D3js Tutorial

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http://www.washingtonpost.com/wp-srv/special/politics

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- Some important aspects of JavaScript
- Introduction to SVG
- CSS
- D3js
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JavaScript - Datatypes

- Variable declaration

```
var a = “Arr”;
var b = 23;
```

- Datatypes are handled automatically

  → may lead to problems!

```
var a = 1;
var b = 2;
var c = a + b;                // c = 3
```

JavaScript - Datatypes

- Variable declaration

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var a = “Arr”;
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```

- Datatypes are handled automatically

  → may lead to problems!

```
var a = 1;
var b = 2;
var c = a + b;              // c = 3
```

```
var a = 1;
var b = “2”;
var c = a + b;              // c = 12 (!)
```

JavaScript - Datatypes

- Variable declaration

```
var a = “Arr”;
var b = 23;
```

- Datatypes are handled automatically

  → may lead to problems!

```
var a = 1;
var b = 2;
var c = a + b;              // c = 3
```

```
var a = 1;
var b = “2”;
var c = a + +b;             // c = 3   (casted b to a number)
```

JavaScript - Arrays

- declaration

```
var a = [];
var a = new Array();
```

- iterating:

```
for(var i = 0; i < a.length; i++)
{
    alert(a[i]);
}
```

```
var myfunction = function(element)
{
      alert(element);
}

a.forEach( myfunction );
```

JavaScript - Objects

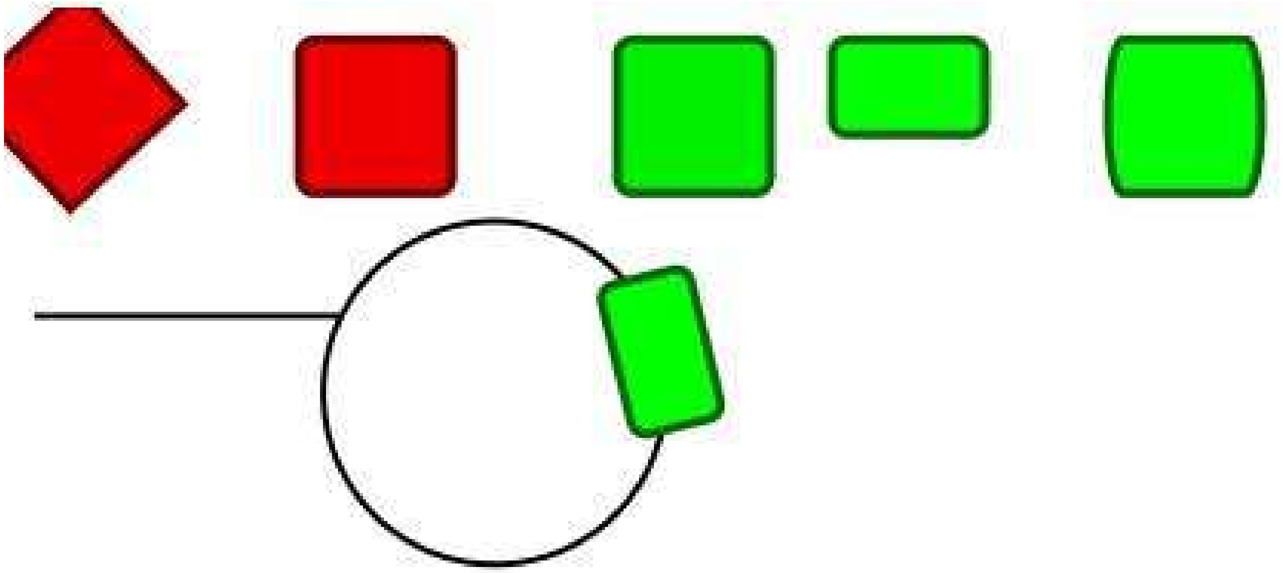
- Everything is a object
- Objects can be extended easily

```
var obj = {};                   // we have an empty object now

obj.speed = 10;                 // obj has now a member!
obj[“arr”] = 1;                 // objects can be used as a map
```

Scalable **V**ector **G**raphics

- Extending HTML with graphics

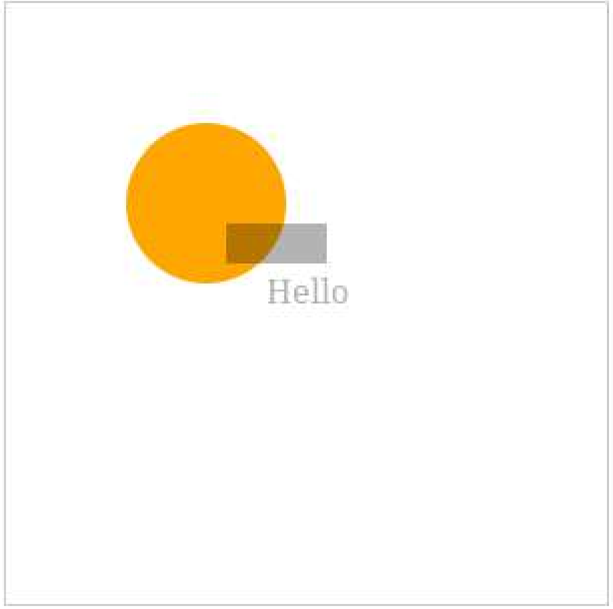


- New Tags <svg>, <g>, <rect>, <circle>, <text>
- http://www.w3schools.com/SVG

SVG

- How to use?

```
<svg width="300" height="300" style="border: 1px solid #CCCCCC">
 <circle cx="100" cy="100" r="40" fill="orange"/>
 <g id="testgroup" opacity="0.3">
  <rect x="110" y="110" width="50" height="20" />
  <text x="130" y="150">Hello</text>
 </g>
</svg>
```

