Visual Studio Code Shipping One of the Largest Microsoft JavaScript Applications

> Alexandru Dima Microsoft

		app.js - myexpressapp - Visual Studio Code	
Ē	EXPLORE	app.js	🞞 🗟 🗙
יש	▲ WORKING FILES	1 var express = require('express');	
\sim	ann is	<pre>2 var path = require('path');</pre>	
		<pre>3 var favicon = require('serve-favicon');</pre>	
	jsconiig.json	4 var Logger = require('morgan');	
4	utils.js	5 var cookierarser = require('cookie-parser');	
V	▲ MYEXPRESSAPP	7	
	▶ bin	<pre>8 var routes = require('./routes/index');</pre>	
B	▷ node_modules	9 var users = require('./routes/users');	
	⊳ public		
	h routoo	11 var app = express();	
	FIGURES	12 13 // view engine setur	
	▷ views	14 app.set('views', path.join(_dirname, 'views')):	
	app.js	15 app.set('view engine', 'jade');	
	jsconfig.json		
	package.json	17 // uncomment after placing your favicon in /public	
	utils.is	<pre>18 //app.use(favicon(dirname + '/public/favicon.ico'));</pre>	
		19 app.use(Logger('dev'));	
		20 app.use(bodyParser.json()); 21 app.use(bodyParser.ur]encoded({ evtended: false }));	
		22 app.use(cookieParser()):	
		<pre>23 app.use(express.static(path.join(dirname, 'public')));</pre>	
		25 app.use('/', routes);	
		26 app.use('/users', users);	
		28 // catch 404 and forward to error handler	
		29 gpp_use(function(reg. res. next) {	
		30 var err = new Error('Not Found');	
		31 err.status = 404;	
		32 next(err);	
		33 });	
		34 25 // oppon bandlong	
		36	
		37 // development error handler	
		38 // will print stacktrace	
		<pre>39 if (app.get('env') === 'development') {</pre>	
		40 app.use(function(err, req, res, next) {	
		41 res.status(err.status 500);	
()	0 \Lambda 2	4/ ····res.render(_epror', -}	JavaScript 🙂



Visual Studio Code

Monaco Editor

•	app.js - myexpressapp - Visual Studio Code		
EXPLORE	aoo.is 🔲 ල් 🗙 🗖		\mathbf{x}^{-}
	1 var express = require('express'):	Calhost8080/monaco-e x	`
	2 var path = require('path');		
app.js	3 var favicon = require('serve-favicon');	🖌 🔶 🔁 🗅 localhost:8080/monaco-editor/test/#sample - typescript 🎲	= I.
jscontig.json	<pre>4 var logger = require('morgan');</pre>		-
utils.js	5 var cookterarser = require(cookte-parser); 6 var bodvarser = require(cookte-parser);		
MYEXPRESSAPP	7		
▶ bin	<pre>8 var routes = require('./routes/index');</pre>	1 /* Game of Life	
hode_modules	9 var users = require('./routes/users');	2 * Implemented in TypeScript	
▶ public		3 * To learn more about TypeScript, please visit http://www.typescriptlang.org/	
▶ routes	$\frac{1}{12} \sqrt{\frac{1}{12}} \frac{1}{12} \frac{1}{12$	4 .*/	
▶ views	13 // view engine setup		
ann ie	14 app.set('views', path.join(dirname, 'views'));	6 medulo Convoy (
	15 app.set('view engine', 'jade');		
isconing.json	lo		
package.json	18 //ap.use(foricond_dirame + //aubic/favicon.ico')):	8 - export class cell {	
utils.js	19 app.use(logger('dev'));	9 → → public row: number;	
	20 app.use(bodyParser.json());	$10 \rightarrow \rightarrow$ public col: number;	- 1
	<pre>21 app.use(bodyParser.urlencoded({ extended: false }));</pre>	11 → → public live: boolean;	
	<pre>22 app.use(cookie/arser()); 23 app.use(cookie/arser());</pre>	12 \rightarrow \rightarrow	- 1
	24	13	
	25 app.use('/', routes);	$14 \rightarrow \rightarrow \rightarrow$ this.row = row;	
	26 app.use('/users', users);	$15 \rightarrow + \text{this.col} = \text{col}$:	
	27 28 // stability 404 and Experient to the films	$16 \rightarrow - + + + + + + + + + + + + + + + + + +$	
	28 // catch 40% and forward to error nanaler 29 ann usefunctionalized parts		
	30 · var err = new Error('Not Found');		
	31 ·· err.status = 404;		
	32 next(err);		
	33 }); 24	20 -> export class dameortire {	
	35 // error handlers	21 → → private gridSize: number;	- 1
	36	22 → → private canvasSize: number;	
	37 // development error handler	23 → → private lineColor: string;	- 1
	38 // will print stacktrace	24 → → private liveColor: string:	- 1
	33 tr (upp.get(upt) ==== ueve(upment) {		
	4 ··· res.status(err.status 500);		
30 A 2	Ln1,Col1 UTF-8 LF JavaSorpt 😁		



Electron node.js Chromium

Modern browsers

Growing the code



autumn 2011

today

Growing the code



I enjoy programming in JavaScript

Pains

Organizing a large and growing code base

Need to come up with "compensating" patterns for classes and modules/namespaces

Refactoring JavaScript code is difficult

"JavaScript code rots over time" "Writing JavaScript code in a large project is like carving code in stone"

Describing APIs

Keep the description in sync with the implementation

TypeScript to the rescue...

Starts with JavaScript

All JavaScript code is TypeScript code, simply copy and paste All JavaScript libraries work with TypeScript

Optional static types, classes, modules

Structural typing and type inference Enable scalable application development and excellent tooling Zero cost: Static types completely disappear at run-time

Ends with JavaScript

Compiles to idiomatic JavaScript Runs in any browser or host, on any OS TypeScript Demo

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Code Organization: Keep code structured

- 1 var Namespace = {};
- 2 Namespace.Util = {};
- 3 Namespace.Util.Strings = {};
- 4 Namespace.Util.Strings.trim = function() {
- 5 /* etc */
- <mark>6</mark>}

Our namespaces were **global variables** and thereby open

Namespaces have no relationship to the actual files on disk Renaming files or namespaces was a pain...

We had cyclic dependencies without noticing...

Growing Pains: Managing dependencies

…our dependency graph was such a mess that each area had a dependency on just about every other area.

