webpack ACADEMY

Webpack Fundamentals

https://github.com/thelarkinn/webpack-workshop-2018

Program Manager

Microsoft Web Platform, Developer Experience, Ecosystem

Maintainer + Advocate

Webpack

Core Team

Angular / angular-cli

Evangelist

Open Source Sustainability

Where most people think Nebraska is...

Background

Former Tech Support Rep. gone rogue turned Software Engineer / Web Developer who got tired of never being able to really help the customer he served.

Languages: Ruby, Objective-C, Swift, Javascript.

Other: Woodworker, 🐓 farmer, IoT

Objective

C-Programming

JS

Sustainable Open Source Practices

JavaScript

Building Contributors, Community, and Ecosystem

Sean Larkin
TheLarkInn

User Experience Developer **@mutualofomaha**. Javascript, Angular, Ruby, Webpack, Typescript. **@webpack** core team. **@angular** cli core team.

@mutualofomaha @webpack...
Lincoln, NE
sean.larkin@cuw.edu
https://careers.stackoverflow....

Organizations

Overview | Repositories 164 | Stars 150 | Followers 413 | Following 53

Pinned repositories — Customize your pinned repositories

webpack/webpack
A bundler for javascript and friends. Packs many modules into a few bundled assets. Code Splitting allows to load parts for the application on demand. Through "loaders," modules can be CommonJs, AM...
JavaScript ★ 24k 2.8k

angular/angular-cli
CLI tool for Angular
TypeScript ★ 7.2k 1.4k

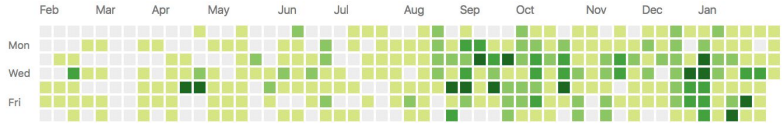
angular-starter-es6-webpack
This is an Angular Starter App with component and service generators using gulp for easy component development. Uses Karma-Mocha-Chai as testing suite and Babel Loader and Webpack for ES6
JavaScript ★ 71 49

angular2-template-loader
Chain-to loader for webpack that inlines all html and style's in angular2 components.
JavaScript ★ 100 40

webpack-developer-kit
webpack dev kit for writing custom plugins and loaders on the fly. Education/Exploration tool as well.
JavaScript ★ 55 7

LazyParseWebpackPlugin
(v8-lazy-parse-webpack-plugin) This is a webpack plugin designed to exploit the V8 engines treatment of functions with parens wrapped around them. This lazy loads the parsing decreasing initial loa...
JavaScript ★ 84 6

1,434 contributions in the last year — Contribution settings



Learn how we count contributions.
Less More

@TheLarkInn

Github - Medium - Codepen - Stack Overflow - LinkedIn - Twitter

ASK ME ANYTHING

http://github.com/thelarkinn/ama

Expectations

Why webpack? - History of Web Performance + JavaScript

Getting Started - Setup, Installation, Scripts, and CLI

The Core Concepts

Starting out Right

The Essentials

Putting it to practice

Triage and Debug

Introductions

- Name
- Country
- Company
- Front-end FW you use
- #1 thing you want to walk away knowing by the end of this course

Chapter 1: Why?

Origins

JavaScript - It's just scripts!

```
const button = document.createElement(
'button');
button.innerText = "My button!";

document.body.appendChild(button);
```

2 ways to load

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <meta http-equiv="X-UA-Compatible" content="ie=edge">
    <title>Document</title>
</head>
<body>
    <script>
        var foo = "hello world!";

        console.log(foo);
    </script>
</body>
</html>
```

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <meta http-equiv="X-UA-Compatible" content="ie=edge">
    <title>Document</title>
</head>
<body>
    <script src="index.js"></script>
</body>
</html>
```

Problems

Doesn't Scale

Too many Scripts

339

Max Number of default simultaneous persistent connections per server/proxy:

```
Firefox 2:  2
Firefox 3+: 6
Opera 9.26: 4
Opera 12:   6
Safari 3:   4
Safari 5:   6
IE 7:       2
IE 8:       6
IE 10:      8
Chrome:     6
```

The limit is per-server/proxy, so your wildcard scheme will work.

FYI: this is specifically related to HTTP 1.1; other protocols have separate concerns and limitations (i.e., SPDY, TLS, HTTP 2).

Too Many Scripts

Unmaintainable Scripts

Scope

Size

Readability

Fragility

Monolith Files

SOLUTION?

IIFE'S

Immediately Invoked Function Expression

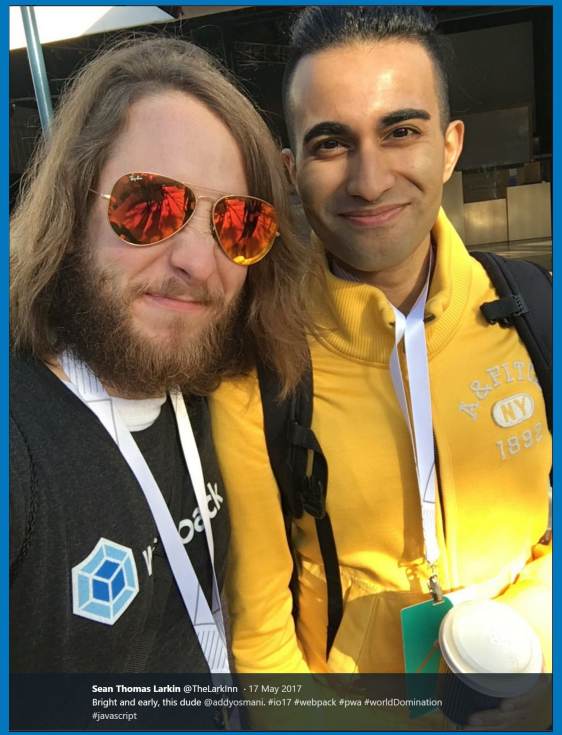
```
/**
 * Immediately Invoked Function Expression
 */
const whatever = (function(dataNowUsedInside) {
    return {
        someAttribute: "youwant"
    }
})(1)
/**
 * whatever.someAttribute
 *
 * > "youwant"
 */
```

