D3

Data-Driven Documents

Overview Examples Documentation Source

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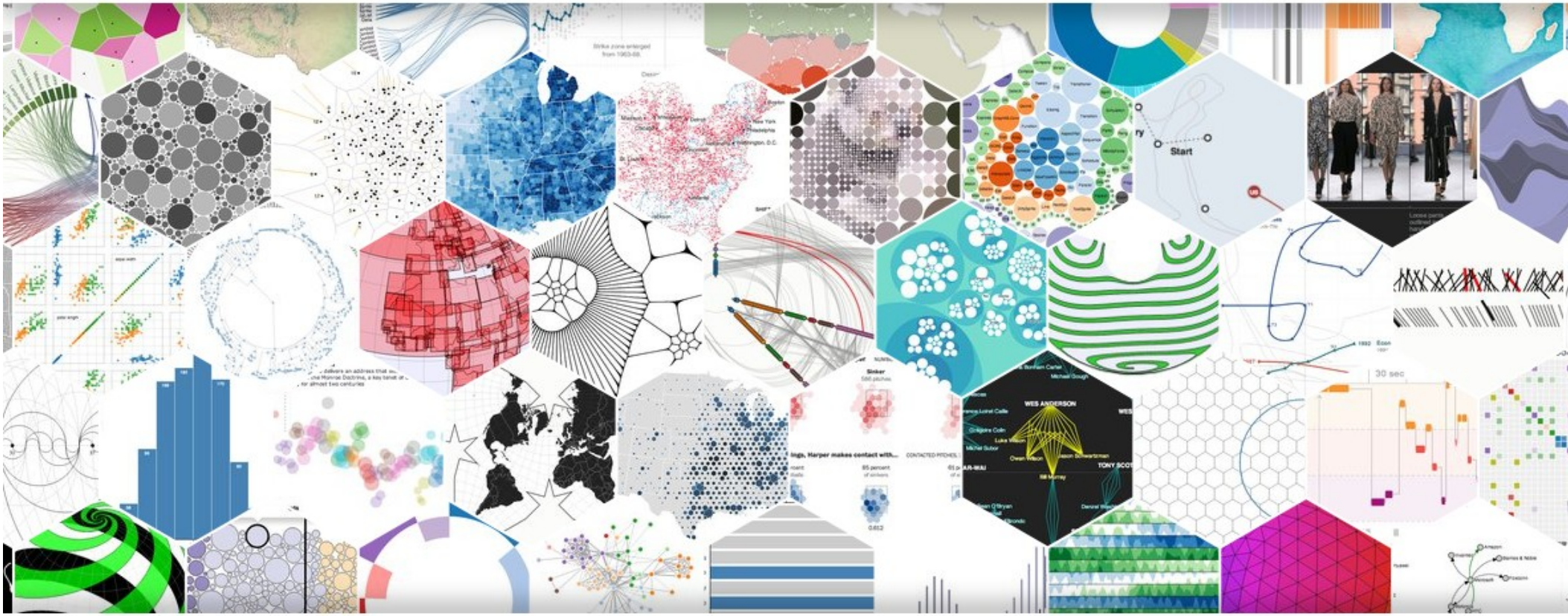
Data-Driven Documents



D3.js is a JavaScript library for manipulating documents based on data. **D3** helps you bring data to life using HTML, SVG, and CSS. D3's emphasis on web standards gives you the full capabilities of modern browsers without tying yourself to a proprietary framework, combining powerful visualization components and a data-driven approach to DOM manipulation.

See more examples.

D3

- Αποτελεί την εξέλιξη του εργαλείου Protovis
- Επιτρέπει την διαχείριση δεδομένων μίας ιστοσελίδας
- Είναι υλοποιημένη με JavaScript, την περισσότερο διαδεδομένη γλώσσα στον κόσμο
- Χρησιμοποιεί Scalable Vector Graphics (SVG)
- Βασίζεται στο Document Object Model (DOM)