-- Ashamed Developer



Our source at the time

90%



Module Systems to the rescue...

AMD

CommonJS

```
1 define('module_id', [
```

```
'dependency_id'
```

```
3 ], function(dependency) {
```

```
4 // code
```

```
6 return {
```

```
7 // exports
```

```
8 };
```

2

5

```
9 });
```

```
my_module.js
```

```
1 var dependency = require('dependency_id');
```

```
2
```

4

```
3 // code
```

```
5 exports.myExports = {
```

```
6 // exports
```

```
7 }
```

TypeScript: First class module support

Supports both AMD and CommonJS with one syntax

```
1 import { Dependency } from "./dependency_id";
2
3 // code
4
5 export function helper() {
6   // export
7 }
```

Sharing code between AMD and CommonJS is easy

Lazy code loading

README	.txt - example - Visual Studio Code - Insiders						— C	x c
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\circ	▲ EXAMPLE							
	README.txt							
•>	test.php							
8								
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1	<pre>// php.contribution.ts</pre>
2	
3	ModesRegistry.registerMode({
4	→ id: 'php',
5	→ extensions: ['.php', '.php4', '.php5'],
6	→ aliases: ['PHP', 'php'],
7	→ mimetypes: ['application/x-php'],
8	→ moduleId: 'vs/languages/php/common/php',
9	→ ctorName: 'PHPMode'
10	});
11	
12	// php.ts
13	
14	<pre>export class PHPMode extends AbstractMode {</pre>
15	
16	\rightarrow constructor() {
17	\rightarrow \rightarrow super('php'):
18	$ \rightarrow\rangle$
18 19	→ }
18 19 20	$ \rightarrow\rangle$ } $ \rightarrow\rangle$ // lots of code
18 19 20 21	<pre> → } → // lots of code }</pre>

Lazy code loading

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-ile Edit View Goto Help		
	test.php	
▷ OPEN EDITORS	1 php</td <td></td>	
A EXAMPLE	2	
README.txt	<pre>3 echo "Hello world!";</pre>	
test.php	4	
\bullet	5 ?>	
	Ln 1, Col 1 Spaces: 4 UTF-8	CRLF PHP 🙂

1	// php.contribution.ts
2	
3	ModesRegistry.registerMode({
4	→ id: 'php',
5	\rightarrow extensions: ['.php', '.php4', '.php5'],
6	\rightarrow aliases: ['PHP', 'php'],
7	\rightarrow mimetypes: ['application/x-php'],
8	<pre>moduleId: 'vs/languages/php/common/php',</pre>
9	→ ctorName: 'PHPMode'
.0	}):
-	<i>,</i> ,,
1	
.1 .2	// php.ts
.1 .2 .3	// php.ts
.1 .2 .3 .4	<pre>// php.ts export class PHPMode extends AbstractMode {</pre>
.1 .2 .3 .4	<pre>// php.ts export class PHPMode extends AbstractMode {</pre>
.1 .2 .3 .4 .5	<pre>// php.ts export class PHPMode extends AbstractMode { constructor() {</pre>
.1 .2 .3 .4 .5 .6	<pre>// php.ts export class PHPMode extends AbstractMode { constructor() { super('php'); } }</pre>
.1 .2 .3 .4 .5 .6 .7	<pre>// php.ts export class PHPMode extends AbstractMode {</pre>
.1 .2 .3 .4 .5 .6 .7 .8	<pre>// php.ts export class PHPMode extends AbstractMode {</pre>
.1 .2 .3 .4 .5 .6 .7 .8	<pre>// php.ts export class PHPMode extends AbstractMode {</pre>
.1 .2 .3 .4 .5 .6 .7 .8 .9	<pre>// php.ts export class PHPMode extends AbstractMode {</pre>

Lazy code loading



1	<pre>// php.contribution.ts</pre>
2	MadacDagistry, registerMada((
2	ModesRegistry, registerMode({
4	→ ld: 'pnp',
5	\rightarrow extensions: ['.php', '.php4', '.php5'],
6	→ aliases: ['PHP', 'php'],
7	→ mimetypes: ['application/x-php'],
8	<pre>moduleId: 'vs/languages/php/common/php',</pre>
9	→ ctorName: 'PHPMode'
10	<pre>});</pre>
11	
12	// php.ts
13	
14	<pre>export class PHPMode extends AbstractMode {</pre>
15	
16	\rightarrow constructor() {
17	\rightarrow \rightarrow super('php');
18	\rightarrow }
19	
20	\rightarrow // lots of code
21	}
	-

CSS dependencies

AMD loader plugins

We implemented a css loader plugin, and TypeScript supports to generate non-TypeScript dependencies in the JavaScript code

```
1 // currentLineHighlight.ts
2
3 import 'vs/css!./currentLineHighlight';
4 import {ViewOverlay} from '...';
5
6 export class CurrentLineHighlight extends ViewOverlay {
7 ····// ...
8 }
9
```

```
/* currentLineHighlight.css */
2
3
    .monaco-editor .current-line {
         display: block;
4
    \rightarrow
         position: absolute;
5
    \rightarrow left: 0;
6
    \rightarrow top: 0;
8
    \rightarrow
         box-sizing: border-box;
Q
   l
```

Performance: Bundle & Minify your Code



Minify everything (600): <u>https://top.fse.guru/nodejs-a-quick-optimization-advice-7353b820c92e#.p52jv6nys</u>

Post Module System Migration

It feels like fresh showered. Self contained modules, no more cycles, no more globals, clean file system structure.

--Happy Developer

Growing the code



today

100% TypeScript

Migration happened out of developer will

Migration is code clean-up but real work... My velocity around 300 LOCs per hour

Team specific rules No implicit 'anys' No missing return types JSDoc comments No unused variables

Towards 100% TypeScript

In JavaScript, you really are at the mercy of your ability to spell:

delete this.markers[range.statMarkerId];

Soon enough, I realized how inconsistent I was, the same data was flowing around in at least 3 different formats...