Revealing Module pattern

```
var outerScope = 1;
/**
 * Immediately Invoked Function Expression
 */
const whatever = (function(dataNowUsedInside) {
    var outerScope = 4;
    return {
        someAttribute: "youwant"
    }
})(1)

console.log(outerScope);
/**
 * console log returns 1! No inner scope leak!
 */
```

Treat each file as IIFE (Revealing Module)

Many Similar Patterns



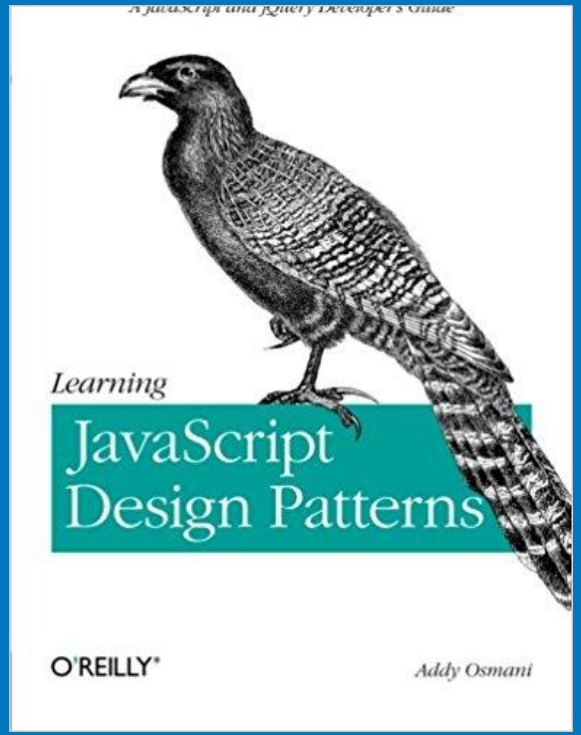


Table Of Contents

Concatenate!

We can "safely" combine files without concern of scope collision!*

Make, Grunt, Gulp, Broccoli, Brunch, StealJS

Full Rebuilds Everytime!

Dead Code

Concat doesn't help tie usages across files

« On joining Microsoft Edge and moving to Seattle

Progressive enhancement isn't dead, but it smells funny »

The cost of small modules

Posted August 15, 2016 by Nolan Lawson in performance, Web. **78 Comments**

Update (30 Oct 2016): *since I wrote this post, a bug was found in the benchmark which caused Rollup to appear slightly better than it would otherwise. However, the overall results are not substantially different (Rollup still beats Browserify and Webpack, although it's not quite as good as Closure anymore), so I've merely updated the charts and tables. Additionally, the benchmark now includes the RequireJS and RequireJS Almond bundlers, so those have been added as well. To see the original blog post without these edits, check out this archived version.*

About a year ago I was refactoring a large JavaScript codebase into smaller modules, when I discovered a depressing fact about Browserify and Webpack:

> "The more I modularize my code, the bigger it gets. 😐"
> – Nolan Lawson

Later on, Sam Saccone published some excellent research on Tumblr and Imgur's page load performance, in which he noted:

> "Over 400ms is being spent simply walking the Browserify tree."
> – Sam Saccone

In this post, I'd like to demonstrate that small modules can have a surprisingly high performance cost depending on your choice of bundler and module system. Furthermore, I'll explain why this applies not only to the modules in your own codebase, but also to the modules *within dependencies*, which is a rarely-discussed aspect of the cost of third-party code.

LOTS OF IIFE'S ARE SLOW

~~DYNAMIC LOADING?~~

Birth of JavaScript Modules


node
JS
®

CommonJS

(Modules 1.0)

```
// index.js
const path = require("path"); // used for builtin Node.js modules
const {add, subtract} = require("./math"); // or also used modules from another file

const sum = add(5, 5);
const difference = subtract(10, 4);

console.log(sum, difference);

/**
 *
 * math.js (has two named exports {add, subtract})
 *
 *
 */
const divideFn = require("./division");

exports.add = (first, second) => first + second;
exports.subtract = (first, second) => first - second;
exports.divide = divideFn;

/**
 *
 * division.js
 *
 *
 * has a default exports "divide"
 */
module.exports = (first, second) => first/second;
```

