

Development of Internet Applications

jQuery, TypeScript, LESS

Ing. Michal Radecký, Ph.D.

www.cs.vsb.cz/radecky

Why „extended“ JavaScript

- Easy development and implementation
- Better compatibility and multiplatform operation
- Mature development concepts
- Available documentation
 - <http://devdocs.io>
- Support within develop tools
 - Web Essentials (Visual Studio)
 - <http://www.jsfiddle.net/>

JavaScript frameworks

- They are JavaScript libraries which help with development of applications and make the work easier.
- The developer can be more focused on solving of problems, not on the optimization and debugging of the code for all web browsers.
- They are based on pure JavaScript and extend the objects, methods, etc. (by usage of prototype)
- Usually, there is a huge set of plugins that implements common features and functions (DOM modification, AJAX, photgallery, etc.)
- There are two basic groups
 - JavaScript libraries – functionality extensions (Prototype, jQuery, MooTools, script.aculo.us,)
 - RIA frameworks – complex solutions for RIA based on JS (AngularJS, Backbone, React, Embed, YUI, Dojo, extJS, GWT)

Javascript frameworks

	2013 1 Oct	2014 1 Jan	2014 1 Apr	2014 1 Jul	2014 1 Oct	2015 1 Jan	2015 1 Apr	2015 1 Jul	2015 1 Oct	2016 1 Jan	2016 1 Apr	2016 1 Jul	2016 1 Oct	2016 16 Oct
None	39.0%	38.2%	37.7%	36.3%	35.9%	35.0%	33.6%	32.0%	30.9%	28.7%	27.2%	26.8%	26.3%	26.1%
JQuery	56.2%	57.4%	58.2%	59.9%	60.5%	61.5%	63.1%	64.8%	66.0%	68.3%	69.9%	70.4%	70.9%	71.2%
Bootstrap						5.9%	6.8%	8.1%	9.2%	10.5%	11.6%	12.5%	13.4%	13.6%
Modernizr	3.7%	4.4%	5.1%	5.9%	6.6%	7.2%	7.9%	8.6%	9.1%	9.8%	10.2%	10.5%	10.7%	10.7%
MooTools	5.1%	5.0%	4.8%	4.6%	4.5%	4.3%	4.2%	4.0%	3.9%	3.8%	3.7%	3.5%	3.3%	3.3%
ASP.NET Ajax	2.4%	2.3%	2.3%	2.2%	2.2%	2.2%	2.2%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%
Prototype	2.9%	2.8%	2.6%	2.6%	2.5%	2.4%	2.3%	2.3%	2.2%	2.2%	2.1%	2.0%	2.0%	2.0%
Script.aculo.us	2.3%	2.2%	2.1%	2.0%	2.0%	1.9%	1.9%	1.9%	1.8%	1.8%	1.8%	1.7%	1.6%	1.6%
YUI Library	0.9%	0.9%	0.8%	0.8%	0.7%	0.7%	0.7%	0.6%	0.6%	0.6%	0.6%	0.5%	0.5%	0.5%
Shadowbox	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.4%	0.4%	0.4%	0.4%
AngularJS	<0.1%	<0.1%	0.1%	0.1%	0.1%	0.1%	0.2%	0.2%	0.2%	0.3%	0.3%	0.3%	0.4%	0.4%
Underscore	0.1%	0.1%	0.1%	0.2%	0.2%	0.2%	0.2%	0.3%	0.3%	0.3%	0.3%	0.4%	0.4%	0.4%
Spry	0.5%	0.5%	0.5%	0.5%	0.5%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%	0.3%
Backbone	<0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.2%	0.2%	0.2%	0.2%
GSAP									0.1%	0.1%	0.1%	0.1%	0.2%	0.2%
Dojo	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%				
Knockout	<0.1%	<0.1%	<0.1%	<0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%				
Ext JS	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%				

