D3 + Angular.Js

Visualizing Data streams using Angular & D3.js

Our Story

- We get real-time Check-in data from Storm and we want to visualize it.
- We would like to integrate our visualization as a part of an Angular.JS Dashboard application.

Data Visualization Tools

- **Google Charts** - Free, lots of options, good docs, Google Spreadsheets integration, Dashboard API. Cloud-only, close-sourced.
- **Highcharts JS** - Free for non-commercial, Open source, export to PDF.
- **Kartograph** - Interactive vector maps framework

Some Background

Graphics in Browser

Bitmap / Raster

JPEG, PNG, GIF

- Supported in older browsers
- Good for images

Vector

Flash, SVG, VML

- Can scale dynamically
- Can be manipulated
- Can be animated
- Charts & drawings

Scalable Vector Graphics

Open XML format, W3C standard since 2001.

Browser support for SVG:

IE9+, Firefox, Chrome, Safari, Android 3+

SVG Filter support:

IE10+, Safari6+, iOS 6+, Android 4.4+

Arrow Functions

- Part of ES6 specification (Project Harmony)
- Already available in Firefox since V22
- Write `x => x + 5`

  Instead of `function (x) { return x + 5; }`
- Very useful with D3.JS

D3.JS

D3.JS - Data-oriented jQuery

- Open source library, first released in 2011
- D3 = Data Driven Documents
- "Speaks" SVG, knows Math & Geometry
- DOM Manipulation methods
- Binds data to DOM

D3 Basics

```
// Selecting elements (like $ in jQuery)
var elements = d3.selectAll('p');

// Manipulating selected elements
elements.style('background-color', 'red').text('Hi!');

// Binding data to elements
elements.data([50, 60, 85]).style('width', d => d + 'px');
elements.text(d => d + '%');
```

D3 Enter

```
var data = [10, 50, 60, 40];
var colors = ['pink', 'yellow', 'cyan', 'magenta'];
var elements = d3.select('div').selectAll('p');
elements.data(data).enter()
// D3 will create new P element each data item
        .append('p').text(d => d + '%')
        .style('width', d => d * 5 + 'px')
        .style('background', (d, i) => colors[i])
```

Live Demo

Let's SVG!

```
var data = [10, 62, 100, 40].sort((a,b) => b-a);
var colors = ['red', 'green', 'yellow', 'blue'];
var circles = d3.select('svg').selectAll('circle');
circles.data(data).enter()
       .append('circle')
       .attr('cx', 125).attr('cy', 125)
       .attr('r', d => d)
       .style('fill', (d, i) => colors[i]);
```

Live Demo

Events & Animations

```
function animate() {
    d3.select(this)
    .transition().duration(500).attr('r', 100)
    .transition().duration(500).attr('r', d => d);
}


circles.…
     .on('mousedown', animate);
```

Live Demo

Angular.JS

Angular.JS

- Popular MC* Framework by Google
- Large community, Enterprise adoption
- Extend HTML capabilities with Directives and two-way Data-Binding
- Dependency Injection, Application Architecture and Easy-to-Test code

Angular.JS - Directives

- Define reusable components
- Extends HTML vocabulary
- Pass information through attributes & callback events.
- Components can be isolated from the surrounding scope.

Building a liveMap directive

```
app.directive('liveMap', () => ({
  scope: {data: '=checkinData'},
  link: (scope, element, attr) => {
    var svg = d3.select(element[0]).append('svg')…;
    scope.$watch('data', value => {
      var circles = svg.selectAll('circle').data(value);
      circles.transition(1000).attr…;
      circles.enter().append('circle').attr…;
      circles.exit().remove();
    });
}}));
```

liveMap directive in action!

Live demo!

Code: https://github.com/urish/d3-angularjs-demo

Learn More

NVD3

- Reusable charts and charts components for use with D3.
- Open source & has angular.js module
- Gallery of examples:

http://nvd3.org/examples/index.html

Great Resources

- The Big List of D3.JS Examples
- Tutorials from D3.JS Wiki
- Dashing D3 Tutorial

Play with Google Charts

- View the Chart Gallery & docs online:

https://developers.google.com/chart/interactive/docs/gallery

- Experiment with code at the Playground:

https://code.google.com/apis/ajax/playground/?type=visualization