Problems

Static Analysis

NPM+NODE+MODULES

Mass Distribution

Problems

No Browser Support

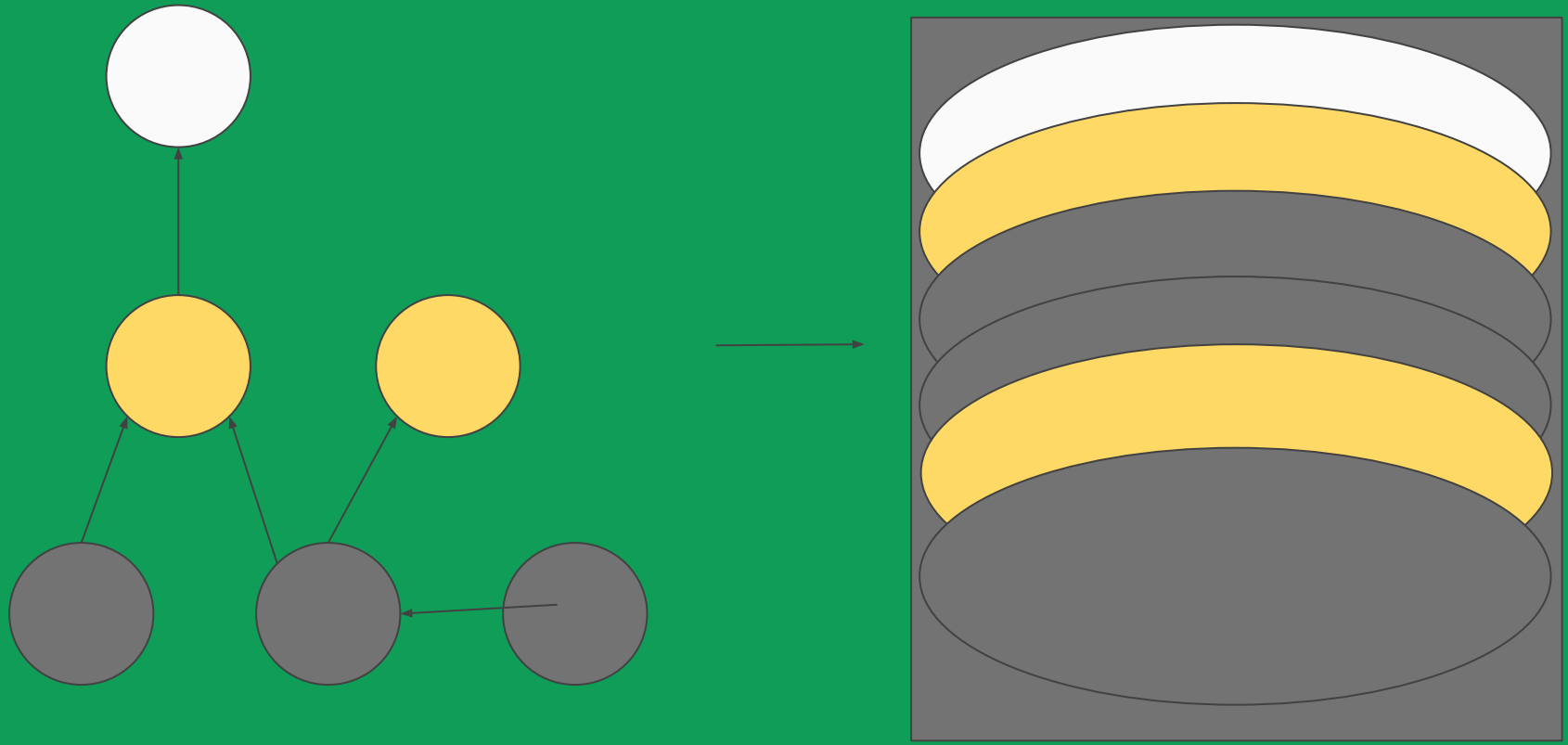
No Live Bindings

Problems with circular references

Sync Module Reso, Loader (slow)

NO BROWSER SUPPORT

SOLUTION?



Bundlers / Linkers

Browserify (static)
RequireJS (loader)
SystemJS (loader)

Problems

CommonJS

```
//loading module
var _ = require('lodash');

//declaring module
module.exports = someValue;
```

No static async / lazy loading (all bundles up front)

CommonJS Bloat

Too Dynamic

Not everyone was shipping CommonJS.

AMD

```
define('myAwesomeLib', ['lodash',
'someDep'],
   function (_, someDep) {
      return { … }
   }
);
```

AMD + CommonJS

```
define( function(require, exports, module) {
   var _ = require('lodash');

   //..do things
   module.exports = someLib;
});
```

Problems

Too Dynamic of Lazy Loading (MomentJS)

Awkward Non Standard Syntax (no real module system)

SOLUTION?

ESM

```
import {uniq, forOf, bar} from ‘lodash-es’
import * as utils from ‘utils’;


export const uniqConst = uniq([1,2,2,4]);
```

Reusable

Encapsulated

Organized

Convenient

Problems

ESM for Node?

HOW DO THEY WORK IN THE BROWSER?

