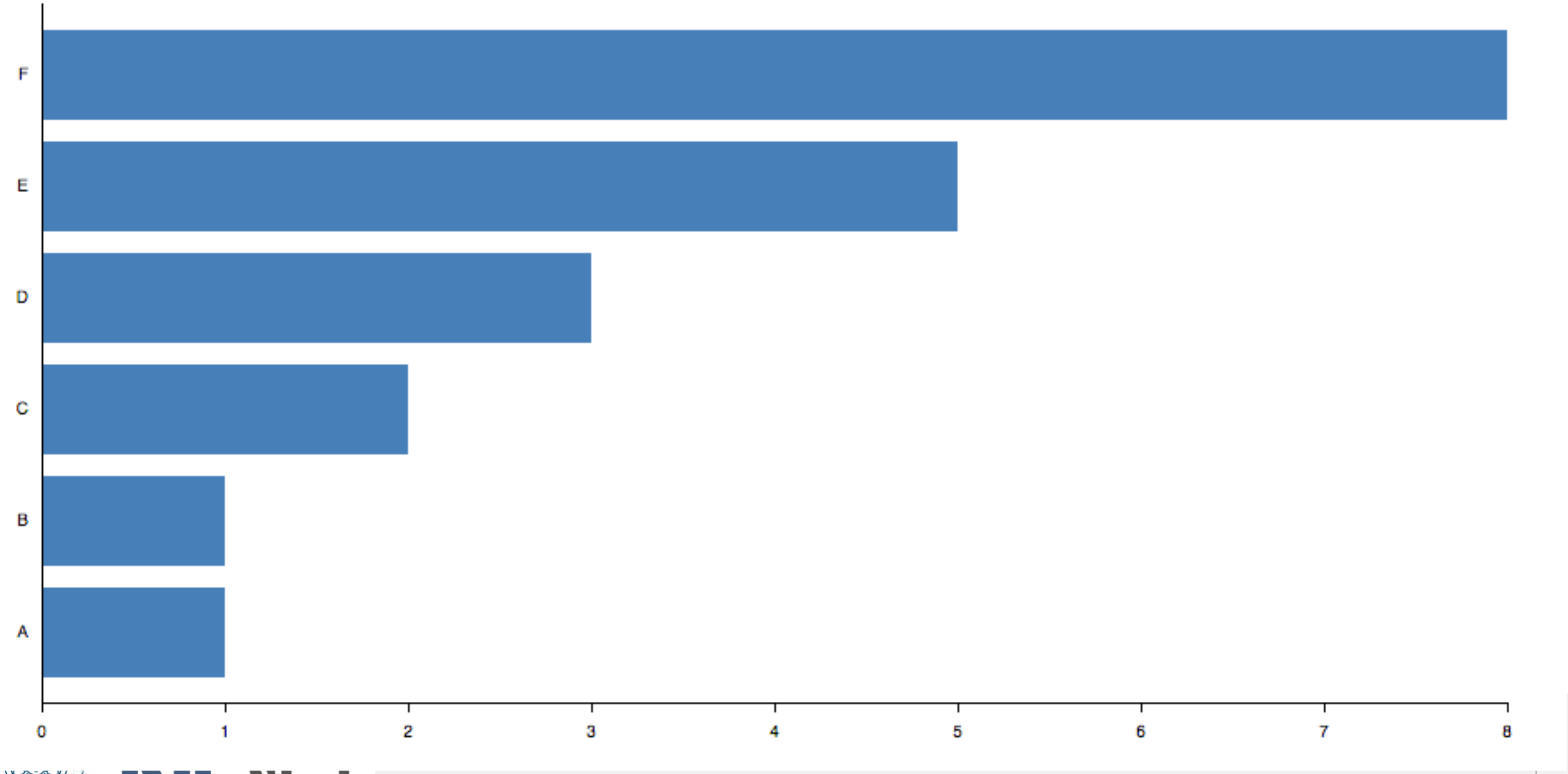
The `attr` functions takes in input a constant value or a function. The function is called automatically by d3, passing the data (`__data__`) bound to the element and a progressive counter

