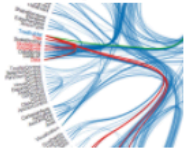
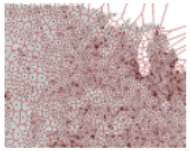
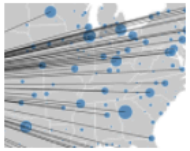
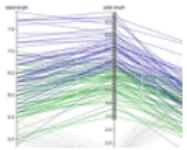
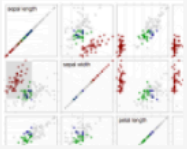
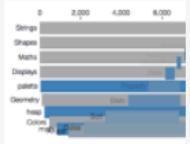
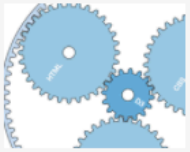
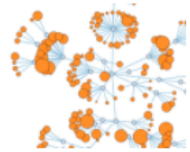
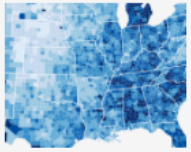
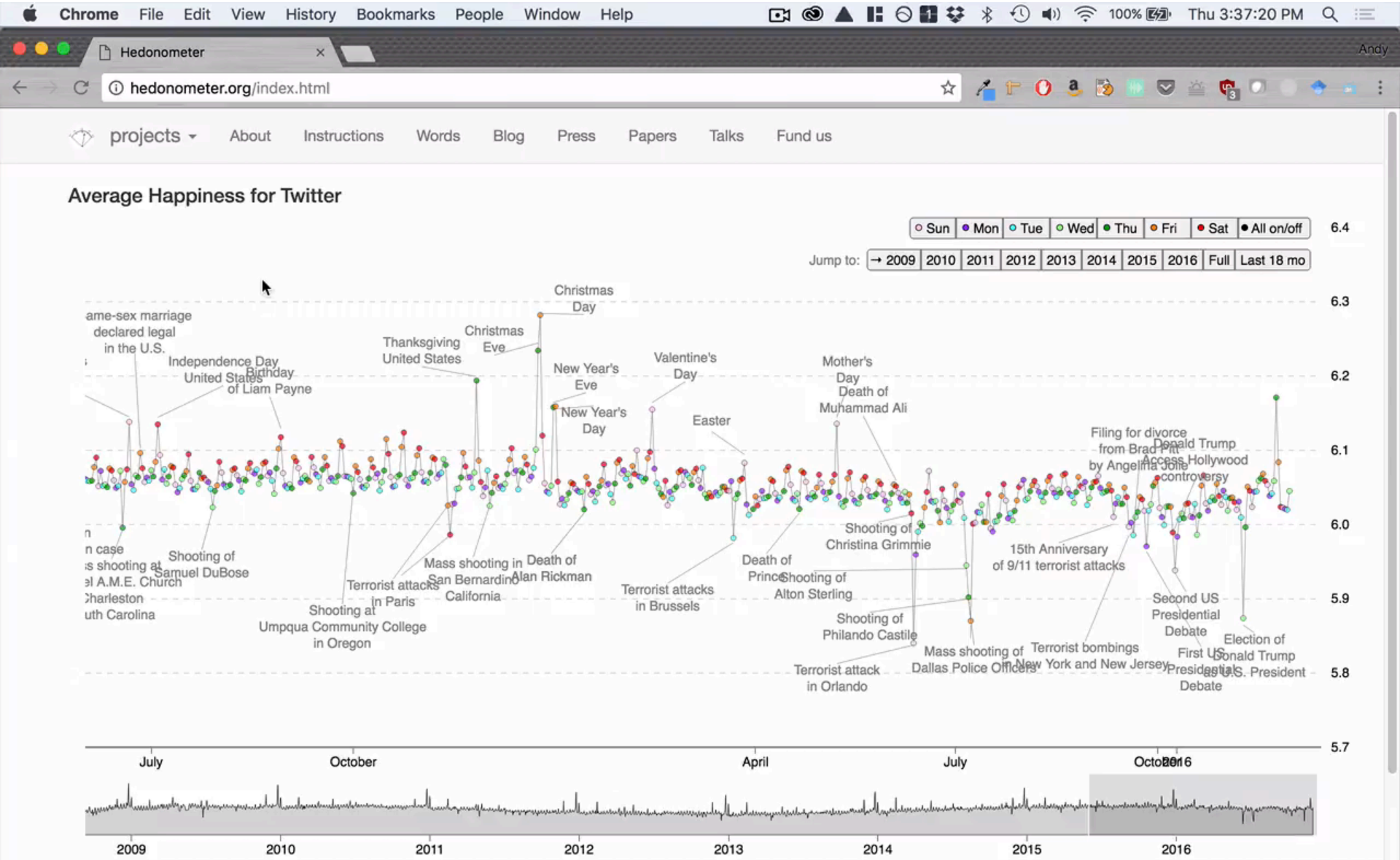
Introduction to D3