Components

We consume:

typescriptServices.js & typescriptServices.d.ts

We ship:

monaco-editor.js & monaco.d.ts vscode.d.ts - defines our extension API

```
declare module monaco.editor {
1
2
3
  · · · /**
  * Create a new editor under `domElement`.
4
   * `domElement` should be empty (not contain other dom nodes).
5
   * The editor will read the size of `domElement`.
6
   ••••*/
7
   export function create(element: HTMLElement, options: IEditorConstructionOptions,
8
9
```

Constructor service injection in many places

```
export class GoToDefinitionAction extends DefinitionAction {
 1
 2
 3
        public static ID = 'editor.action.goToDeclaration';
 4
 5
      constructor(
        descriptor: editorCommon.IEditorActionDescriptorData,
    \rightarrow
    → editor: editorCommon.ICommonCodeEditor,
    → @IMessageService messageService: IMessageService,
8
   → @IEditorService editorService: IEditorService
9
  → ) {
10
   \rightarrow super(descriptor, editor, messageService, editorService, new DefinitionActionConfig());
11
```





c:\Alex\src\vscode>scripts\test.bat

 •	
 •	
•	
•	
•	
•	
•	

2092 passing (10s) 5 failing

 ExtHostLanguageFeatures Definition, data conversion: Error: Could not find definition! at Object.getDeclarationsAtPosition (c:\Alex\src\vscode\out\vs\editor\contrib\

Growing the code



autumn 2011

today

Electron Demo



Explore the Electron APIs

The Electron API Demos app interactively demonstrates the most important features of the Electron API. See what's possible with Electron with sample code and helpful tips for building your app.

😫 Download for Windows

View all releases on GitHub

http://electron.atom.io/

Execution environments











Execution environments



Execution environments



Folder path	Runtime	Allowed to depend on
common	ES5	-
node	ES5 + node.js	common
browser	ES5 + browser	common
electron-main	ES5 + node.js + electron (main)	common, node
electron-browser	ES5 + node.js + electron (renderer) + browser	common, node, browser
worker	ES5 + web worker	common

Demo developing vscode

Performance: Virtual scrolling

2	*	Impl	emented in TuroScript
4 1	*	To 1	earn more about TypeScript please visit http:
4	*/	10 1	tearn more about Typescript, prease visit <u>netp</u> .
5	. 1		
6	mod	ule	Conway {
7			conney (
8	\rightarrow	exp	oort class Cell {
9	\rightarrow		public row: number:
10	\rightarrow	\rightarrow	public col: number;
11	\rightarrow	\rightarrow	public live: boolean;
12	\rightarrow	\rightarrow	
13	\rightarrow	\rightarrow	constructor(row: number, col: number, live: b
14	\rightarrow	\rightarrow	<pre> → this.row = row; </pre>
15	\rightarrow	\rightarrow	→ this.col = col;
16	\rightarrow	\rightarrow	this.live = live
17	\rightarrow	\rightarrow	}
18	\rightarrow	}	
19	\rightarrow		
20	\rightarrow	exp	oort class GameOfLife {
21	\rightarrow	\rightarrow	private gridSize: number;
22	\rightarrow	\rightarrow	private canvasSize: number;
23	\rightarrow	\rightarrow	private lineColor: string;
24	\rightarrow	\rightarrow	private liveColor: string;
25	\rightarrow	\rightarrow	private deadColor: string;
26	\rightarrow	\rightarrow	<pre>private initialLifeProbability: number;</pre>
27	\rightarrow	\rightarrow	private animationRate: number;
28	2	2	private cellSize: number;
29	÷	÷	private context: CanvasRenderingContext2D;

▼ <div aria-hidden="true" class="view-lines" role="presentation" style="position: absolute; font-fa</p></th><th>n</th></tr><tr><th>monospace; font-size: 12px; line-height: 15px; width: 796px; height: 2260px;"></div>	
<pre><div class="view-line" linenumber="2" style="top:15px;height:15px;"></div></pre>	
<pre><div class="view-line" linenumber="3" style="top:30px;height:15px;"></div></pre>	
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<pre><div class="view-line" linenumber="19" style="top:270px;height:15px;"></div></pre>	
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<pre></pre> div linenumber="26" style="top:375px:height:15px:" class="view-line">	
<pre></pre> div linenumber="27" style="top:390px:height:15px:" class="view-line">	
<pre>\div linenumber="28" style="top:405px:height:15px:" class="view-line"></pre>	