ESM for Browser is very very very slow

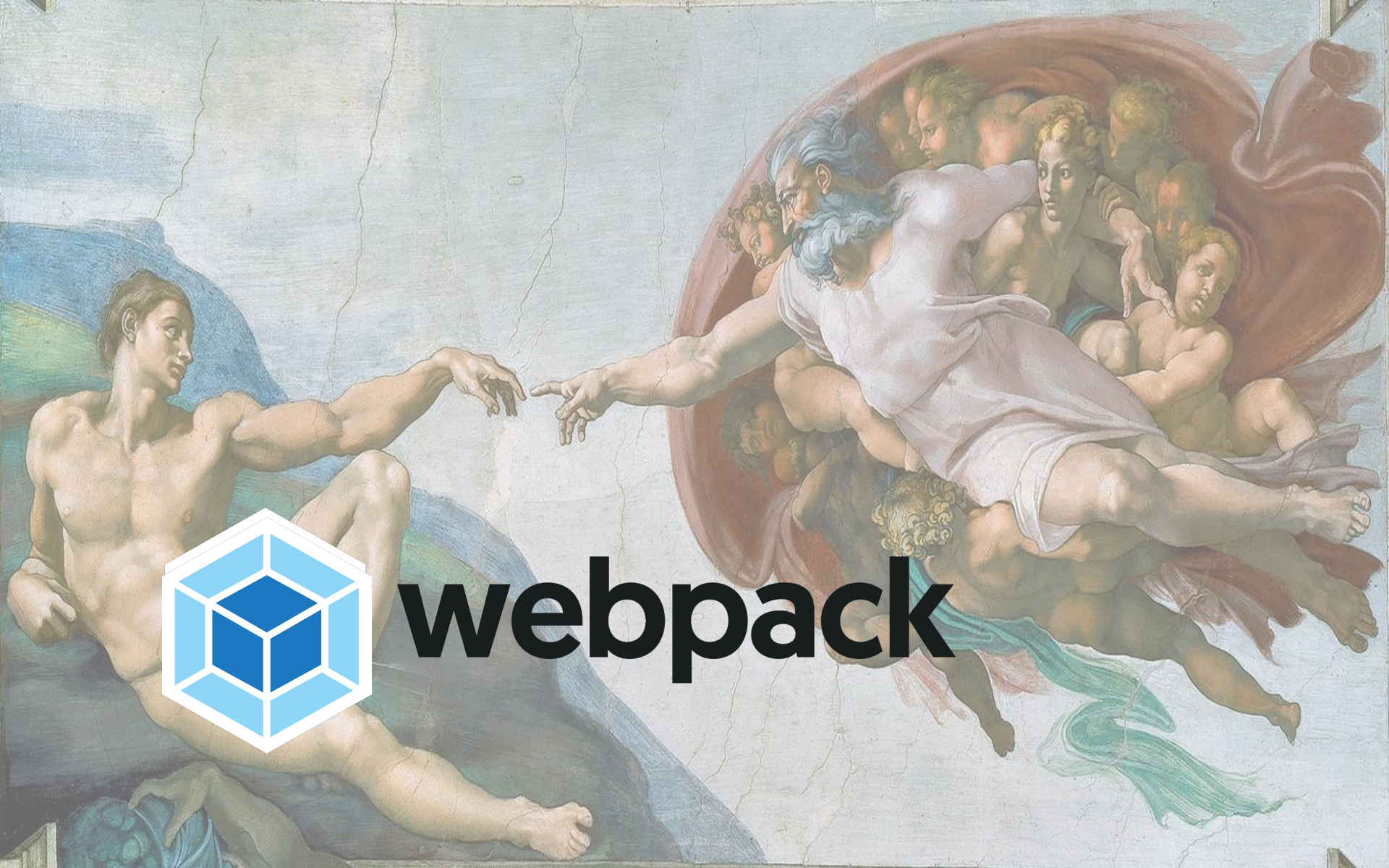
Every library is different...

Library authors use the module types that they like and choose

And this is just for JavaScript...

Each and every other filetype until now has had to have specific ways to process it.

Wouldn't it be nice...


webpack

WEBPACK IS A MODULE BUNDLER

LETS YOU WRITE ANY MODULE FORMAT (MIXED!), COMPILES THEM FOR THE BROWSER

Supports Static Async Bundling

Rich, Vast, Ecosystem

The most performant way to ship JavaScript today

Webpack - How to use it?

Config

(webpack.config.js) Yes, it's a module too!!!

```
module.exports = {
  entry: {
    vendor: './src/vendors.ts',
    main: './src/main.browser.ts'
  },
  output: {
   path: 'dist/',
   filename: '[name].bundle.js'
  }
}
```

Webpack - How to use it?

Webpack CLI

```
$> webpack <entry.js>
<result.js> --colors
--progress
```

```
$> webpack-dev-server
--port=9000
```

Webpack - How to use it?

Node API

```
var webpack = require("webpack");

// returns a Compiler instance
webpack({
    // configuration object here!
}, function(err, stats) {
   // …
   // compilerCallback
   console.error(err);
});
```

Questions?

Break!