D3's Data Model

What Can D3 Build?

What Can D3 Build

Hierarchical Edge Bundling 	Voronoi Diagram 	Symbol Map 	Parallel Coordinates 
Scatterplot Matrix 	Zoomable Pack Layout 	Hierarchical Bars 	Epicyclical Gears 
Collision Detection 	Collapsible Force Layout 	Force-Directed States	Azimuthal Projections 
Choropleth 	Collapsible Tree Layout 	Zoomable Treemap 	Zoomable Partition Layout 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ame-sex marriage declared legal in the U.S.
Independence Day
United States Birthday of Liam Payne
Thanksgiving United States
Christmas Eve
Christmas Day
New Year's Eve
New Year's Day
Valentine's Day
Easter
Mother's Day
Death of Muhammad Ali
Filing for divorce from Brad Pitt by Angelina Jolie
Donald Trump Access Hollywood controversy
n case
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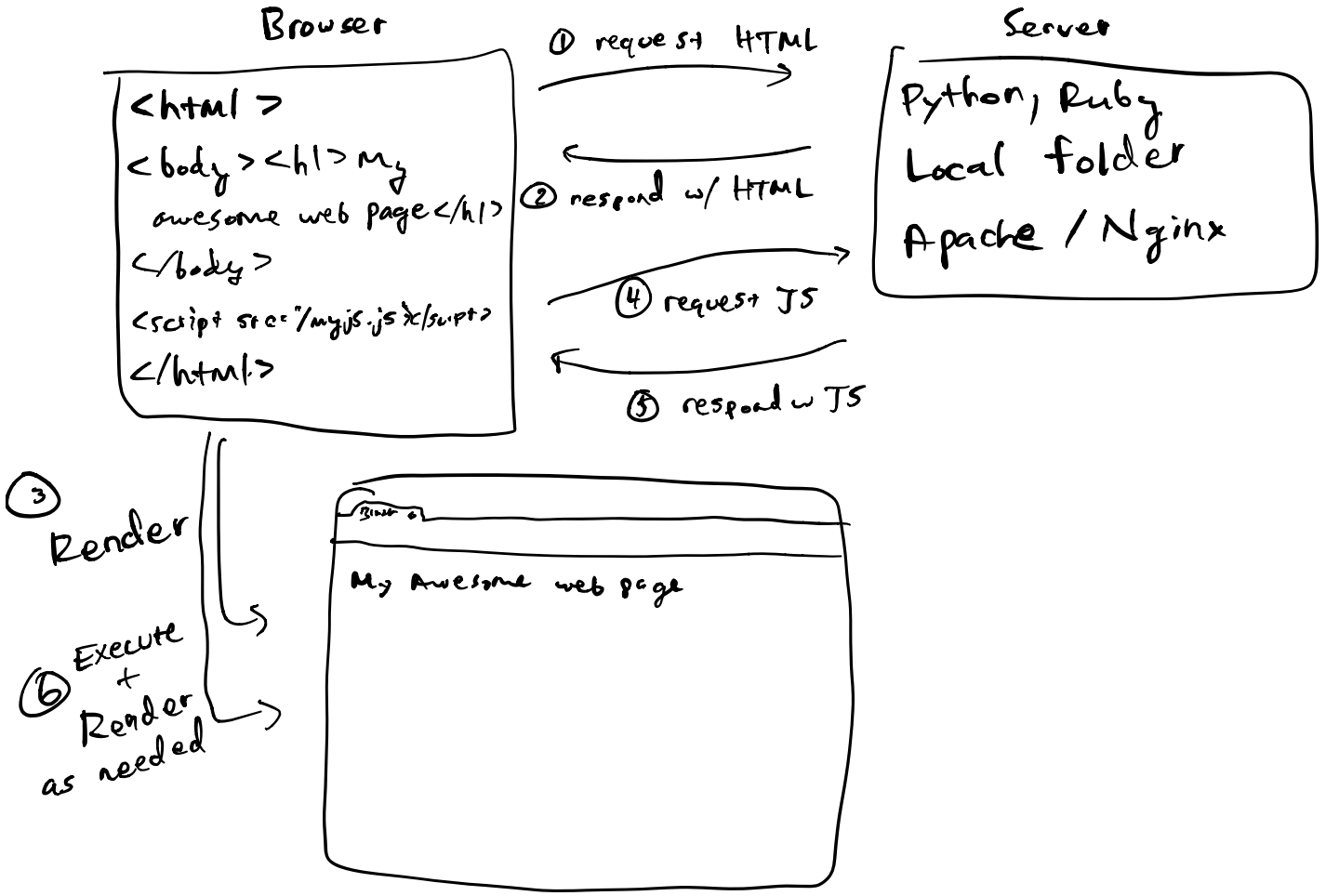
el A.M.E. Church
Charleston
uth Carolina
Shooting of Samuel DuBose
Terrorist attacks in Paris
Shooting at Umpqua Community College in Oregon
Mass shooting in San Bernardino California
Death of Alan Rickman
Terrorist attacks in Brussels
Death of Prince
Shooting of Alton Sterling
Shooting of Christina Grimmie
Shooting of Philando Castile
Terrorist attack in Orlando
Mass shooting of Dallas Police Officers
Terrorist bombings in New York and New Jersey
15th Anniversary of 9/11 terrorist attacks
Second US Presidential Debate
First US Presidential Debate
Election of Donald Trump as U.S. President
July
October
April
July
October
2009
2010
2011
2012
2013
2014
2015
2016