EXERCISE #2

- Use length visual variable to represent a set of numbers
  - Map numbers to a set of lines
  - Make each line length proportional to the number it represents

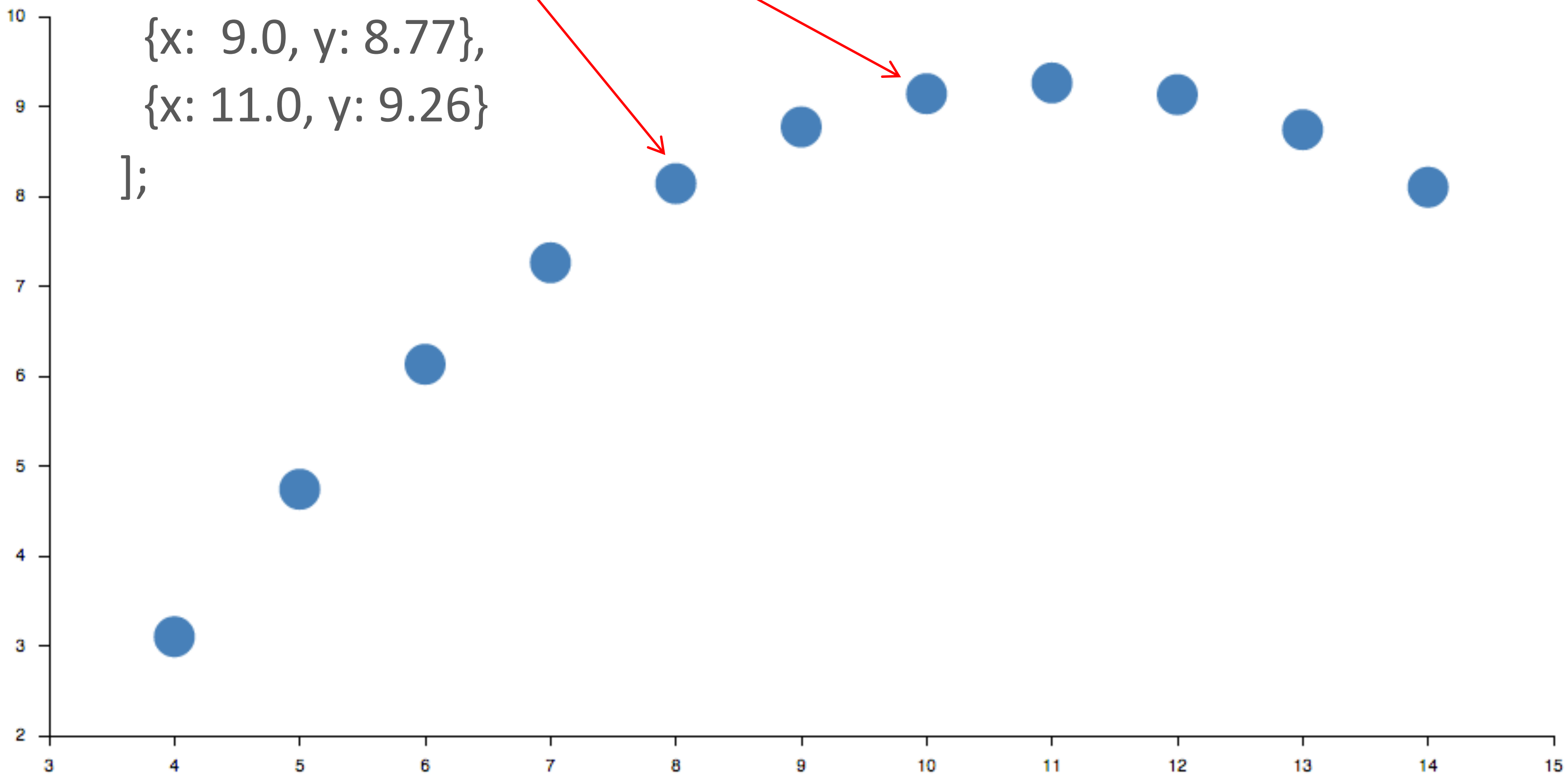
DATA CAN BE NUMBERS

```
var numbers= [1, 1, 2, 3, 5, 8];
```