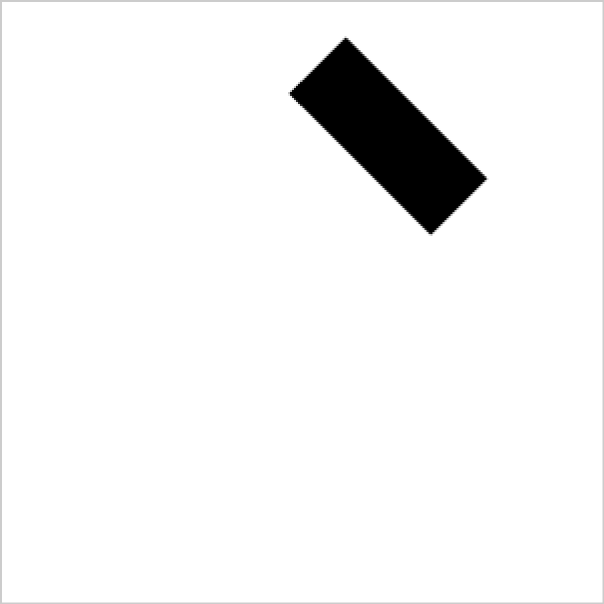


SVG - transformations

- Translate, Rotate, Scale:

```
<svg width="300" height="300" style="border: 1px solid #CCCCCC">
 <rect width="50" height="20"
    transform="translate(50 50) scale(2 1) rotate(45 25,5)" />
</svg>
```

- Take care of the order!



CSS

- Styling your graphics
- Write a css-file containing e.g.:

```
svg {
  border: 1px solid grey;
}

rect {
  stroke: blue;
  stroke-dasharray: 2,5;
  stroke-width: 3;
  fill: orange;
}
```

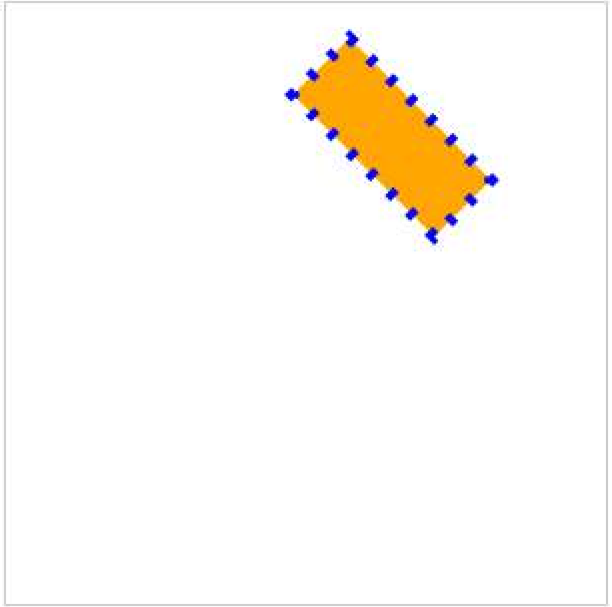
- Include it in your html-file:

```
<link href="test.css" rel="stylesheet" type="text/css" />
```

CSS

```
svg {
  border: 1px solid grey;
}

rect {
  stroke: blue;
  stroke-dasharray: 2,5;
  stroke-width: 3;
  fill: orange;
}
```



CSS

- What can you manipulate?

field	description
stroke: {color}	Sets the stroke-color (used to outline the shape)
stroke-width: {in pixel}	Sets the width of the stroke
stroke-opacity: {0.0 .. 1.0}	Sets the opacity
stroke-linecap: {round, butt or square}	Sets the line-caps
fill: {color}	Sets the fill-color
fill-opacity: {0.0 .. 1.0}	Sets the fill-opacity of the shape

D3js

- JavaScript-Library like jQuery
- http://www.d3js.org
- Modify the HTML-DOM easily
- Support for animations
- Compatibility: only problems with old versions of IE (< v9) and Android Browser (< v3)

D3js – function chaining

```
var a = d3.select("#barchart");
var b = a.append("g");
var c = b.attr("transform", "translate(10,10)");
```

```
d3.select("#barchart").append("g").attr("transform",
"translate(10,10)");

-or-

d3.select("#barchart")
  .append("g")
  .attr("transform", "translate(10,10)");
```

D3js – create elements

```
var chart = d3.select("chart");

chart.selectAll(".group")
      .data(myData)
      .enter().append("rect");
```

- Automatically adds new elements for the given data
- If myData has elements from a previous call new elements won't be created
  - enter() only applied onto not-existent data-elements

D3js – load data

- Loading CSV/TSV-files

```
d3.csv(filename, doneCallback);
d3.tsv(filename, doneCallback);
```

- is loaded asynchronously

  → callback is called, when all data are read

```
d3.csv(filename, function(error, data)
                 {
                     data.forEach(function(d)
                                  {
                                     d.year = +d.year;
                                  }
                     // ...
                 }
      );
```

D3js – Mapping Coordinates

- We have data in data-space → how to map them to screen-space?
- D3 offers simple helpers:

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

function(d) {return y(d); }  will give the correct screen-
coordinate for the given value d
```

- linear, log, ordinal, category10

Interaction - Drag

```
function dragged() {
  chart.selectAll(".bar")
    .attr("y", d3.event.y)
    .attr("height", height - d3.event.y);
}

// Add a drag handle to change the return bar
chart.selectAll(".bar")
     .call(d3.behavior.drag().on("drag", dragged));
```

Hands On / Live Demo

Further Information

- Tools and Toolkits
  - Zurb Foundation
  - Twitter Bootstrap
  - JQuery

- See also Resources-list on course-site

Thank you for
your attention