	2017 1 Oct	2017 1 Nov	2017 1 Dec	2018 1 Jan	2018 1 Feb	2018 1 Mar	2018 1 Apr	2018 1 May	2018 1 Jun	2018 1 Jul	2018 1 Aug	2018 1 Sep	2018 1 Oct	2018 22 Oct
None	24.3%	24.2%	24.1%	24.0%	24.0%	23.9%	23.7%	23.8%	24.5%	24.5%	24.4%	24.4%	24.5%	24.5%
JQuery	72.9%	72.9%	73.0%	73.1%	73.2%	73.2%	73.4%	73.3%	73.2%	73.3%	73.3%	73.4%	73.3%	73.3%
Bootstrap	15.9%	16.1%	16.3%	16.5%	16.7%	16.8%	17.0%	17.2%	17.3%	17.5%	17.7%	17.8%	17.9%	18.0%
Modernizr	11.3%	11.3%	11.3%	11.4%	11.4%	11.4%	11.5%	11.5%	11.4%	11.5%	11.5%	11.4%	11.4%	11.4%
Underscore	1.8%	1.8%	1.9%	1.9%	2.0%	2.0%	2.1%	2.1%	2.2%	2.2%	2.3%	2.4%	2.5%	2.6%
MooTools	2.9%	2.8%	2.8%	2.7%	2.7%	2.6%	2.6%	2.6%	2.6%	2.5%	2.5%	2.5%	2.4%	2.4%
ASP.NET Ajax	2.1%	2.0%	2.0%	2.0%	2.0%	1.9%	1.9%	1.9%	1.8%	1.8%	1.8%	1.8%	1.7%	1.7%
Prototype	1.6%	1.6%	1.6%	1.6%	1.5%	1.5%	1.4%	1.4%	1.4%	1.4%	1.3%	1.3%	1.3%	1.2%
Moment.js	0.8%	0.8%	0.9%	0.9%	0.9%	1.0%	1.0%	1.0%	1.0%	1.0%	1.1%	1.1%	1.2%	1.2%
Script.aculo.us	1.4%	1.3%	1.3%	1.3%	1.3%	1.2%	1.2%	1.2%	1.2%	1.1%	1.1%	1.1%	1.0%	1.0%
Backbone	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.7%	0.8%	0.8%	0.9%
Angular	0.4%	0.4%	0.5%	0.5%	0.5%	0.5%	0.5%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
GSAP	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%	0.4%	0.4%	0.4%	0.4%
YUI Library	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%	0.3%	0.3%
Shadowbox	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Spry	0.3%	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Lodash	0.5%	0.5%	0.5%	0.5%	0.6%	0.6%	0.7%	0.7%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%
Polyfill.io			0.1%	0.1%	0.3%	0.6%	0.7%	0.5%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
React				0.5%	0.5%	0.6%	0.6%	0.6%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Vue.js	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
MathJax	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Knockout	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Dojo	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Ext JS	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Zepto	<0.1%	0.3%	0.4%	0.4%	0.5%	0.5%	0.6%	0.6%	0.1%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%



jQuery

- Javascript library
- Current version: 3.4.1 (1.4.1 – IE 6,7,8, Migrate Plugin)
- Size: 250kB
- Basic syntax: function \$ or jQuery
 - Prototyping of the native Window object
- Main focus
 - Manipulation with DOM
 - Events
 - Animations
 - Communication (AJAX, JSON)
- Huge utilization of anonymous and nested functions
- Plugins and extensions

```
<head>
```

```
<script type="text/javascript" src="jquery.js"></script>
```

Include the jquery file

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

```
$(document).ready(function(){
```

The "ready event" (Binds a function to be executed whenever the DOM is ready)

This part can be written in an external .js file.

```
$(".button").click(function(){
```

Where do you want to bind the function?

It can be CSS class, ID, Selectors (ie. DIV, H1, A, P, LI...)

```
$("#panel").slideDown("slow");
```

This function will be triggered when an element with class="button" is clicked

```
});
```

What would like to do with #panel?

In this case, slide it down with "slow" speed.

```
});
```

```
</script>
```

Where do you want to apply this function?