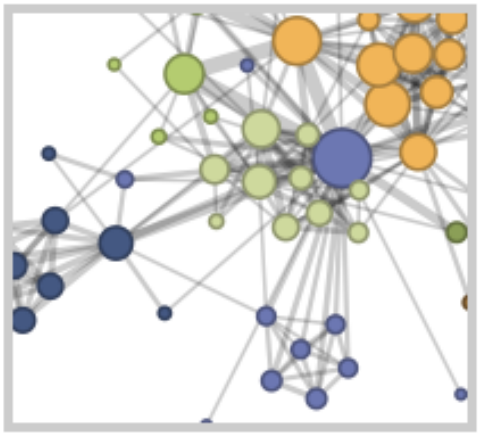
D3.js

- Είναι μία βιβλιοθήκη της JavaScript που μας δίνει την δυνατότητα να διαχειριστούμε Documents βασισμένα σε δεδομένα
- Η τελευταία έκδοση είναι η 5.7.0
- Γράφτηκε από τον Mike Bostock
- Μπορεί να ενσωματωθεί και σαν σύνδεσμος στις ιστοσελίδες μας με το παρακάτω snippet:

```
<script src="https://d3js.org/d3.v5.min.js"></script>
```

D3 – μετεξέλιξη του Protovis

Gallery



Force-Directed Layout

Protovis A GRAPHICAL APPROACH TO VISUALIZATION

Protovis composes custom views of data with simple marks such as bars and dots. Unlike low-level graphics libraries that quickly become tedious for visualization, Protovis defines marks through dynamic properties that encode data, allowing inheritance, scales and layouts to simplify construction.

Protovis is free and open-source, provided under the BSD License. It uses JavaScript and SVG for web-native visualizations; no plugin required (though you will need a modern web browser)! Although programming experience is helpful, Protovis is mostly declarative and designed to be learned by example.

Protovis is no longer under active development.

The final release of Protovis was v3.3.1 (4.7 MB). The Protovis team is now developing a new visualization library, **D3.js**, with improved support for animation and interaction. D3 builds on many of the concepts in Protovis; for more details, please read the introduction and browse the examples.

Protovis vs. D3

- Το D3 είναι καλύτερο για δυναμικό περιεχόμενο, animation και αλληλεπίδραση
- Το D3 έχει μεγαλύτερη ολοκλήρωση με τους browsers, επειδή χρησιμοποιεί απευθείας αντικείμενα του SVG και όχι ενδιάμεσες δομές
- Έχουν κοινή σχεδίαση και τον ίδιο κατασκευαστή
- Επειδή η τεχνολογία του Διαδικτύου εξελίσσεται είναι απαραίτητο να περνάμε σε νέες εφαρμογές εάν υφίστανται

Το D3 βασίζεται σε τέσσερεις τεχνολογίες:

1) HTML

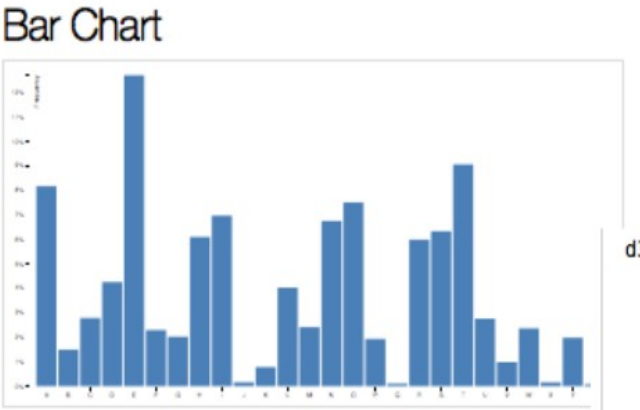
2) CSS

3) JavaScript

4) SVG

Data-Driven Documents

“D3 Code”