D3 Technologies

- HTML
- CSS
- JS
- SVG
- The DOM

Web Programming 101

We ended up with this:



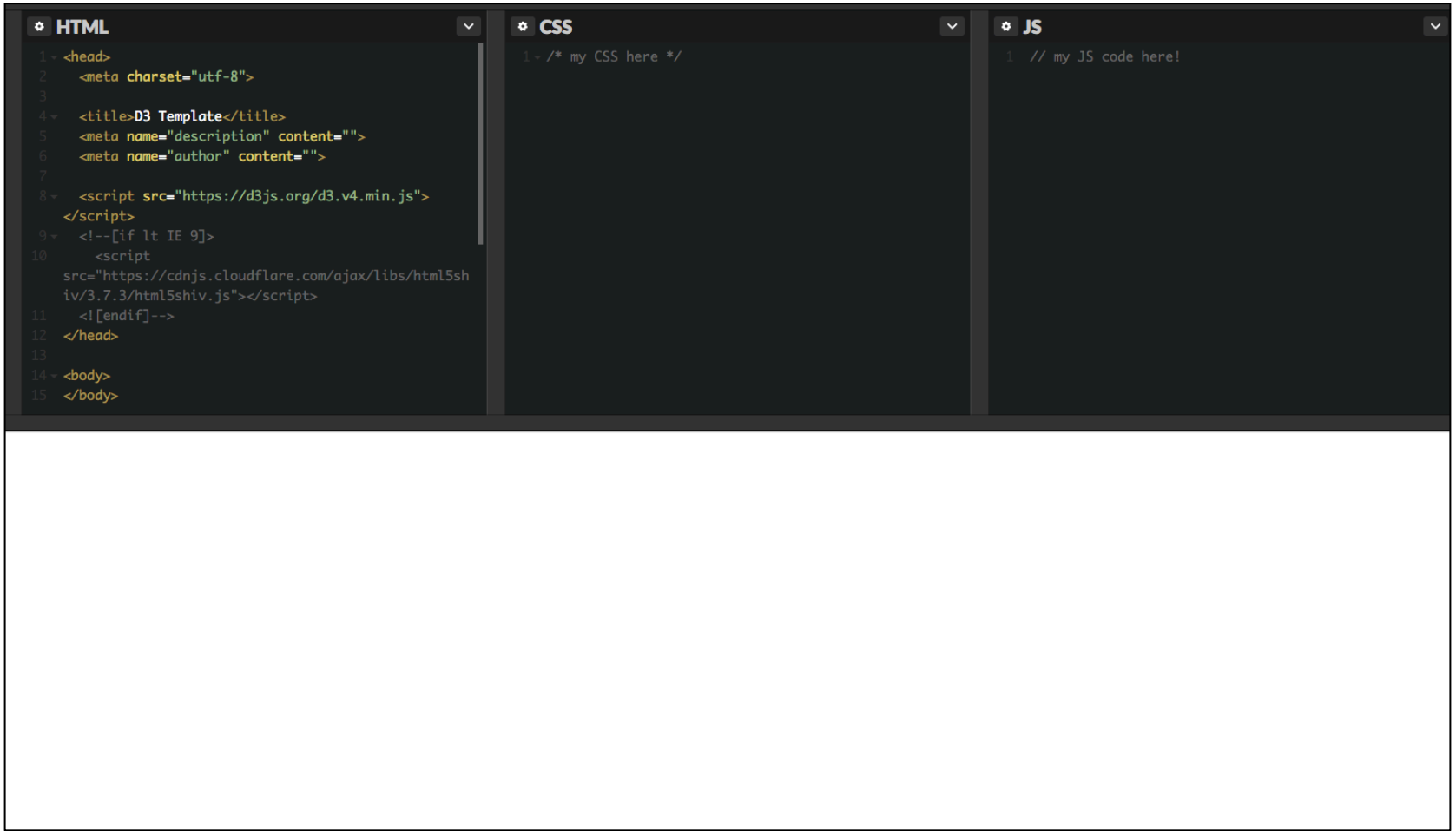
Getting Started With D3

```
<!doctype html>

<html lang="en">
<head>
  <meta charset="utf-8">

  <title>D3 Template</title>
  <meta name="description" content="">
  <meta name="author" content="">

  <link rel="stylesheet" href="css/style.css">
  <script src="https://d3js.org/d3.v4.min.js"></script>
  <!--[if lt IE 9]>
    <script src="https://cdnjs.cloudflare.com/ajax/libs/html5shiv/3.7.3/html5shiv.js"></script>
  <![endif]-->
</head>

<body>
  <script src="js/myviz.js"></script>
</body>
</html>
```

Getting Started

```
<!doctype html>

<html lang="en">
<head>
  <meta charset="utf-8">

  <title>D3 Template</title>
  <meta name="description" content="">
  <meta name="author" content="">

  <style>
    /* my CSS here */
  </style>
  <script src="https://d3js.org/d3.v4.min.js"></script>
  <!--[if lt IE 9]>
    <script src="https://cdnjs.cloudflare.com/ajax/libs/html5shiv/3.7.3/html5shiv.js"></script>
  <![endif]-->
</head>

<body>
  <script type="text/javascript">
    // my JS code here!
  </script>
</body>