DATA CAN BE OBJECTS.

```
var data = [
  {x: 10.0, y: 9.14},
  {x:  8.0, y: 8.14},
  {x: 13.0, y: 8.74},
  {x:  9.0, y: 8.77},
  {x: 11.0, y: 9.26}
];
```

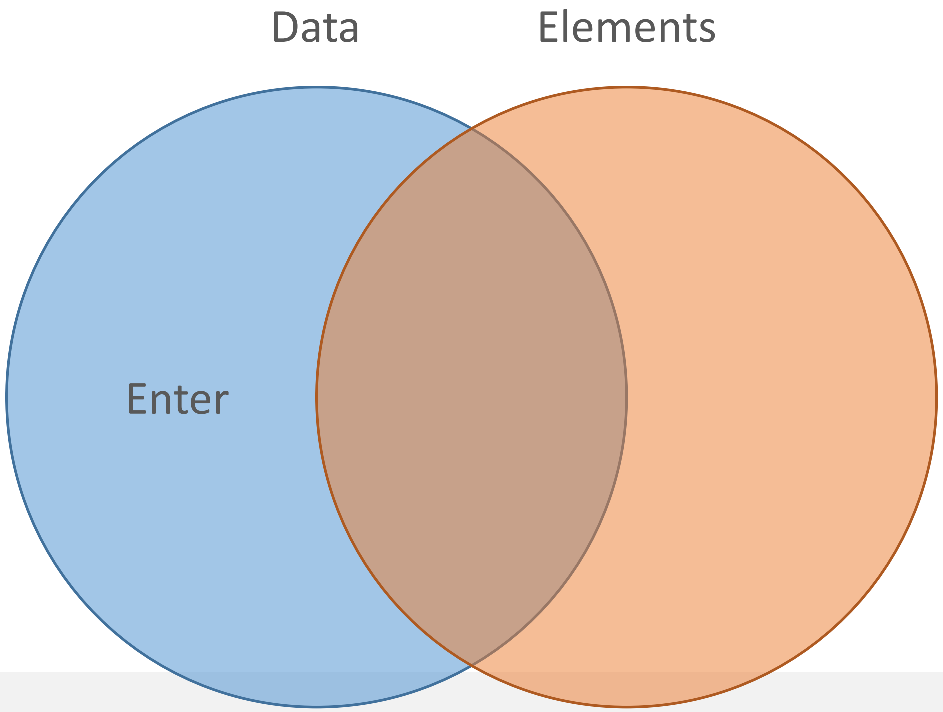


ENTER, EXIT, AND UPDATE

Thinking with Joins

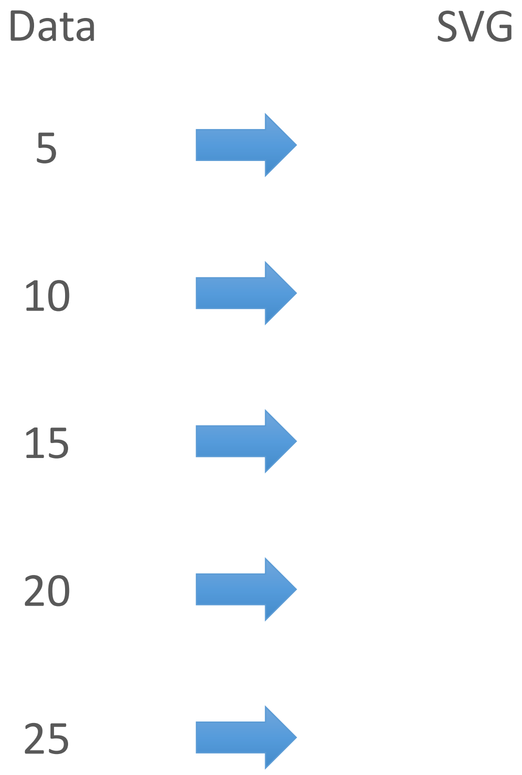
ENTER

- New data, for which there were no existing elements.