<div class="contentWidgets"></div>

Minified code: an editor's worst nightmare

- 1 /*! jQuery v2.2.3 | (c) jQuery Foundation | jquery.org/license */
- 2 !function(a,b){"object"==typeof module&&"object"==typeof module.exports?module.exports=a.document?b(a,!0):function(a){if(!a.document)throw new Error("jQuery requires a window with a document");return b(a)}:b(a)}("undefined"!=typeof window?window?this,function(a,b){var c=[],d=a.document,e=c.slice,f=c.concat,g=c.push,h=c.indexOf,i={},j=i.toString,k=i.hasOwnProperty, 1={},m="2.2.3",n=function(a,b){return new n.fn.init(a,b)},o=/^[\s\uFEF\xA0]+[\s\uFEF\xA0]+\$/g,p=/^-ms-/,q=/-([\da-z])/gi,r=function(a,b){return b.toUpperCase()};n.fn=n.prototype= {jquery:m,constructor:n,selector:"",length:0,toArray:function(){return e.call(this)},get:function(a){return null!=a?0>a?this[a+this.length]:this[a]:e.call(this)},pushStack:function(a) {var b=n.merge(this.constructor(),a);return b.prevObject=this,b.context=this.context,b},each:function(a){return n.each(this,a)},map:function(a){return this.pushStack(n.map(this, function(b,c){return a.call(b,c,b)})),slice:function(){return this.pushStack(e.apply(this,arguments))},first:function(){return this.eq(0)},last:function(){return this.eq(-1)}, eq:function(a){var b=this.length,c=+a+(0>a?b:0);return this.pushStack(c>=0&&b>c?[this[c]]:[])},end:function(){return this.prevObject||this.constructor()},push:g,sort:c.sort, splice:c.splice},n.extend=n.fn.extend=function(){var a,b,c,d,e,f,g=arguments[0]||{},h=1,i=arguments.length,j=!1;for("boolean"==typeof g&&(j=g,g=arguments[h]||{},h++),"object"==typeof g||n.isFunction(g)||(g={}),h===i&&(g=this,h--);i>h;h++)if(null!=(a=arguments[h]))for(b in a)c=g[b],d=a[b],g!==d&&(j&&d&(n.isPlainObject(d)||(e=n.isArray(d)))?(e?(e=!1,f=c&&n.isArray(d))?(e?(e=!1,f=c&&n.isArray(d))?(e=!1,f=c&&n.isArray(d))?(e=!1,f=c&&n.isArray(d))?(e=!1,f=c&&n.isArray(d))?(e=!1,f=c&&n.isArray(d))?(e=!1,f=c&&n (c)?c:[]):f=c&&n.isPlainObject(c)?c:{},g[b]=n.extend(j,f,d)):void 0!==d&&(g[b]=d));return g},n.extend({expando:"jQuery"+(m+Math.random()).replace(/\D/g,""),isReady:!0,error:function(a) {throw new Error(a)},noop:function(){},isFunction(a){return"function"===n.type(a)},isArray:Array.isArray,isWindow:function(a){return null!=a&&a===a.window},isNumeric:function (a){var b=a&&a.toString();return!n.isArray(a)&&b-parseFloat(b)+1>=0},isPlainObject:function(a){var b;if("object"!==n.type(a)||a.nodeType||n.isWindow(a))return!1;if(a.constructor&& !k.call(a, "constructor")&&!k.call(a.constructor.prototype0||{},"isPrototype0f"))return!1;for(b in a);return void 0===b||k.call(a,b)},isEmptyObject:function(a){var b;for(b in a)return!1; return!0},type:function(a){return null==a?a+"":"object"==typeof a||"function"==typeof a?i[j.call(a)]||"object":typeof a},globalEval:function(a){var b,c=eval;a=n.trim(a),a&& (1===a.indexOf("use strict")?(b=d.createElement("script"), b.text=a,d.head.appendChild(b).parentNode.removeChild(b)):c(a))},camelCase:function(a){return a.replace(p,"ms-").replace(q,r)} ,nodeName:function(a,b){return a.nodeName&&a.nodeName.toLowerCase()}===b.toLowerCase()},each:function(a,b){var c,d=0;if(s(a)){for(c=a.length;c>d;d++)if(b.call(a[d],d,a[d])===!1)break} else for(d in a)if(b.call(a[d],d,a[d])===!1)break;return a},trim:function(a){return null==a?"":(a+"").replace(o,"")},makeArray:function(a,b){var c=b||[];return null!=a&&(s(Object(a))? n.merge(c,"string"==typeof a?[a]:a):g.call(c,a)),c};inArray:function(a,b,c){return null==b?-1:h.call(b,a,c)},merge:function(a,b){for(var c=+b.length,d=0,e=a.length;c>d;d++)a[e++]=b[d]; return a.length=e,a},grep:function(a,b,c){for(var d,e=[],f=0,g=a.length,h=!c;g>f;f++)d=!b(a[f],f),d!==h&&e.push(a[f]);return e},map:function(a,b,c){var d,e,g=0,h=[];if(s(a))for (d=a.length;d>g;g++)e=b(a[g],g,c),null!=e&&h.push(e);else for(g in a)e=b(a[g],g,c),null!=e&&h.push(e);return f.apply([],h)},guid:1,proxy:function(a,b){var c,d,f;return"string"==typeof b&&(c=a[b],b=a,a=c),n.isFunction(a)?