Chapter 2 - From Scratch

github.com/thelarkinn/webpack-workshop-2018

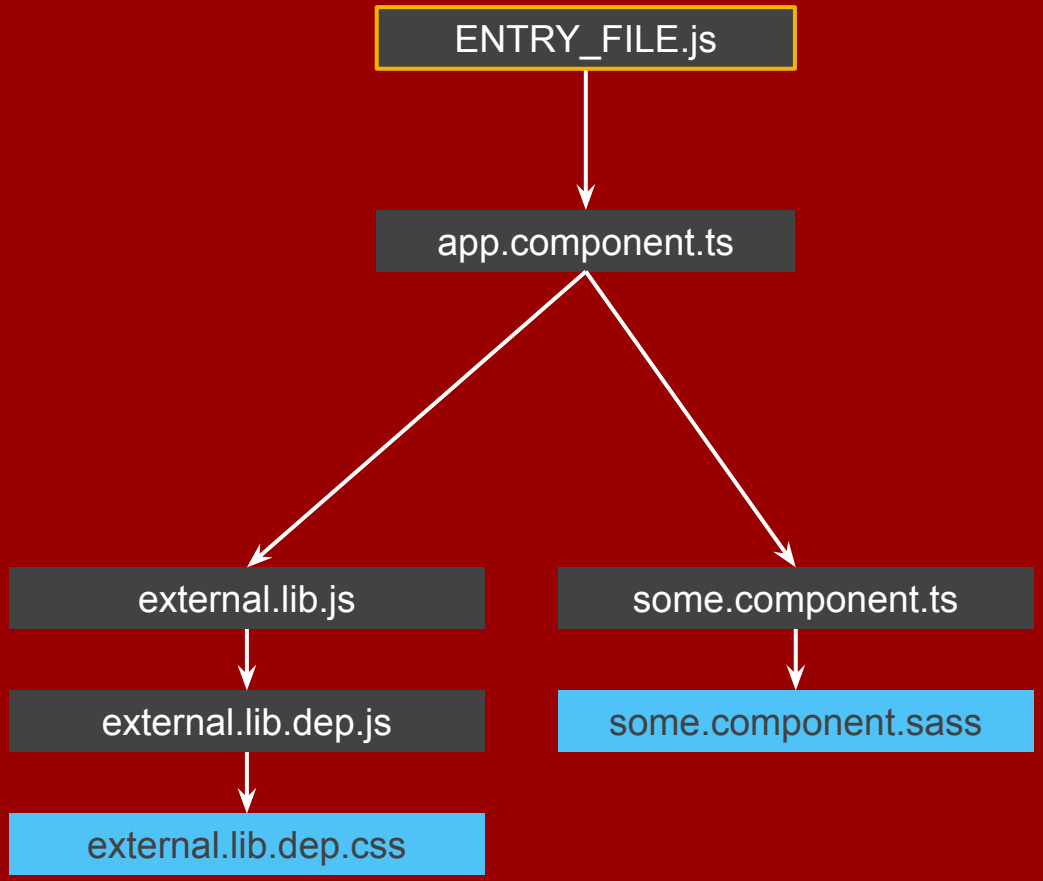
The Core Concepts

Entry

The Core Concepts: Entry

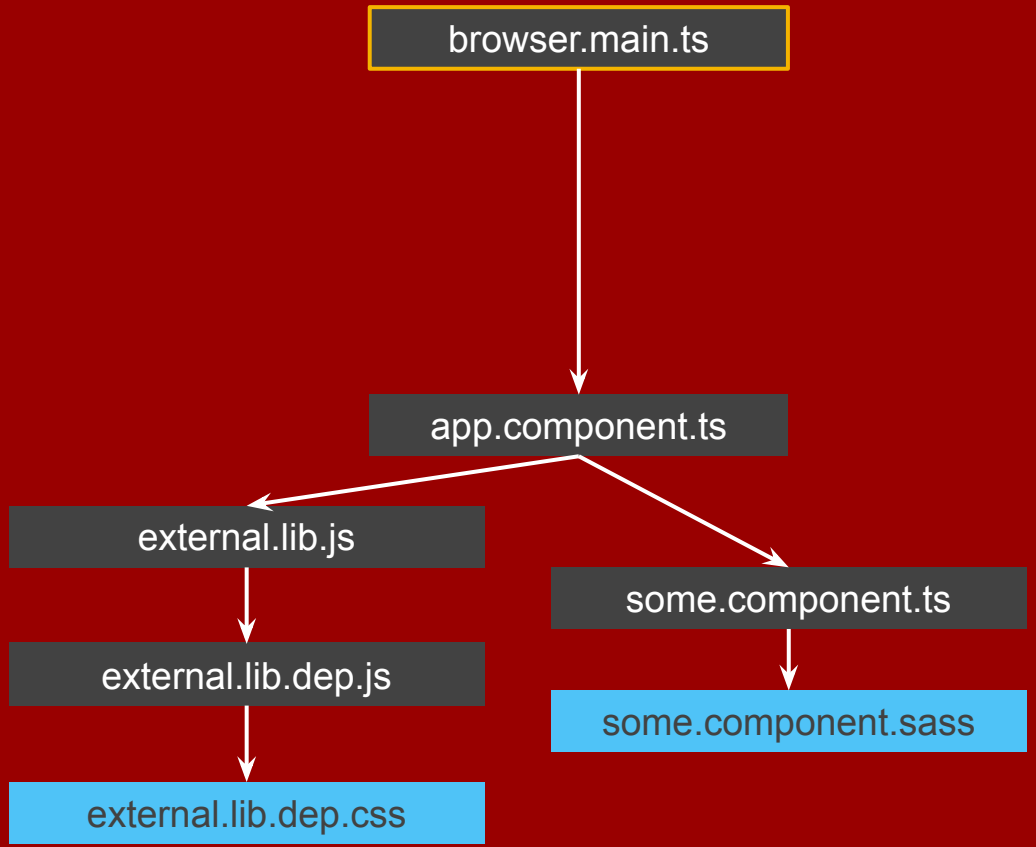
The first javascript file to load to “kick-off” your app.