ENTERING NEW ELEMENTS

```
var numbers =
[5,10,15,20,25];
var lines =
svg.selectAll(”line")
      .data(numbers);


lines
      .enter().append(”line
");
```



Data

SVG

5

10

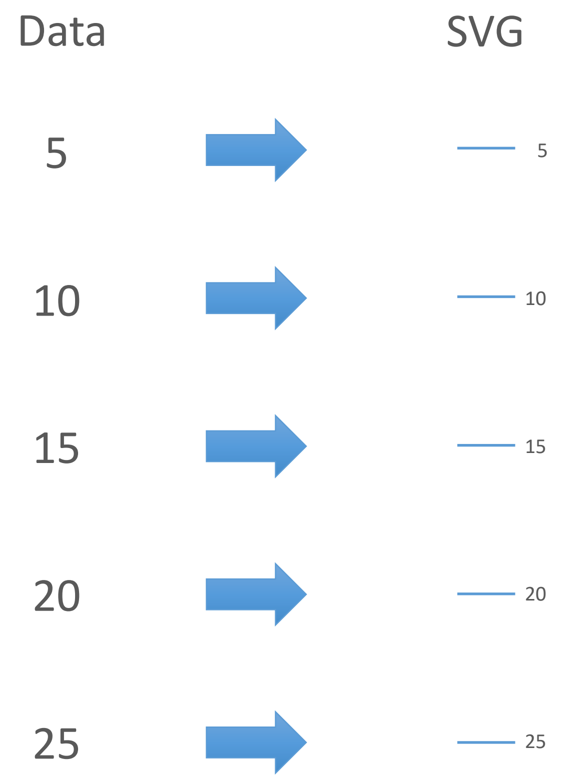
15

20

25

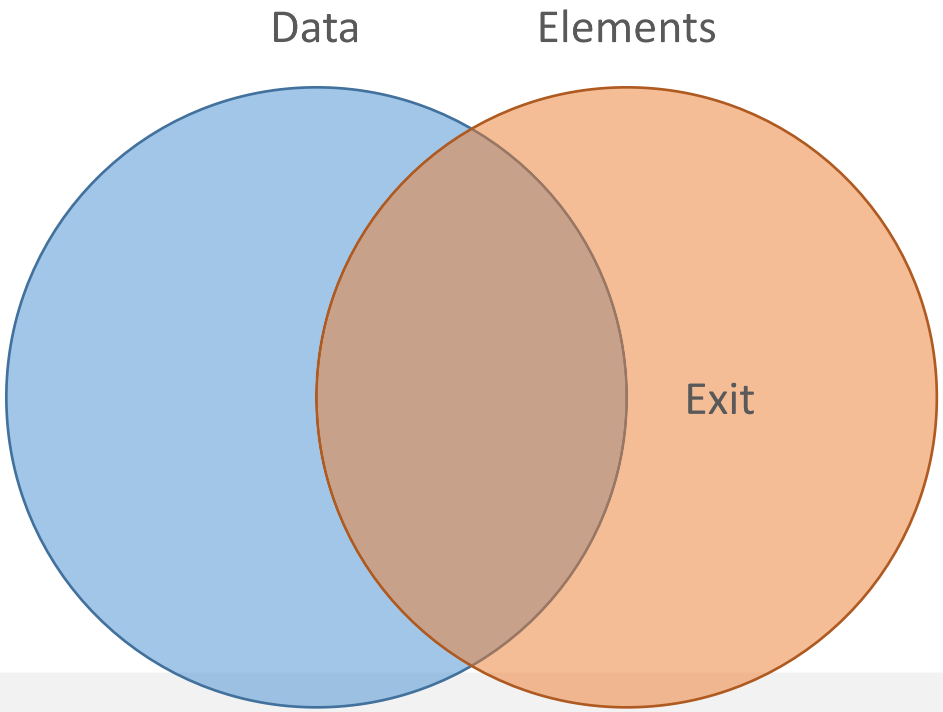
ENTERING NEW ELEMENTS

```
var numbers =
[5,10,15,20,25];
var lines =
svg.selectAll(”line")
      .data(numbers);


lines
      .enter().append(”line
");
```