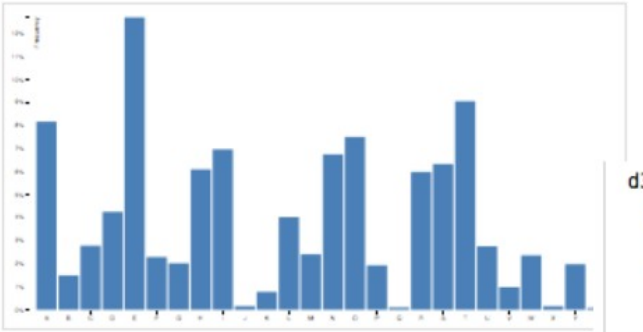


index.html

```
<!DOCTYPE html>
<meta charset="utf-8">
<style>

.bar {
  fill: steelblue;
}

.bar:hover {
  fill: brown;
}

.axis {
  font: 10px sans-serif;
}

.axis path,
.axis line {
  fill: none;
  stroke: #000;
  shape-rendering: crispEdges;
}

.x.axis path {
  display: none;
}

</style>
<body>
<script src="http://d3js.org/d3.v3.min.js"></script>
<script>

var margin = {top: 20, right: 20, bottom: 30, left: 40},
    width = 960 - margin.left - margin.right,
    height = 500 - margin.top - margin.bottom;

var x = d3.scale.ordinal()
    .rangeRoundBands([0, width], .1);

var y = d3.scale.linear()
    .range([height, 0]);

var xAxis = d3.svg.axis()
    .scale(x)
    .orient("bottom");

var yAxis = d3.svg.axis()
    .scale(y)
    .orient("left")
    .ticks(10, "%");

var svg = d3.select("body").append("svg")
    .attr("width", width + margin.left + margin.right)
    .attr("height", height + margin.top + margin.bottom)
  .append("g")
    .attr("transform", "translate(" + margin.left + "," + margin.top + ")");

d3.tsv("data.tsv", type, function(error, data) {
  x.domain(data.map(function(d) { return d.letter; }));
  y.domain([0, d3.max(data, function(d) { return d.frequency; })]);

  svg.append("g")
      .attr("class", "x axis")
      .attr("transform", "translate(0," + height + ")")
      .call(xAxis);

  svg.append("g")
      .attr("class", "y axis")
      .call(yAxis)
    .append("text")
      .attr("transform", "rotate(-90)")
      .attr("y", 6)
      .attr("dy", ".71em")
      .style("text-anchor", "end")
      .text("Frequency");

  svg.selectAll(".bar")
      .data(data)
    .enter().append("rect")
      .attr("class", "bar")
      .attr("x", function(d) { return x(d.letter); })
      .attr("width", x.rangeBand())
      .attr("y", function(d) { return y(d.frequency); })
      .attr("height", function(d) { return height - y(d.frequency);

});

function type(d) {
  d.frequency = +d.frequency;
  return d;
}

</script>
```

HTML SVG CSS

Bar Chart



index.html

```
<!DOCTYPE html>
<meta charset="utf-8">
<style>

.bar {
  fill: steelblue;
}

.bar:hover {
  fill: brown;
}

.axis {
  font: 10px sans-serif;
}

.axis path,
.axis line {
  fill: none;
  stroke: #000;
  shape-rendering: crispEdges;
}

.x.axis path {
  display: none;
}

</style>
```

```
<body>
<script src="http://d3js.org/d3.v3.min.js"></script>
<script>

var margin = {top: 20, right: 20, bottom: 30, left: 40},
    width = 960 - margin.left - margin.right,
    height = 500 - margin.top - margin.bottom;

var x = d3.scale.ordinal()
    .rangeRoundBands([0, width], .1);

var y = d3.scale.linear()
    .range([height, 0]);

var xAxis = d3.svg.axis()
    .scale(x)
    .orient("bottom");

var yAxis = d3.svg.axis()
    .scale(y)
    .orient("left")
    .ticks(10, "%");

var svg = d3.select("body").append("svg")
    .attr("width", width + margin.left + margin.right)
    .attr("height", height + margin.top + margin.bottom)
  .append("g")
    .attr("transform", "translate(" + margin.left + "," + margin.top + ")");
```

```
d3.tsv("data.tsv", type, function(error, data) {
  x.domain(data.map(function(d) { return d.letter; }));
  y.domain([0, d3.max(data, function(d) { return d.frequency; })]);

  svg.append("g")
      .attr("class", "x axis")
      .attr("transform", "translate(0," + height + ")")
      .call(xAxis);

  svg.append("g")
      .attr("class", "y axis")
      .call(yAxis)
    .append("text")
      .attr("transform", "rotate(-90)")
      .attr("y", 6)
      .attr("dy", ".71em")
      .style("text-anchor", "end")
      .text("Frequency");

  svg.selectAll(".bar")
      .data(data)
    .enter().append("rect")
      .attr("class", "bar")
      .attr("x", function(d) { return x(d.letter); })
      .attr("width", x.rangeBand())
      .attr("y", function(d) { return y(d.frequency); })
      .attr("height", function(d) { return height - y(d.frequency); });

});

function type(d) {
  d.frequency = +d.frequency;
  return d;
}

</script>
```