In this case, it is the element with id="panel"

```
</head>
```

```
$("#panel")
```

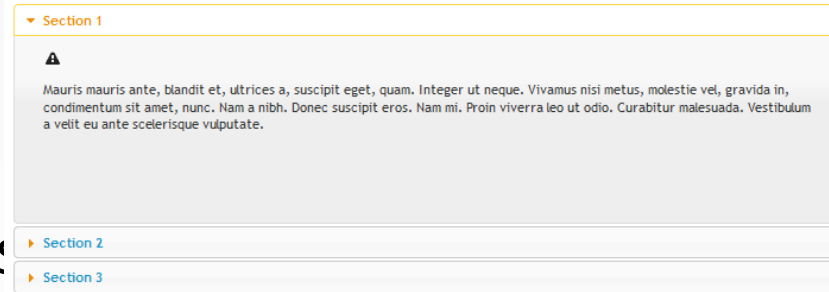
The quotation marks can be either single or double.
ie. ("class") or (.class)



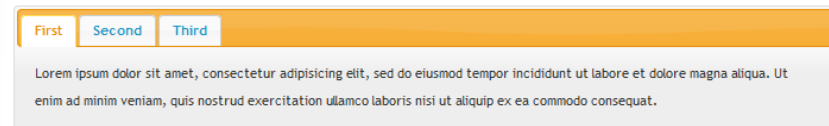
jQuery UI

- Extension of jQuery
- Interactive components of user interface, focused on complex web applications
- A huge set of control elements (incremental library)
- Templates for visualization

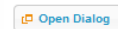
Accordion



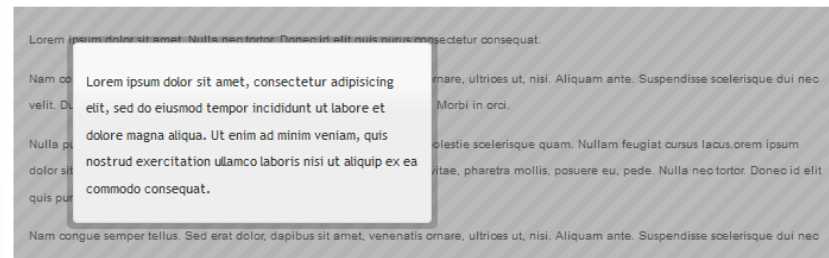
Tabs



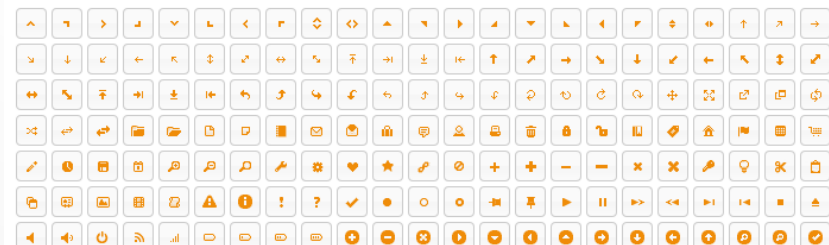
Dialog



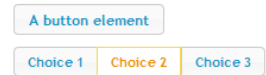
Overlay and Shadow Classes



Framework Icons (content color preview)