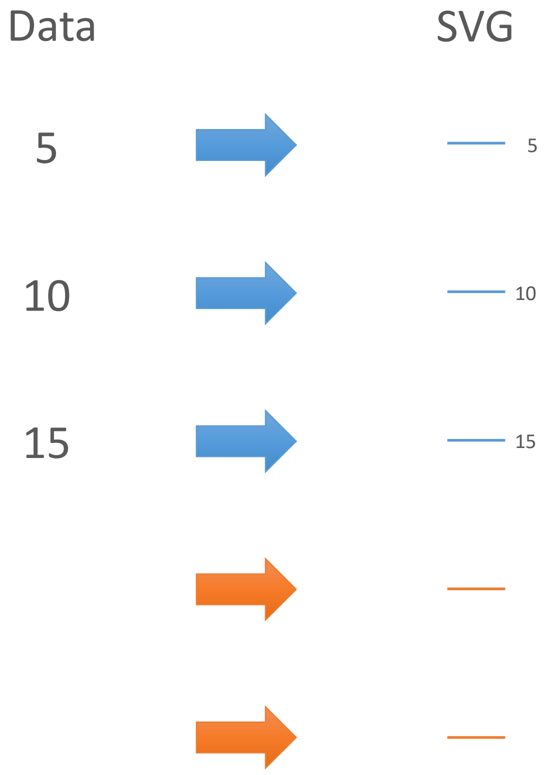
EXIT

- Elements that are associated with no data



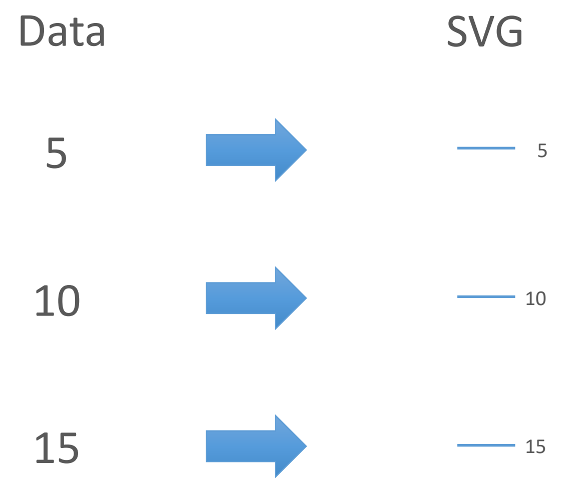
EXITING UNNECESSARY ELEMENTS

```
var numbers = [5,10,15];
var lines =
svg.selectAll(”line")
      .data(numbers);

lines
      .exit().remove();
```



ENTERING NEW ELEMENTS

```
var numbers =
[5,10,15,20,25];
var lines =
svg.selectAll(”line")
      .data(numbers);


lines
      .exit().remove();
```