Hello HTML

index.html

```
1  <!DOCTYPE html>
2  <html>
3    <head>
4      <meta charset="utf-8">
5      <title>Basic HTML Page</title>
6    </head>
7    <body>
8      Hello HTML!
9    </body>
10 </html>
```

Hello SVG

index.html

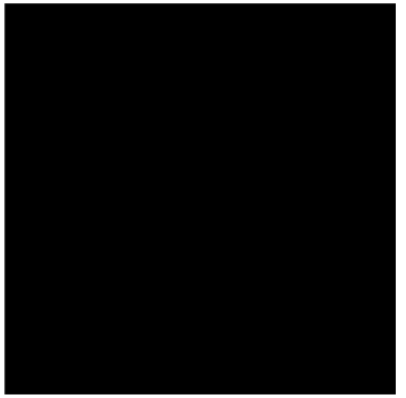
```
1  <!DOCTYPE html>
2  <html>
3    <head>
4      <meta charset="utf-8">
5      <title>SVG Example</title>
6    </head>
7    <body>
8
9      <svg>
10       <rect width="100" height="100"></rect>
11     </svg>
12
13   </body>
14 </html>
```

Default SVG size

```
<!DOCTYPE html>
<html>
  <head>
    <meta charset="utf-8">
    <title>SVG Example</title>
  </head>
  <body>

    <svg>
      <rect width="250" height="250"></rect>
    </svg>

  </body>
</html>
```

Specify SVG Dimensions

```
<!DOCTYPE html>
<html>
  <head>
    <meta charset="utf-8">
    <title>SVG Example</title>
  </head>
  <body>

    <svg width="250" height="250">
      <rect width="250" height="250"></rect>
    </svg>

  </body>
</html>
```

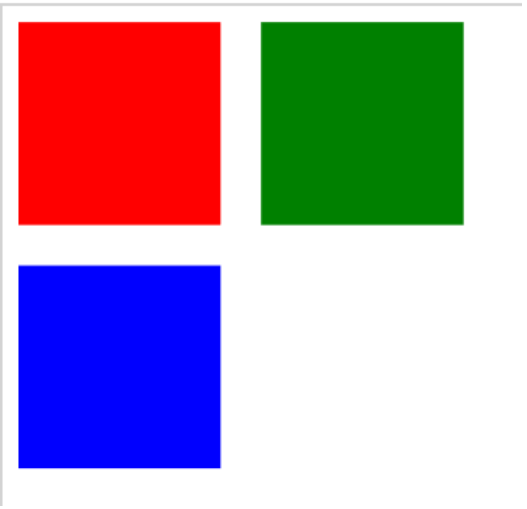


Adding (x, y) coordinates

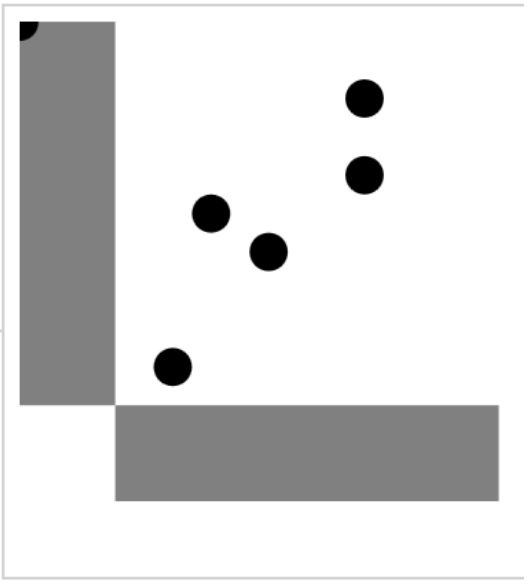
```
<!DOCTYPE html>
<html>
  <head>
    <meta charset="utf-8">
    <title>SVG Example</title>
  </head>
  <body>

    <svg width="250" height="250">
      <rect x="50" y="50" width="20" height="20"></rect>
    </svg>

  </body>
</html>
```