(d=e.call(arguments,2),f=function(){return a.apply(b||this,d.concat(e.call(arguments)))},f.guid=a.guid=a.guid=a.guid+,f):void 0},now:Date.now, support:]}), "function"==typeof Symbol&&(n.fn[Symbol.iterator]=c[Symbol.iterator]), n.each("Boolean Number String Function Array Date RegExp Object Error Symbol".split(" "), function(a,b) {i["[object "+b+"]"]=b.toLowerCase()});function s(a){var b=!!a&&"length"in a&&a.length,c=n.type(a);return"function"===c||n.isWindow(a)?!1:"array"===c||0===b||"number"==typeof b&&b>0&& b-1 in a}var t=function(a){var b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u="sizzle"+1*new Date,v=a.document,w=0,x=0,y=ga(),Z=ga(),A=ga(),B=function(a,b){return a===b&&(l=!0),0},C=1<<31,D= {}.hasOwnProperty,E=[],F=E.pop,G=E.push,H=E.push,I=E.slice,J=function(a,b){for(var c=0,d=a.length;d>c;c++)if(a[c]===b)return c;return-1},K="checked|selected|async|autofocus|autoplay| controls|defer|disabled|hidden|ismap|loop|multiple|open|readonly|required|scoped",L="[\\x20\\t\r\\n\\f]",M="(?:\\\.|[^\\x00-\\xa0])+",N="\\["+L+"*([*^\$|!~]?=)" +L+"*(?:'((?:\\\\.[^\\\\'])*)'|\"((?:\\\\.[^\\\\'])*)\"|("+M+"))|)"+L+"*\\]",0=":("+M+")(?:\\(\.[^\\\\'])*)'|\"((?:\\\\.[^\\\\'])*)\")|((?:\\\\.[^\\\\'])*)\")|((?:\\\\.[^\\\\'])*)\"](?:\\\\.[^\\\\'])*) .*)\\))",P=new RegExp(L+"+","g"),Q=new RegExp("^"+L+"+"+((?:^|[^\\\))"+L+"+\$","g"),R=new RegExp("^"+L+"*"),S=new RegExp("^"+L+"*"),T=new RegExp("^"+L+"*"),T=new RegExp("^"+L+"*"),S=new RegExp(""+L+"*"),S=new RegExp(""),S=new Re ("="+L+"*([^\\]'\"]*?)"+L+"*\\]","g"),U=new RegExp(0),V=new RegExp("^"+M+"\$"),W={ID:new RegExp("^("+M+")"),CLASS:new RegExp("^\\.("+M+")"),TAG:new RegExp("^("+M+"[[*])"),ATTR:new RegExp("^"+N),PSEUDO:new RegExp("^"+0),CHILD:new RegExp("^:(only|first|last|nth|nth-last)-(child|of-type)(?:\\("+L+"*(even|odd|(([+-])(\\d*)n|)"+L+"*(`([+-]|)"+L+"*(\\d+)|))"+L+"*(\\d+)))"+L+"*(\\d+) |)","i"),bool:new RegExp("^(?:"+K+")\$","i"),needsContext:new RegExp("^"+L+"*[>+~]]:(even|odd|eq|gt|lt|nth|first|last)(?:\\("+L+"*((?:-\\d)?\\d*)"+L+"*\\)|)(?=[^-]|\$)","i")},X=/^(? :input|select|textarea|button)\$/i,Y=/^h\d\$/i,Z=/^[^{]+\{\s*\[native \w/,\$=/^(?:#([\w-]+)|(\\w+)|\.([\\w-]+)]/,_=/[+~]/,aa=/'|\\/g,ba=new RegExp("\\\\([\\da-f]{1,6}"+L+"?|("+L+")|.)", "ig"), ca=function(a,b,c){var d="0x"+b-65536; return d!==d||c?b:0>d?String.fromCharCode(d+65536):String.fromCharCode(d>>10|55296,1023&d|56320)}, da=function(){m()}; try{H.apply(E=I.call (v.childNodes),v.childNodes),E[v.childNodes.length].nodeType}catch(ea){H={apply:E.length?function(a,b){G.apply(a,I.call(b))}:function(a,b){var c=a.length,d=0;while(a[c++]=b[d++]); a.length=c-1}}function fa(a,b,d,e){var f,h,j,k,l,o,r,s,w=b&&b.ownerDocument,x=b?b.nodeType:9;if(d=d||[],"string"!=typeof a||!a||1!==x&&9!==x&&11!==x)return d;if(!e&&((b? b.ownerDocument||b:v)!==n&&m(b),b=b||n,p)){if(11!==x&&(o=\$.exec(a)))if(f=o[1]){if(9===x}{if(!(j=b.getElementById(f)))return d;if(j.id===f)return d.push(j),d}else if(w&& (j=w.getElementById(f))&&t(b,j)&&j.id===f)return d.push(j),d}else{if(o[2])return H.apply(d,b.getElementsByTagName(a)),d;if((f=o[3])&&c.getElementsByClassName) return H.apply(d,b.getElementsByClassName(f)),d}if(c.qsa&&!A[a+" "]&&(!q||!q.test(a))){if(1!==x)w=b,s=a;else if("object"!==b.nodeName.toLowerCase()){(k=b.getAttribute("id"))? k=k.replace(aa,"\\\$&"):b.setAttribute("id",k=u),r=g(a),h=r.length,l=V.test(k)?"#"+k:"[id='"+k+"']";while(h--)r[h]=l+" "+qa(r[h]);s=r.join(","),w= .test(a)&&oa(b.parentNode)||b}if(s)try {return H.apply(d,w.querySelectorAll(s)),d}catch(y){}finally{k===u&&b.removeAttribute("id")}}}return i(a.replace(Q,"\$1"),b,d,e)}function ga(){var a=[];function b(c,e){return a.push(c +" ")>d.cacheLength&&delete b[a.shift()],b[c+" "]=e}return b}function ha(a){return a[u]=!0,a}function ia(a){var b=n.createElement("div");try{return!!a(b)}catch(c){return!1}finally