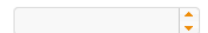
Button



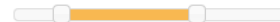
Autocomplete



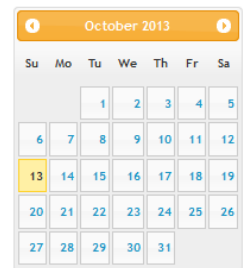
Spinner



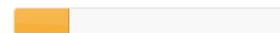
Slider



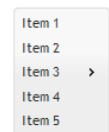
Datepicker



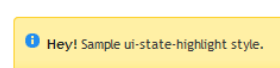
Progressbar



Menu

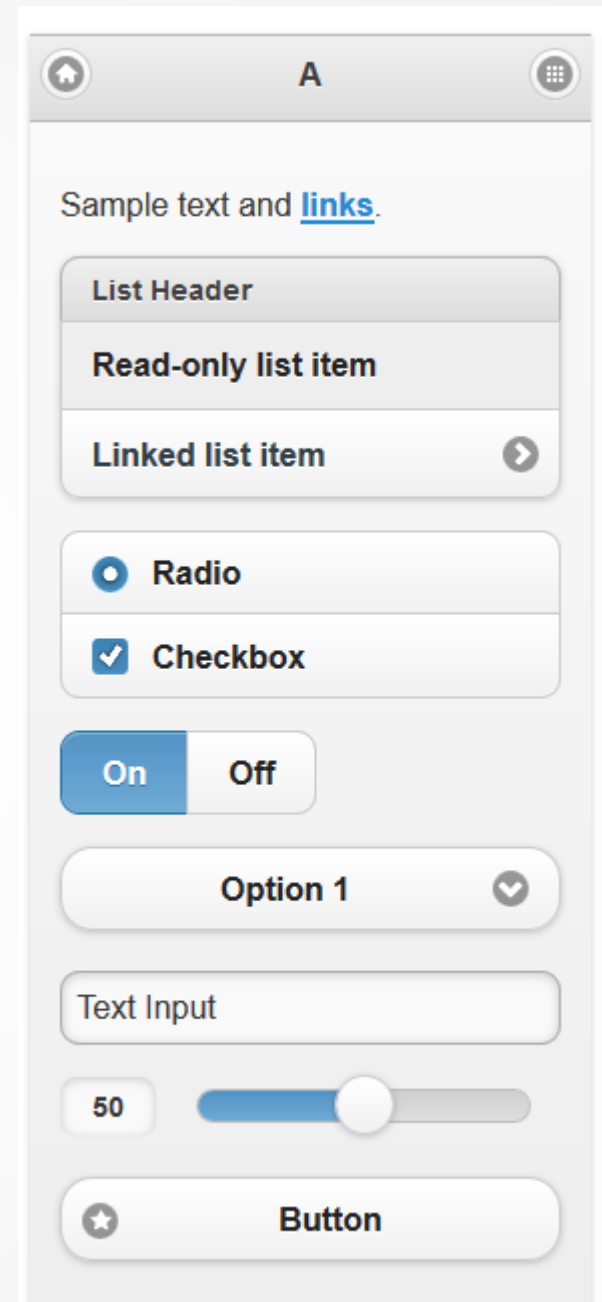


Highlight / Error



jQuery Mobile

- Extension of jQuery
- Based on jQuery UI
- Optimization of size and functionality on mobile devices
- Web application with universal look-and-feel across platforms
- Templates for visualization



TypeScript

PREVIEW

TypeScript

- The new programming language by Microsoft – transpiler to JavaScript, installation for Visual Studio 2012/13 (VS2013 Update 3 integrated).
- Many other IDE with TypeScript support (i.e. VS Code, WebStorm, Atom, Sublime Text, or Eclipse).
- „Every JavaScript code is TypeScript code as well“
- The output is always JavaScript code, however it is more effective and easier way of development (Visual Studio)
- Optimization, minification, etc.
- There is no influence on performance during operation – it is still pure JavaScript
- Syntax and constructions based on ECMAScript 6
- Integration and utilization within different environments and approaches