webpack uses this as the starting point



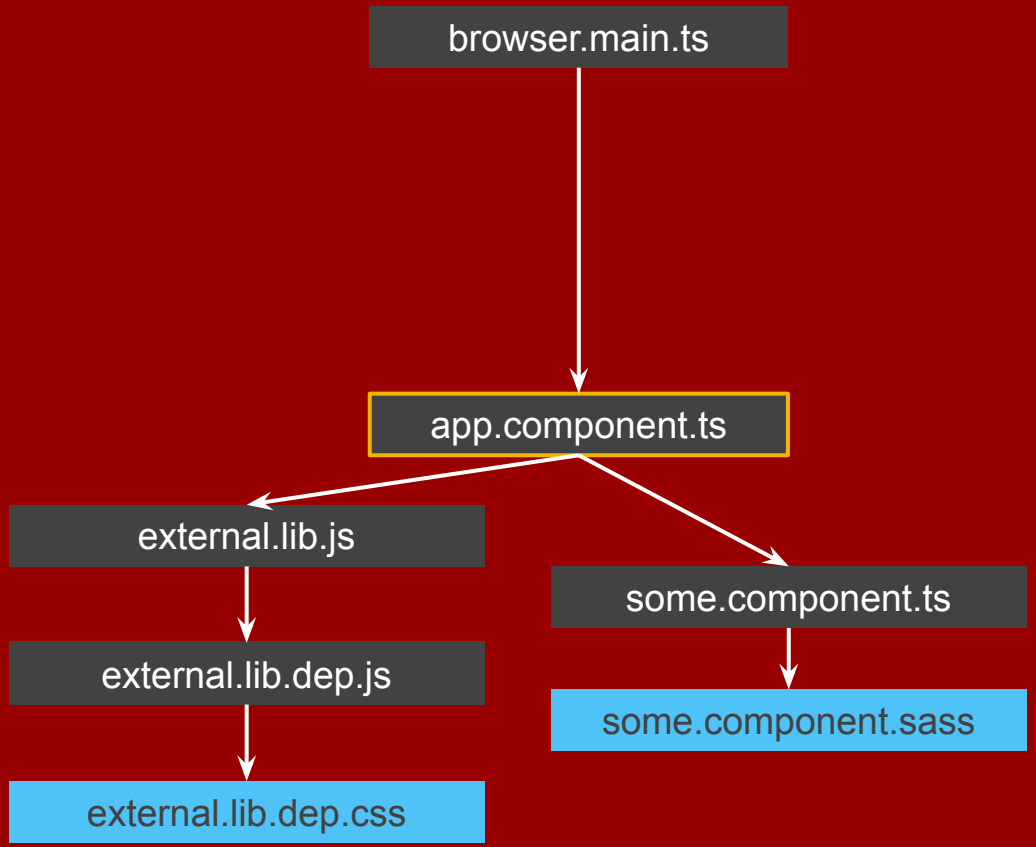
The Core Concepts: Entry

```
//webpack.config.js
module.exports = {
  entry: './browser.main.ts',
  //...
}

//browser.main.ts
import {
  Component
} from '@angular/core';

import {
  App
} from './app.component';
bootstrap(App,[]);

//app.component.ts
@Component({...})
export class App {};
```



The Core Concepts: Entry

```
//webpack.config.js
module.exports = {
  entry: './browser.main.ts',
  //...
}

//browser.main.ts
import {Component} from
'@angular/core';

import {App} from
'./app.component';

bootstrap(App,[]);

//app.component.ts
@Component({...})
export class App {};
```