Minified code: an editor's worst nightmare

What's in 42 lines?

3409 spans (~tokens)

1 /*! jQuery v2.2.3 | (c) jQuery Foundation | jquery.org/license */

2 !function(a,b){"object"==typeof module&&"object"==typeof module.exports?module.exports=a.document?b(a.!0):function(a){if(!a.document)throw new Error("jOuery requires a window with a document");return b(a)}:b(a)}("undefined"!=typeof window?window:this,function(a,b){var c=[],d=a.document,e=c.slice,f=c.concat,g=c.push,h=c.indexOf,i={},j=i.toString,k=i.hasOwnProperty, 1={},m="2.2.3",n=function(a,b){return new n.fn.init(a,b)},o=/^[\s\uFEFF\xA0]+[[\s\uFEFF\xA0]+*/g,p=/^-ms-/,q=/-([\da-z])/gi,r=function(a,b){return b.toUpperCase()};n.fn=n.prototype= {jquery:m,constructor:n,selector:"",length:0,toArray:function(){return e.call(this)},get:function(a){return null!=a?0>a?this[a+this.length]:this[a]:e.call(this)},pushStack:function(a) {var b=n.merge(this.constructor(),a);return b.prev0bject=this,b.context=this.context,b},each:function(a){return n.each(this,a)},map:function(a){return this.pushStack(n.map(this, a))} function(b,c){return a.call(b,c,b)})),slice:function(){return this.pushStack(e.apply(this,arguments))},first:function(){return this.eq(-1)}, eq:function(a){var b=this.length,c=+a+(0>a?b:0);return this.pushStack(c>=0&&b>c?[this[c]]:[])},end:function(){return this.prevObject||this.constructor()},push:g,sort:c.sort, splice:c.splice},n.extend=n.fn.extend=function(){var a,b,c,d,e,f,g=arguments[0]||{},h=1,i=arguments.length,j=!1;for("boolean"==typeof g&&(j=g,g=arguments[h]||{},h++),"object"==typeof g||n.isFunction(g)||(g+{}),h===i&&(g=this,h--);i>h;h++)if(null!=(a=arguments[h]))for(b in a)c=g[b],d=a[b],g!==d&&(j&&d&(b) = 0 \\ (b = 1, f=c&ar_a, b) = (b = 1, (c)?c:[]):f=c&&n.isPlainObject(c)?c:{},g[b]=n.extend(j,f,d)):void 0!==d&&(g[b]=d));return g},n.extend({expando:"jQuery"+(m+Math.random()).replace(/\D/g,""),isReady:!0,error:function(a) {throw new Error(a)},noop:function(){},isFunction:function(a){return"function"===n.type(a)},isArray.isArray.isAirray.isWindow:function(a){return null!=a&&a===a.window},isNumeric:function (a){var b=a&&a.toString();return1n.isArray(a)&&b-parseFloat(b)+1>=0},isPlainObject:function(a){var b;if("object"1==n.type(a)||a.nodeType||n.isWindow(a))return11;if(a.constructor&& !k.call(a, "constructor")&&!k.call(a.constructor.prototype||{},"isPrototype0f"))return!1;for(b in a);return void 0===b||k.call(a,b)},isEmptyObject:function(a){var b;for(b in a)return!1; return!0},type:function(a){return null==a?a+"":"object"==typeof a?i[j.call(a)]||"object":typeof a},globalEval:function(a){var b,c=eval;a=n.trim(a),a& (1===a.indexOf("use strict")?(b=d.createElement("script"),b.text=a,d.head.appendChild(b).parentNode.removeChild(b)):c(a))},camelCase:function(a){return a.replace(p,"ms-").replace(q,r)} ,nodeName:function(a,b){return a.nodeName&&a.nodeName.toLowerCase()===b.toLowerCase()),each:function(a,b){var c,d+0;if(s(a)){for(c=a.length;cd;d++)if(b.call(a[d],d,a[d])===11)break} else for(d in a)if(b.call(a[d],d,a[d])===!1)break;return a},trim:function(a){return null==a?"":(a+"").replace(o,"")},makeArray:function(a,b){var c=b||[];return null!=a&&(s(Object(a))? n.merge(c,"string"==typeof a?[a]:a):g.call(c,a)),c},inArray:function(a,b,c){return null==b?-1:h.call(b,a,c)},merge:function(a,b){for(var c=+b.length,d=0,e=a.length;c>d;d++)a[e++]=b[d]; return a.length=e,a},grep:function(a,b,c){for(var d,e=[],f=0,g=a.length,h=!c;g>f;f++)d=!b(a[f],f),d!==h&&e.push(a[f]);return e},map:function(a,b,c){var d,e,g=0,h=[];if(s(a))for (d=a.length;d>g;g++)e=b(a[g],g,c),null!=e&&h.push(e);else for(g in a)e=b(a[g],g,c),null!=e&&h.push(e);return f.apply([],h)},guid:1,proxy:function(a,b){var c,d,f;return"string"==typeof b&&(c=a[b],b=a,a=c),n.isFunction(a)?(d=e.call(arguments,2),f=function(){return a.apply(b||this,d.concat(e.call(arguments)))},f.guid=a.guid=a.guid=a.guid=h.guid++,f):void 0},now:Date.now, support:]),"function"==typeof Symbol&&(n.fn[Symbol.iterator]=c[Symbol.iterator]),n.each("Boolean Number String Function Array Date RegExp Object Error Symbol.".split(" "),function(a,b) {i["[object "+b+"]"]=b.toLowerCase()});function s(a){var b=!!a&&"length"in a&&a.length,c=n.type(a);return"function"===c||n.isWindow(a)?!1:"array"===c||0===b||"number"==typeof b&&b>&& b-1 in a}var t=function(a){var b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u="sizzle"+1*new Date,v=a.document,w=0,x=0,y=ga(),Z=ga(),Z=ga(),B=function(a,b){return a===b&&(l=!0),0},C=1<<31,D= {}.hasOwnProperty,E=[],F=E.pop,G=E.push,H=E.push,H=E.slice,J=function(a,b){for(var c=0,d=a.length;d>c;c++)if(a[c]===b)return c;return-1},K="checked|selected|async|autofocus|autoplay| controls/defer/disabled/hidden/ismap/loop/multiple/open/readonly/required/scoped",L="[\\x20\\t\\r\\n\\f",M="(?:\\\.|[\\x-][^\\x00-\\xa0])+",N="\["+L+"*("+M+")(?:"+L+"*([*^\$]!~]?=)" .*)///])",P=new RegExp(L++","g"),Q=new RegExp("^"+L+"+|((?:^|[^///])?:///.)*)"+L+"+\$","g"),R=new RegExp("^"+L+"*"),S=new RegExp("^"+L+"*"),T=new RegExp(""+L+"*"),T=new RegExp(""+L+"*"),T=new RegExp(""+L+"*"),T=new RegExp(""+L+"*"),T=new RegExp(""+L+"*"),T=new RegExp(""+L+"*"),T=new RegExp(""+L+"*"),T=new RegExp(""+L+"*"),T=new RegExp("",T=L"*"),T=new RegExp("",T=R"),T=new RegExp(""),T=new RegExp("",T=R"),T=new RegExp("",T=R"),T=new RegExp("",T=R" ("="+L+"*([^\\]`\"]?)"+L+"*\\]", "g"),U=new RegExp(0),V=new RegExp("^"+M+"\$"),W={ID:new RegExp("^#("+M+")"),CLASS:new RegExp("^\\.("+M+")"),TAG:new RegExp("^("+M+"][#])"),ATTR:new RegExp("^"+N),PSEUDO:new RegExp("^"+0),CHILD:new RegExp("^:(only|first|last|nth|nth-last)-(child|of-type)(?:\\("+L+"*(even|odd|(([+-])(\\d*)n|)"+L+"*(?:([+-])"+L+"*(\\d+)))"+L+"*(\\d+)))"+L+"*(\\d+))"+L+"*(\d+))"+L+"* |)","i"),bool:new RegExp("^(?:"+K+")\$","i"),needsContext:new RegExp("^"+L+"*[>+~]]:(even|odd|eq|gt|lt|nth|first|last)(?:\\("+L+"*(\?:-\\d)?\\d*)"+L+"*\\)|)(?=[^-]|\$)","i"),X=/^(? :input|select|textarea|button)\$/i,Y=/^h\d\$/i,Z=/^[^{]+\{\s*\[native \w/,\$=/(?:#([\w-]+)|(\w+)|.([\\-]+)}/,aa=/'|\\/g,ba=new RegExp("\\\([\\da-f]{1,6}"+L+"?|("+L+")|.)", "ig"), ca=function(a,b,c) {var d="0x"+b-65536; return d!==d||c?b:0>d?String.fromCharCode(d+65536):String.fromCharCode(d>>10|55296,1023&d|56320)}, da=function(){m()}; try{H.apply(E=I.call (v.childNodes),v.childNodes, E[v.childNodes.length].nodeType}catch(ea){H={apply:E.length?function(a,b){G.apply(a,I.call(b))}:function(a,b){var c=a.length,d=0;while(a[c++]=b[d++]); a.length=c-1}}function fa(a,b,d,e){var f,h,j,k,l,o,r,s,w=b&b.ownerDocument,x=b?b.nodeType:9;if(d=d||[],"string"!=typeof a||!a||1!==x&&1!==x)return d;if(!e&&((b? b.ownerDocument||b:v)!==n&&m(b),b=b||n,p)){if(11!=x&&(o=\$.exec(a)))if(f=o[1]){if(9==x){if(!(j=b.getElementById(f)))return d;if(j.id==f)return d.push(j),d}else if(w&& (j=w.getElementById(f))&&t(b,j)&&j.id===f)return d.push(j),d}else{if(o[2])return H.apply(d,b.getElementsByTagName(a)),d;if((f=o[3])&&c.getElementsByClassName&&b.getElementsByClassName) return H.apply(d,b.getElementsByClassName(f)),d)if(c.qsa&&lA[a+" "]&&(lq||1,test(a))){if(1!=x)w=b,s=a;else if("object"!==b.nodeName.toLowerCase()){(k=b.getAttribute("id"))? k=k.replace(aa,"\\\$&"):b.setAttribute("id",k=u),r=g(a),h=r.length,l=V.test(k)?"#"+k:"[id='"+k+"']";while(h--)r[h]=l+" "+qa(r[h]);s=r.join(","),w=_.test(a)&&oa(b.parentNode)||b}if(s)try {return H.apply(d,w.querySelectorAll(s)),d}catch(y){}finally{k===u&&b.removeAttribute("id")}}return i(a.replace(Q,"\$1"),b,d,e)}function ga(){var a=[];function b(c,e){return a.push(c +" ")>d.cacheLength&&delete b[a.shift()],b[c+" "]=e}return b}function ha(a){return a[u]=!0,a}function ia(a){var b=n.createElement("div");try{return!!a(b)}catch(c){return!1}finally