Χρώμα με CSS Color Strings

```
<!DOCTYPE html>
<html>
  <head>
    <meta charset="utf-8">
    <title>SVG Example</title>
  </head>
  <body>

    <svg width="250" height="250">
      <rect x="0"   y="0" width="100" height="100" fill="red"></rect>
      <rect x="120" y="0" width="100" height="100" fill="green"></rect>
      <rect x="0" y="120" width="100" height="100" fill="blue"></rect>
    </svg>

  </body>
</html>
```



Ψευτο-Scatter Plot

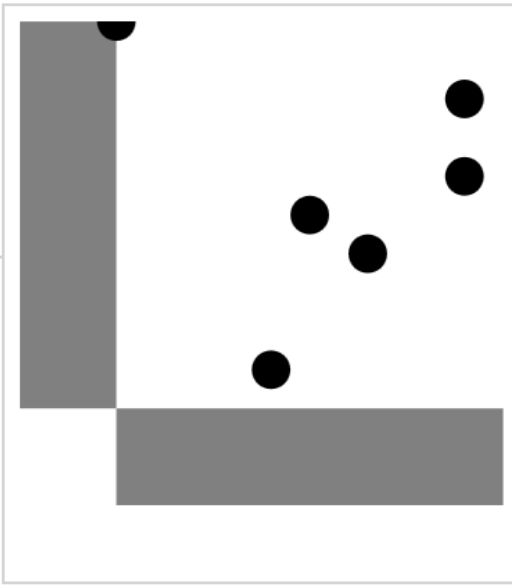


index.html

```
<!DOCTYPE html>
<html>
  <head>
    <meta charset="utf-8">
    <title>SVG Example</title>
  </head>
  <body>

    <svg width="250" height="250">

      <rect x="0"  y="0"   width="50"  height="200" fill="gray"/>
      <rect x="50" y="200" width="200" height="50"  fill="gray"/>

      <circle cx="0"   cy="0"   r="10"/>
      <circle cx="100" cy="100" r="10"/>
      <circle cx="130" cy="120" r="10"/>
      <circle cx="80"  cy="180" r="10"/>
      <circle cx="180" cy="80"  r="10"/>
      <circle cx="180" cy="40"  r="10"/>

    </svg>

  </body>
</html>
```

“g” για groups

- group transform applies to child elements

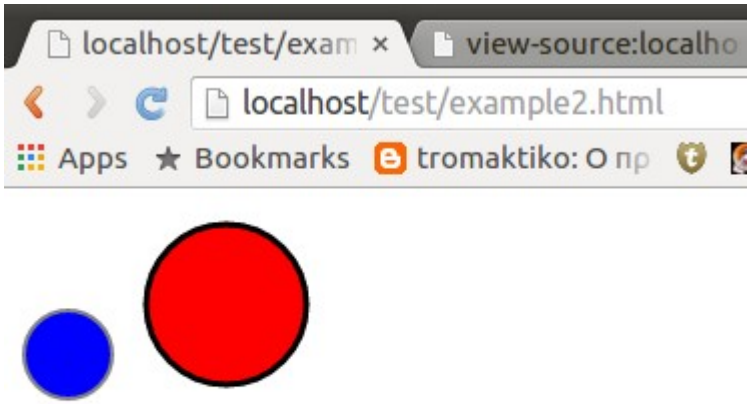


index.html

```
<!DOCTYPE html>
<html>
  <head>
    <meta charset="utf-8">
    <title>SVG Example</title>
  </head>
  <body>

    <svg width="250" height="250">

      <rect x="0"  y="0"   width="50"  height="200" fill="gray"/>
      <rect x="50" y="200" width="200" height="50"  fill="gray"/>

      <g transform="translate(50, 0)">
        <circle cx="0"   cy="0"   r="10"/>
        <circle cx="100" cy="100" r="10"/>
        <circle cx="130" cy="120" r="10"/>
        <circle cx="80"  cy="180" r="10"/>
        <circle cx="180" cy="80"  r="10"/>
        <circle cx="180" cy="40"  r="10"/>
      </g>

    </svg>

  </body>
</html>
```