The Core Concepts

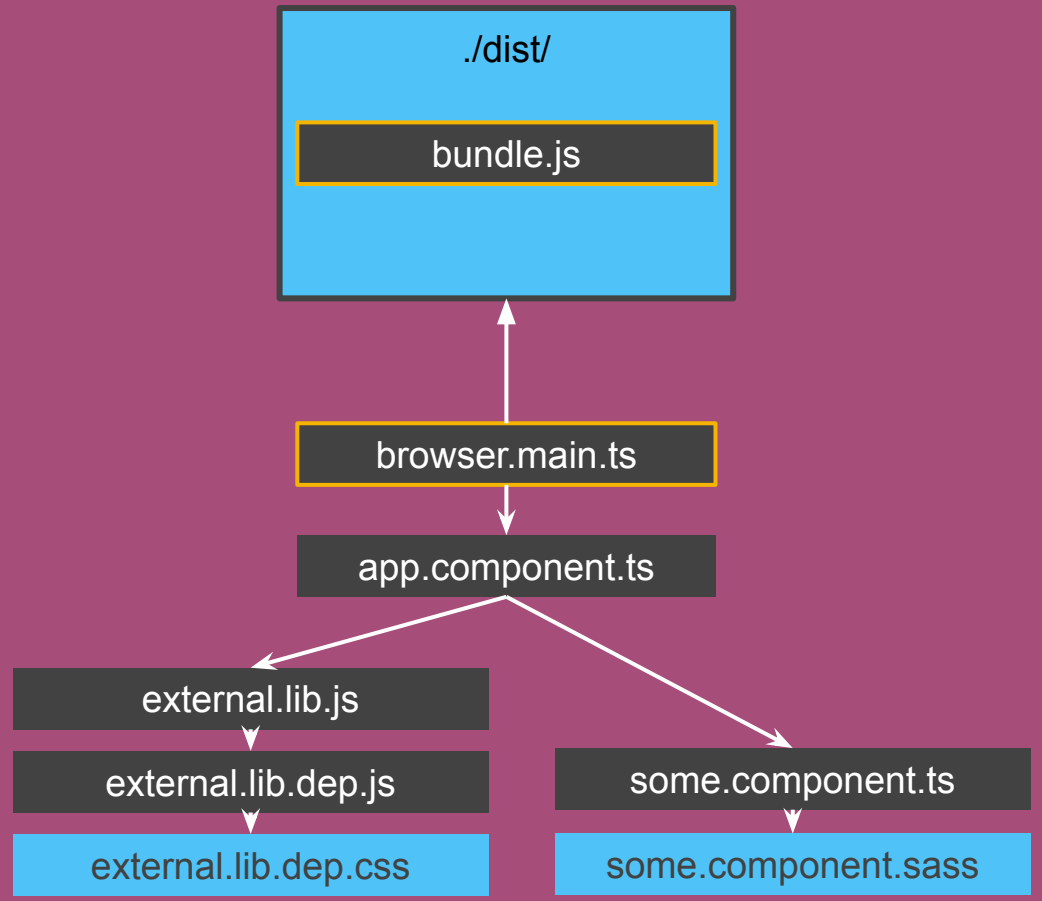
Entry

Tells webpack ***WHAT*** (files) to load for the browser;
Compliments the *Output* property.

Output

The Core Concepts: Output

```
//webpack.config.js
module.exports = {
  entry: './browser.main.ts',
  output: {
    path: './dist',
    filename: './bundle.js',
  },
  //...
}

//Generates bundle.js
```



The Core Concepts

Entry

Output

Tells Webpack WHERE and HOW to distribute bundles (compilations). Works with Entry.

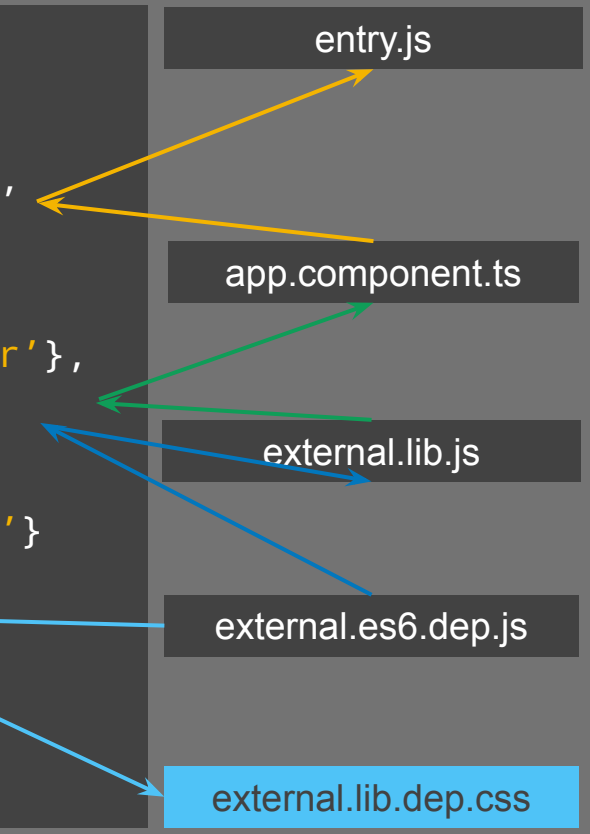
Loaders + Rules

The Core Concepts: Loaders

Tells webpack how to modify files before its added to dependency graph

Loaders are also javascript modules (*functions*) that takes the source file, and returns it in a [modified] state.

```
module: {
  rules: [
    {test: /\.ts$/, use: 'ts-loader'},

    {test: /\.js$/, use: 'babel-loader'},

    {test: /\.css$/, use: 'css-loader'}
  ],
}
```



The Core Concepts: Loaders

```
module: {
  rules: [
    {
      test: regex,
      use: (Array|String|Function)
      include: RegExp[],
      exclude: RegExp[],
      issuer: (RegExp|String)[],
      enforce: "pre"|"post"
    },
  ],
}
```

test

A *regular expression* that instructs the compiler which files to run the loader against.

use

An array/string/function that returns loader objects.

enforce

Can be "pre" or "post", tells webpack to run this rule before or after all other rules

The Core Concepts: Loaders

```
module: {
  rules: [
    {
      test: /\.ts$/,
      use: [
        'awesome-typescript-loader',
        'ng2-asset-loader`
      ],
      include: /some_dir_name/,
      exclude: [/\.(spec|e2e)\.ts$/],
    },
  ],
}
```

include

An *array of regular expression* that instruct the compiler which folders/files to include. *Will only search paths provided with the include.*

exclude

An *array of regular expression* that instructs the compiler which folders/files to ignore.