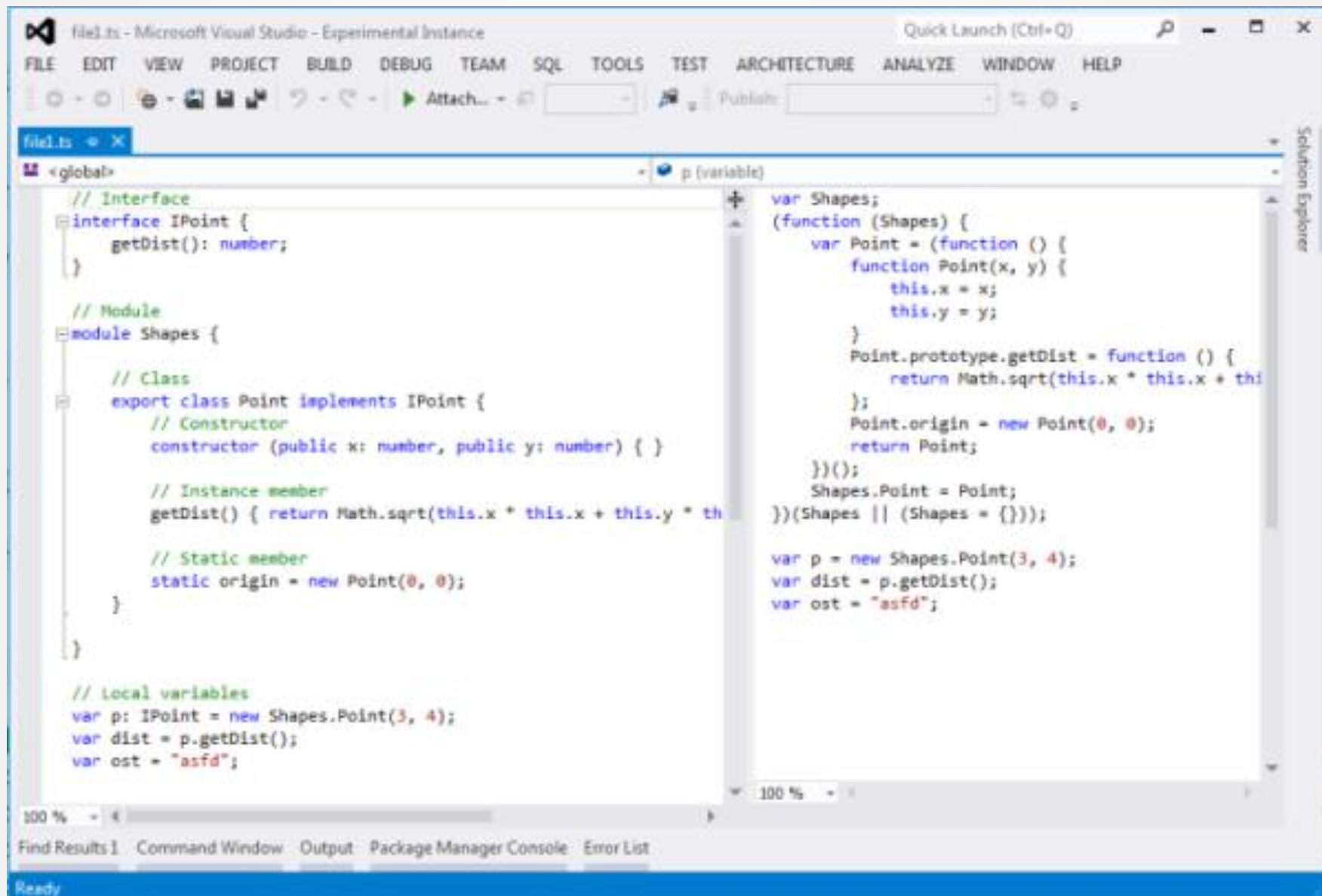
What can TypeScript offer

- Static data types
- Classes and inheritance
- Modules/namespaces
- Interfaces
- Generic data types
- Covariation and contravariation - polymorphism
- Duck-typing is applied – the interface is determining
- And more else... (destructuring assignment, const, for .. of, ...)

What can IDE offer thanks to TypeScript

- IntelliSense for own code, javascript libraries and DOM
- Highlighting of warnings and errors
- Refactoring
- Go To Definition and Find All References
- Repository of definition libraries- <https://github.com/borisyankov/DefinitelyTyped>

TypeScript





Less

- CSS preprocesor – from special syntax to output in pure CSS
- „CSS code is still LESS code“
- Improving development and sustainability
- Compilation can be performed in several environments
- New features
 - Variables
 - Mixins
 - Nesting of elements
 - Math operations
 - Functions
- <http://lesscss.org/>

```
#header {  
  h1 {  
    font-size: 26px;  
    font-weight: bold;  
  }  
  p { font-size: 12px;  
    a { text-decoration: none;  
      &:hover { border-width: 1px }  
    }  
  }  
}
```


Other frameworks and extensions

- Javascript frameworks
 - http://en.wikipedia.org/wiki/Comparison_of_JavaScript_frameworks
 - Dojo, Prototype, Mootools, ...
- Javascript transpilers
 - Dart - <https://www.dartlang.org/>
 - CoffeeScript - <http://coffeescript.org/>
- CSS preprocessors
 - SASS - <http://sass-lang.com/>
 - Stylus - <http://learnboost.github.io/stylus/>
- Front-end frameworks
 - Twitter Bootstrap - <http://getbootstrap.com/>
 - Foundation - <http://foundation.zurb.com/>
- Extras
 - Node.js - <http://nodejs.org/>