Παράδειγμα SVG

```
<svg width="50" height="50">
      <circle cx="25" cy="25" r="22"
      fill="blue" stroke="gray" stroke-width="2"/>
</svg>

<svg height="100" width="100">
  <circle cx="50" cy="50" r="40" stroke="black" stroke-width="3" fill="red" />
</svg>
```



Πρώτο παράδειγμα

```
<!doctype html>
<html>

<head>
    <meta charset="utf-8">
    <title>D3 tutorial</title>
    <script src="d3/d3.js"></script>
</head>

<body>


    <script type="text/javascript">
        d3.select("body").append("p").text("Hello this is D3");
    </script>

</body>
```

Δεύτερο παράδειγμα α

```
<!doctype html>
<html>

<head>
	<meta charset="utf-8">
	<title>D3 tutorial 2</title>
	<script src="d3/d3.min.js"></script>
</head>

<body>
	<p>This is a paragraph</p>
	<p>This is a second paragraph</p>
	<script>
		d3.select("p").text("Hello this is D3");
	</script>

</body>
</html>
```

Δεύτερο παράδειγμα β

```
<!doctype html>
<html>

<head>
	<meta charset="utf-8">
	<title>D3 tutorial 2</title>
	<script src="d3/d3.min.js"></script>
</head>

<body>
	<p>This is a paragraph</p>
	<p>This is a second paragraph</p>
	<script>
		d3.selectAll("p").text("Hello this is D3");
	</script>

</body>
</html>
```

Δεύτερο παράδειγμα γ

```
<!doctype html>
<html>

<head>
	<meta charset="utf-8">
	<title>D3 tutorial 2</title>
	<script src="d3/d3.min.js"></script>
</head>

<body>
	<p>This is a paragraph</p>
	<p id='secondPar'>This is a second paragraph</p>
	<script>
		d3.select("p").text("Hello this is D3");
		d3.select("#secondPar").text("Hello this is D3 again");
	</script>

</body>
</html>
```

Τρίτο παράδειγμα

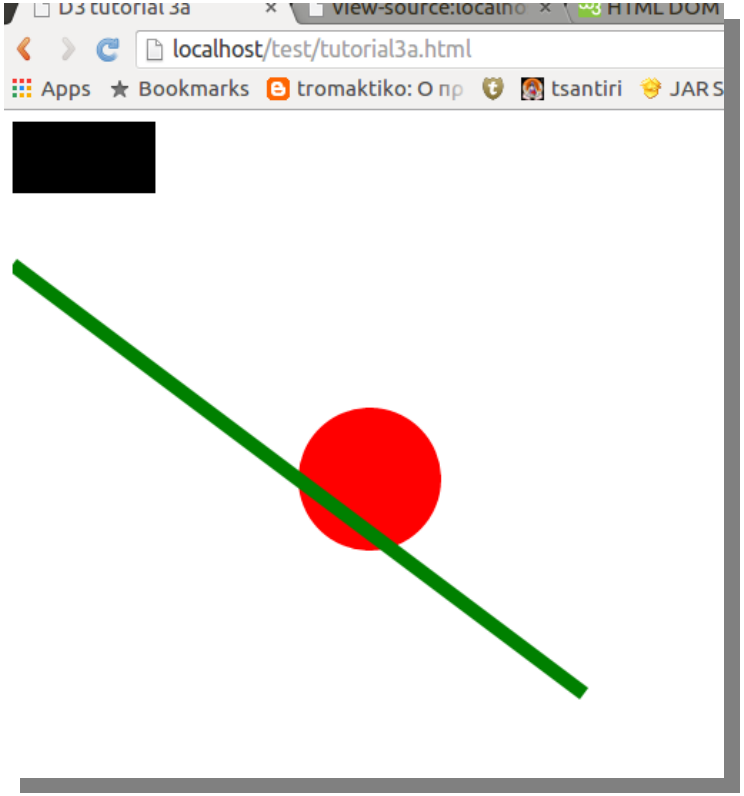
```
<!doctype html>
<html>

<head>
	<meta charset="utf-8">
	<title>D3 tutorial 3</title>
	<script type="text/javascript" src="d3/d3.min.js"></script>
</head>

<body>

	<script type="text/javascript">

		d3.select("body")
			.append("p")
			.style("color", "red")
			.text("Hello this is D3");

	</script>

</body>
```