</html>
```

How This Works in CodePen



D3 Arrives at Version 4

D3 is made up of many, small modules

From the D3 API Ref: https://github.com/d3/d3/blob/master/API.md

- Arrays (Statistics, Search, Transformations, Histograms)
- Axes
- Brushes
- Chords
- Collections (Objects, Maps, Sets, Nests)
- Colors
- Dispatches
- Dragging
- Delimiter-Separated Values
- Easings
- Forces
- Number Formats
- Geographies (Paths, Projections, Spherical Math, Spherical Shapes, Streams, Transforms)
- Hierarchies
- Interpolators
- Paths
- Polygons
- Quadtrees
- Queues
- Random Numbers
- Requests
- Scales (Continuous, Sequential, Quantize, Ordinal)
- Selections (Selecting, Modifying, Data, Events, Control, Local Variables, Namespaces)
- Shapes (Arcs, Pies, Lines, Areas, Curves, Symbols, Stacks)
- Time Formats
- Time Intervals
- Timers
- Transitions
- Voronoi Diagrams
- Zooming

History: From Protovis to D3

Described in *D3: Data-Driven Documents*
http://idl.cs.washington.edu/papers/d3

Elaboration on the design of D3 API in *What Makes Software Good*
https://medium.com/@mbostock/what-makes-software-good-943557f8a488

How Not to Learn D3

Use only existing templates.