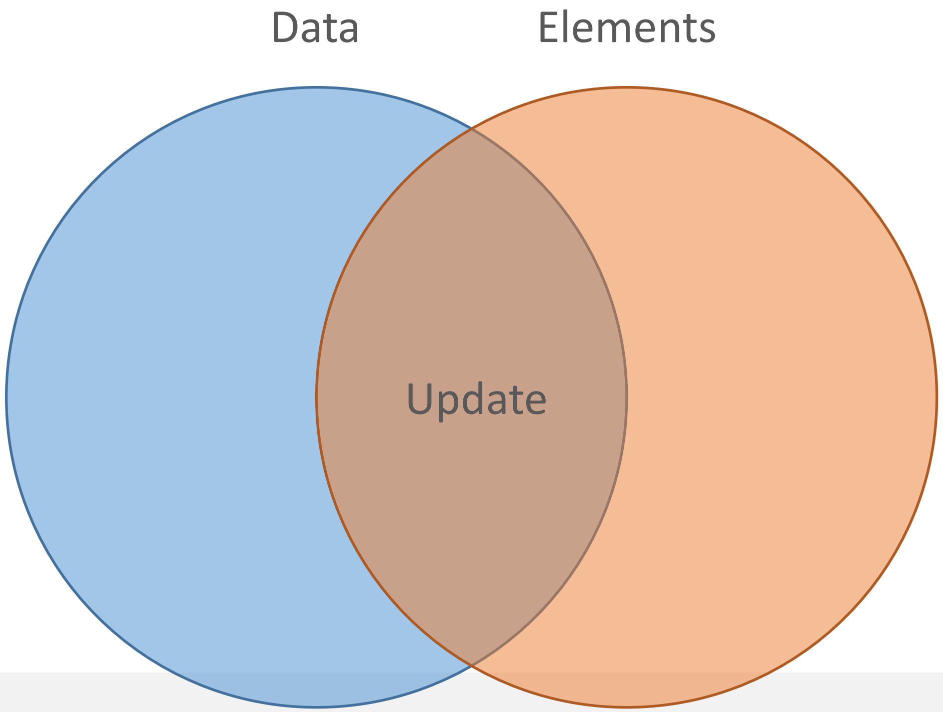


DATA ATTRIBUTES TO ELEMENTS ATTRIBUTES

Step 2

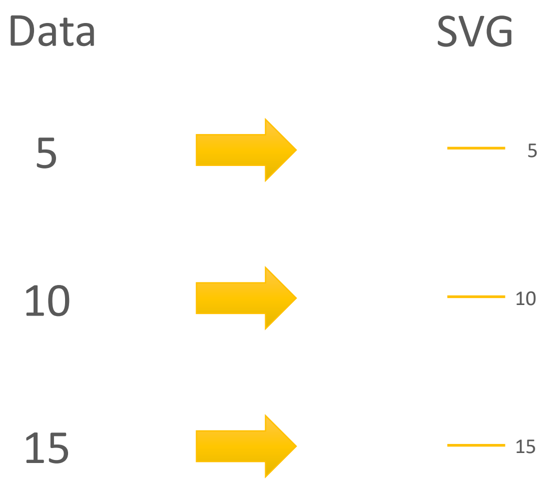
UPDATE

- Data already joined with previous elements



UPDATE EXISTING AND NEW ELEMENTS WITH NEW DATA

```
var numbers =
[5,10,15,20,25];
var lines =
svg.selectAll(”line")
      .data(numbers);

lines = lines.enter()
      .append(“line”)
      .merge(lines);

lines.attr(“x1”,10)
      .attr(“y1”,posy(d,i))
      .attr(“x2”,posx(d,i))
      .attr(“y2”,posy(d,i));
```



Data	SVG
5	5
10	10
15	15

JOINING WITH KEY FUNCTION

```
var data = [
  {name: "Locke", number: 4},
  {name: "Reyes", number: 8},
  {name: "Ford", number: 15},
  {name: "Jarrah", number: 16},
  {name: "Shephard", number: 31},
  {name: "Kwon", number: 34}
];

d3.selectAll("div")
  .data(data, function(d) { return d ? d.name : this.id; })
    .text(function(d) { return d.number; });
```

USEFUL RESOURCES

- https://d3js.org

- https://www.dashingd3js.com/
- https://github.com/mbostock/d3/wiki/API-Reference

- Tutorials
- http://bost.ocks.org/mike/d3/workshop/
- https://www.oliviavane.co.uk/tutorials/d3/about/tutorial-about

DEVELOPMENT CHECKLIST

TOOLS

- A modern browser (Chrome, Firefox, etc)
- An integrated IDE, like WebStorm for example
- Node.js and NPM installed

USING VUE.JS AND VUE.CLI

- `npm install –g vue-cli`
  - Create a command to manage Vue.js projects
- `vue init webpack-simple my-project`
- `cd my-project`
- `npm install`
- `npm run dev`
- These commands create a skeleton project configured with Vue.js

WEB PAGE PREPARATION

- Create a file HTML
- Create content for the page
- Include an empty DIV for the visualization
- Install and link D3
- Construct SVG element within the DIV element
- Optionally
  - Create and init git repository