SVG μέσω D3

```
<!doctype html>
<html>

<head>
	<meta charset="utf-8">
	<title>D3 tutorial 3a</title>
	<script type="text/javascript" src="d3/d3.min.js"></script>
</head>

<body>
	<script type="text/javascript">

	var canvas = d3.select("body")
			.append("svg")
			.attr("width", "500")
			.attr("height", "500");
```

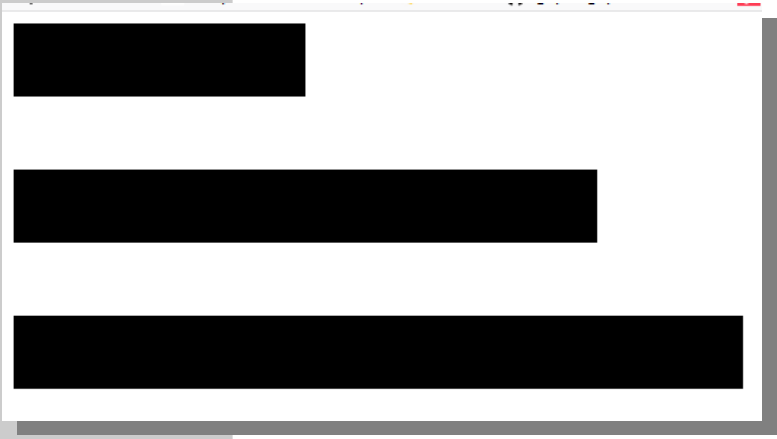
SVG μέσω D3

```
    var circle = canvas.append("circle")
                .attr("cx", "250")
                .attr("cy", "250")
                .attr("r", 50)
                .attr("fill", "red");

    var rect = canvas.append("rect")
                .attr("width", "100")
                .attr("height", "50");

    var line = canvas.append("line")
                .attr("x1", "0")
                .attr("y1", "100")
                .attr("x2", "400")
                .attr("y2", "400")
                .attr("stroke", "green")
                .attr("stroke-width","10");
    </script>
</body>
```



Απλό Bar Graph

```
<!doctype html>
<html>
<head>
	<meta charset="utf-8">
	<title>D3 tutorial</title>
	<script src="https://d3js.org/d3.v5.min.js" charset="utf-8"></script>
</head>

<body>
	<script type="text/javascript">
		var dataArray = [20, 40, 50];

		var canvas = d3.select("body")
			.append("svg")
			.attr("width", 500)
			.attr("height", 500);

		var bars = canvas.selectAll("rect")
			.data(dataArray)
			.enter()
				.append("rect")
				.attr("width", function(d) { return d * 10;})
				.attr("height", 50)
				.attr("y", function(d, i) { return i * 100 });
	</script>
</body>
</html>
```



Αρχείο JSON


```
[
 {
  "status": ["Άψογο σέρβις"],
  "name": ["Μήτσος Καραμήτσος"],
  "url": [null],
  "text": ["text bla-bla.."],
  "plannedworkheadline": [null],
  "Time": [" 7:35AM"],
  "Date": ["12/15/2011"]
 },
 {
  "status": ["Καλή υπηρεσία"],
  "name": ["Μάνος Παπαγιάννης"],
  "url": [null],
  "text": ["text bla-bla.."],
  "plannedworkheadline": [null],
  "Time": [" 7:35AM"],
  "Date": ["12/15/2011"]
 }
]
```

D3 και JSON

```
<!DOCTYPE html>
<html>
	<head>
		<meta charset="utf-8">
		<script src="https://d3js.org/d3.v4.min.js" charset="utf-8"></script>
		<script>
			function draw(data) {
				"use strict";
				d3.select("body")
					.append("ul")
					.selectAll("li")
					.data(data)
					.enter()
					.append("li")
					.text(function (d) {
						return d.name + ": " + d.status;
					});
			}
		</script>
	</head>

	<body>
		<script>
			data=d3.json("http://…../data/service_status.json", draw);
		</script>
	</body>
</html>
```