281 spans (~tokens)

* jQuery JavaScript Library v2.2.3 3 * http://jquery.com/ 5 📲 Includes Sizzle.js 6 * http://sizzlejs.com/ 8 .* Copyright jQuery Foundation and other contributors 9 * Released under the MIT license 10 * http://jquery.org/license 11 .* 12 * Date: 2016-04-05T19:26Z 13 .*/ 14 15 (function(global, factory) { 16 17 if (typeof module === "object" && typeof module.exports === "object") { → // For CommonJS and CommonJS-like environments where a proper `window' 18 19 // is present, execute the factory and get jQuery. // For environments that do not have a `window` with a `document' 20 // (such as Node.js), expose a factory as module.exports. 21 22 // This accentuates the need for the creation of a real `window`. // e.g. var jQuery = require("jquery")(window); 24 // See ticket #14549 for more info. module.exports = global.document ? factory(global, true) : 26 function(w) { 28 if (!w.document) { 29 throw new Error("iOuerv requires a window with a document"); 30 31 return factory(w); 32 33 } else { 34 factory(global); 35 → 37 // Pass this if window is not defined yet 38 }(typeof window !== "undefined" ? window : this, function(window, noGlobal) { 40 // Support: Firefox 18+ 41 // Can't be in strict mode, several libs including ASP.NET trace 42 // the stack via arguments.caller.callee and Firefox dies if

Get to know your tools: Scrolling Performance

The Timeline shows the big picture:



Loading

But Chrome Developer Tools has a few hidden gems:



Get to know your tools: Scrolling Performance

Monaco Editor Debug

Template Y_	BigCSS	•	Ballistic scroll
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1 #wrapper .w12,#wrapper.w12{min-width:972px;width:81em}.pa{margin:0 auto;padding:0 .5em}.pa #area1,.pa #area2,.pa #area3 {float:left}.pa #subfoot{clear:both}.pa #area2,.pa #area3{margin-left:1em}.pa #page:after{clear:both;content:"."; display:block;height:0;visibility:hidden}#wrapper{padding:0 0;text-align:left;margin:0 auto}#wrapper .w1{min-width:70px; width:5.833em}#wrapper .w2{min-width:152px;width:12.667em}#wrapper .w3{min-width:234px;width:19.5em}#wrapper .w3 .w50 {min-width:111px;width:9.25em}#wrapper .w4{min-width:316px;width:26.333em}#wrapper .w4 .w33{min-width:97px;width:8.083em} #wrapper .w4 .ce3.w33{min-width:98px;width:8.167em}#wrapper .w5{min-width:398px;width:33.167em}#wrapper .w5 .w33 {min-width:124px;width:10.333em}#wrapper .w5 .ce2.w33,#wrapper .w5 .ce3.w33{min-width:125px;width:10.417em}#wrapper .w5 .w50{min-width:193px;width:16.083em}#wrapper .w6{min-width:480px;width:40em}#wrapper .w7{min-width:562px;width:46.833em} #wrapper .w7 .w33{min-width:179px;width:14.917em}#wrapper .w7 .ce3.w33{min-width:180px;width:15em}#wrapper .w7 .w50 {min-width:275px;width:22.917em}#wrapper .w8{min-width:644px;width:53.667em}#wrapper .w8 .w33{min-width:206px; width:17.167em}#wrapper .w8 .ce1.w33,#wrapper .w8 .ce3.w33{min-width:206px;width:17.167em}#wrapper .w9{min-width:726px; width:60.5em}#wrapper .w9 .w50{min-width:357px;width:29.75em}#wrapper .w10{min-width:808px;width:67.333em}#wrapper .w10 .w33{min-width:261px;width:21.75em}#wrapper .w10 .ce3.w33{min-width:262px;width:21.833em}#wrapper .w11{min-width:890px; width:74.167em}#wrapper .w11 .w33{min-width:288px;width:24em}#wrapper .w11 .ce2.w33,#wrapper .w11 .ce3.w33 {min-width:289px;width:24.083em}#wrapper .w11 .w50{min-width:439px;width:36.583em}#wrapper .w12{min-width:972px; width:81em}#head{min-width:972px;background:transparent}#nav{min-width:972px;background:transparent}#content {background: 🗆 #fff}#foot{min-width:972px;background:transparent}.wings{background-color: 🗖 #009ad9;min-width:81em;width:100% #nav .wings{height:1.667em}#doublerownav .wings{height:3.75em}body{color: #333;font-family:arial,sans-serif;font-size:75%; line-height:1.33em;margin:0;padding:0;text-align:center}a.more,div.br *,.cotb *,.coss *{font-family:arial,sans-serif} @media print{form,object{display:none}}a,a:link,a:visited{color: ##333;text-decoration:none}a:hover,a:hover span {color: #000;text-decoration:underline}a img{border:none}input,select,textarea{font-size:15px;line-height:normal}big, div.h2,div.h3,h1,h2,h3,h4,h5,h6,small{font-family:arial,sans-serif;font-size:100%;margin:0;padding:0}.cf:after,ul.cf li:after,.ro:after{clear:both;content:".";display:block;height:0;visibility:hidden}.none{display:none}#area1 .ro .co, #area2 .ro .co{margin:.667em}body.ukhp{background: #ededed url(../../i/9e/d11d472df557c51b75b9f0b27752e0.gif) repeat-x center top}#page{background-color: #fff;min-width:972px;background:transparent}#wrapper .msnfoot1{margin:0}#area2 .ro .w4 .co3b2 .br2{min-width:100px;width:8.333em}#wrapper .actfeed1 .ac-head,#wrapper .actfeed1 .ac-status{border-color: ##e2f1d4} .headerbar1 .websearch2 .opt, headerbar1 .websearch2 .opt span, headerbar1 .websearch2 label{color: #fff}.headerbar1 .websearch2 .scopes span{color: #c1c1c1}#wrapper .searchbar3{padding:5px 0}.ebay1 .simple8 input.image{float:right; margin-top:0}.headerbar3 .websearch2 input.text{width:322px}#head:after,#page:after,#foot:after{clear:both;content:"."; display:block;height:0;visibility:hidden}#area1 .co,#area2 .co,#wrapper #area1 .cogr,#wrapper #area2 .cogr{margin:.667em} #wrapper.w12,#head .w12,#foot .w12,#nav .w12,#page .w12{width:81.667em;min-width:980px}#subhead .w12{width:81em; min_width+072px)#foot_w12(background_colon:]#ffflbody_conbp(background:]#ododod_un]