Let's Get Started

The most important module in D3 is the selection: `d3.selection()`.

D3 works by creating, updating, modifying, and removing selections.

Always reference the API docs when it's unclear: https://github.com/d3/d3-selection

Selecting an Element

```
var div = document.createElement("div");
div.innerHTML = "Hello, world!";
document.body.appendChild(div);
```

Selecting an Element

```
var body = d3.select("body");
var div = body.append("div");
div.html("Hello, world!");
```

Selecting (Many) Elements

```
var section = d3.selectAll("section");
var div = section.append("div");
div.html("Hello, world!");
```

Chaining Methods

```
var body = d3.select("body");
body.style("color", "black");
body.style("background-color", "white");
```

Chaining Methods

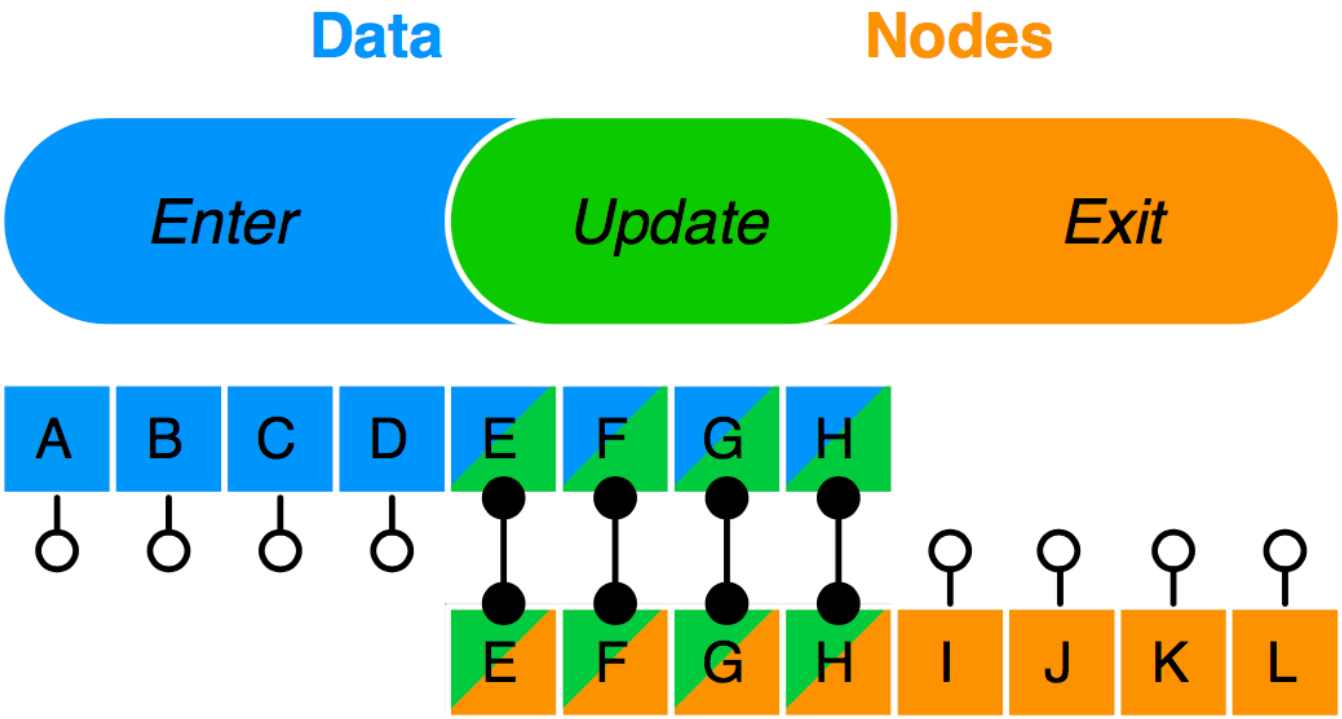
```
d3.select("body")
    .style("color", "black")
    .style("background-color", "white");
```

Chaining Methods

```
d3.selectAll("section")
    .attr("class", "special")
  .append("div")
    .html("Hello, world!");
```

Store Selection in Variables

```
var section = d3.selectAll("section");

section.append("div")
    .html("First!");

section.append("div")
    .html("Second.");
```


Data
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