A few translate3d`s later...

Monaco Editor Debug

Template Y___BigCSS

1 #wrapper .w12,#wrapper.w12{min-width:972px;width:81em}.pa{margin:0 auto;padding:0 .5em}.pa #area1,.pa #area2,.pa #area3 {float:left}.pa #subfoot{clear:both}.pa #area2,.pa #area3{margin-left:1em}.pa #page:after{clear:both;content:"."; display:block;height:0;visibility:hidden}#wrapper{padding:0 0;text-align:left;margin:0 auto}#wrapper .w1{min-width:70px; width:5.833em}#wrapper .w2{min-width:152px;width:12.667em}#wrapper .w3{min-width:234px;width:19.5em}#wrapper .w3 .w50 {min-width:111px;width:9.25em}#wrapper .w4{min-width:316px;width:26.333em}#wrapper .w4 .w33{min-width:97px;width:8.083em} #wrapper .w4 .ce3.w33{min-width:98px;width:8.167em}#wrapper .w5{min-width:398px;width:33.167em}#wrapper .w5 .w33 {min-width:124px;width:10.333em}#wrapper .w5 .ce2.w33,#wrapper .w5 .ce3.w33{min-width:125px;width:10.417em}#wrapper .w5 .w50{min-width:193px;width:16.083em}#wrapper .w6{min-width:480px;width:40em}#wrapper .w7{min-width:562px;width:46.833em} #wrapper .w7 .w33{min-width:179px;width:14.917em}#wrapper .w7 .ce3.w33{min-width:180px;width:15em}#wrapper .w7 .w50 {min-width:275px;width:22.917em}#wrapper .w8{min-width:644px;width:53.667em}#wrapper .w8 .w33{min-width:206px; width:17.167em}#wrapper .w8 .ce1.w33,#wrapper .w8 .ce3.w33{min-width:206px;width:17.167em}#wrapper .w9{min-width:726px; width:60.5em}#wrapper .w9 .w50{min-width:357px;width:29.75em}#wrapper .w10{min-width:808px;width:67.333em}#wrapper .w10 .w33{min-width:261px;width:21.75em}#wrapper .w10 .ce3.w33{min-width:262px;width:21.833em}#wrapper .w11{min-width:890px; width:74.167em}#wrapper .w11 .w33{min-width:288px;width:24em}#wrapper .w11 .ce2.w33,#wrapper .w11 .ce3.w33 {min-width:289px;width:24.083em}#wrapper .w11 .w50{min-width:439px;width:36.583em}#wrapper .w12{min-width:972px; width:81em}#head{min-width:972px;background:transparent}#nav{min-width:972px;background:transparent}#content {background: #fff}#foot{min-width:972px;background:transparent}.wings{background-color: ##009ad9;min-width:81em;width:100% #nav .wings{height:1.667em}#doublerownav .wings{height:3.75em}body{color: ##333;font-family:arial,sans-serif;font-size:75%; line-height:1.33em;margin:0;padding:0;text-align:center}a.more,div.br *,.cotb *,.coss *{font-family:arial,sans-serif} @media print{form,object{display:none}}a,a:link,a:visited{color: ##333;text-decoration:none}a:hover,a:hover span {color: #000;text-decoration:underline}a img{border:none}input,select,textarea{font-size:15px;line-height:normal}big, div.h2,div.h3,h1,h2,h3,h4,h5,h6,small{font-family:arial,sans-serif;font-size:100%;margin:0;padding:0}.cf:after,ul.cf li:after,.ro:after{clear:both;content:".";display:block;height:0;visibility:hidden}.none{display:none}#area1 .ro .co, #area2 .ro .co{margin:.667em}body.ukhp{background:□#ededed url(../../i/9e/d11d472df557c51b75b9f0b27752e0.gif) repeat-x center top}#page{background-color: #fff;min-width:972px;background:transparent}#wrapper .msnfoot1{margin:0}#area2 .ro .w4 .co3b2 .br2{min-width:100px;width:8.333em}#wrapper .actfeed1 .ac-head.#wrapper .actfeed1 .ac-status{border-color: ##2f1d4} .headerbar1 .websearch2 .opt,.headerbar1 .websearch2 .opt span,.headerbar1 .websearch2 label{color: ##fff}.headerbar1 .websearch2 .scopes span{color: #c1c1c1]#wrapper .searchbar3{padding:5px 0}.ebay1 .simple8 input.image{float:right; margin-top:0}.headerbar3 .websearch2 input.text{width:322px}#head:after,#page:after,#foot:after{clear:both;content:"."; display:block;height:0;visibility:hidden}#area1 .co,#area2 .co,#wrapper #area1 .cogr,#wrapper #area2 .cogr{margin:.667em} #wrapper.w12, #head .w12, #foot .w12, #nav .w12, #page .w12{width:81.667em;min-width:980px}#subhead .w12{width:81em; min_width+072px)#foot_w12[hackground_colon: #fff]hody_controlhackground: #adadad_wn]

Monaco Editor Debug

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VS Code https://github.com/Microsoft/vscode

TypeScript https://www.typescriptlang.org/

Electron http://electron.atom.io/

gulp-tsb <u>https://github.com/jrieken/gulp-tsb</u>

Twitter <u>@code</u>