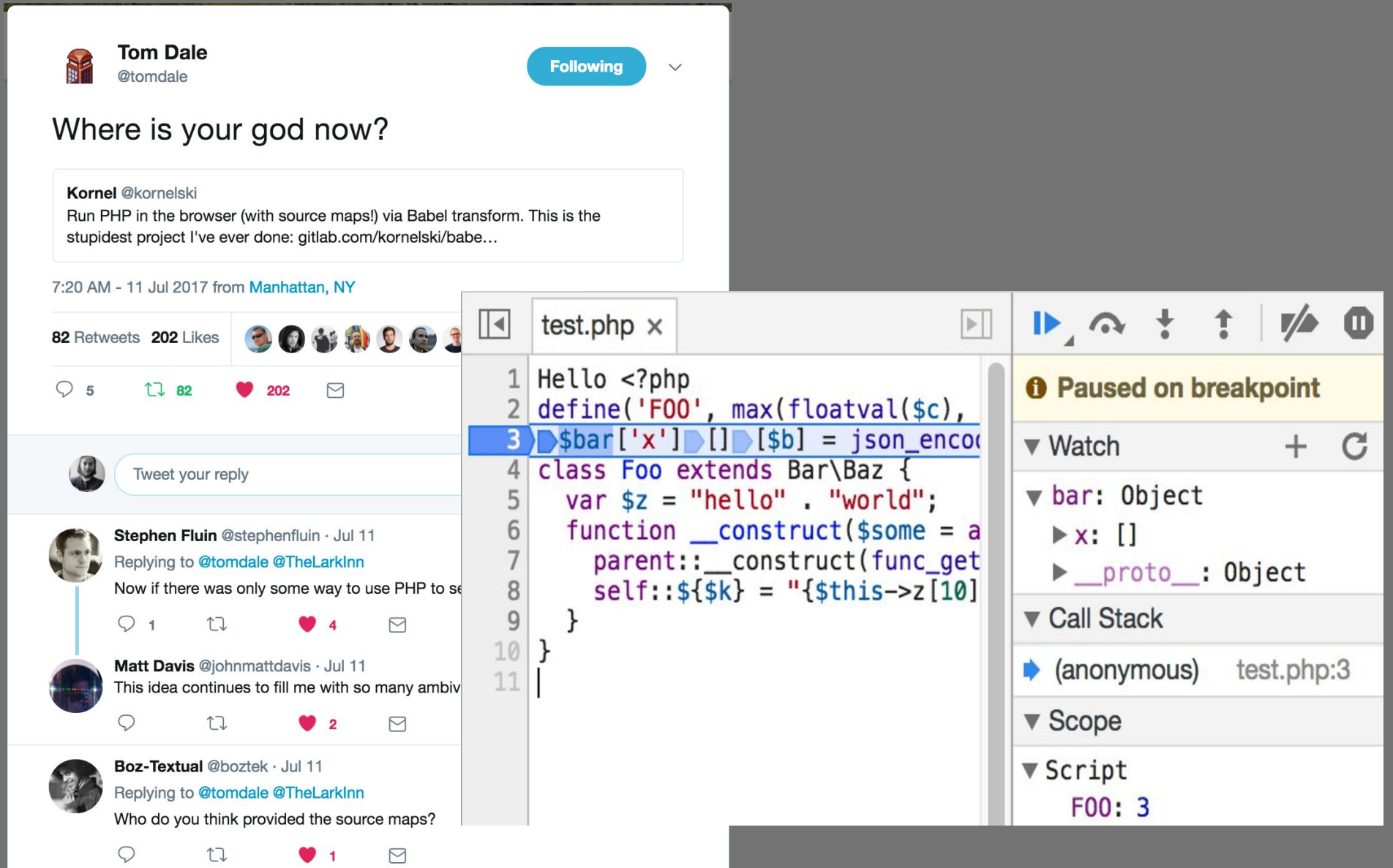
The Core Concepts: Loaders

Chaining Loaders

```
rules: [
  {
    test: /\.less$/,
    use:['style-loader','css-loader','less-loader']
  }
]
```

The Core Concepts: Loaders

json, hson, raw, val, to-string, imports, exports, expose, script, apply, callback, ifdef-loader, source-map, sourceMappingURL, checksum, cowsay, dsv, glsl, glsl-template, render-placement, xml, svg-react, svg-url, svg-as-symbol, symbol, base64, ng-annotate, node, required, icons, markup-inline, block-loader, bundler-configuration, console, solc, .sol, web3, includes, combine, regexp-replace, file, url, extract, worker, shared-worker, serviceworker, bundle, require.ensure, promise, async-module, bundle, require.ensure, react-proxy, react-hot, image, file, url, img, base64-image, responsive, srcset, svgo, svg-sprite, symbol, svg-fill, fill, line-art, baggage, polymer, uglify, html-minify, vue, tojson, zip-it, file, lzstring, modernizr, s3, path-replace, react-intl, require.ensure, font-subset, w3c-manifest, web-app-manifest, manifest-scope, coffee, coffee-jsx, coffee-redux, json5, es6, esnext, babel, regenerator, livescript, sweetjs, traceur, ts, typescript, awesome-typescript, webpack-typescript, purs, oj, elm-webpack, miel, wisp, sibilant, ion, html, dom, riot, pug, jade-html, jade-react, virtual-jade, virtual-dom, template-html, handlebars, handlebars-template-loader, dust, ractive, jsx, react-templates, em, ejs, ejs-html, mustache, yaml, yml, react-markdown, front-matter, markdown, remarkable, markdown-it, markdownattrs, ng-cache, ngtemplate, hamlc, haml, jinja, nunjucks, soy, smarty, swagger, template-string, ect, tmodjs, layout, swig, twig, mjml-, bootstrap-webpack, font-awesome-webpack, bootstrap-sass, bootstrap, bootstrap, font-awesome, style, isomorphic-style, style-loader, css, cess, less, sass, stylus, csso, rework, postcss, autoprefixer, namespace-css, fontgen, classnames, theo, bulma, css-to-string, css-loader, po, po2mo, format-message, jsxlate, angular-gettext, json, angular-gettext, webpack-angular-translate, angular-gettext-extract, .pot, gettext, preprocessor, amdi18n-loader, .json, .js, .coffee, sprockets-preloader, properties, transifex, mocha, coverjs, istanbul-instrumenter, ibrik-instrumenter, eslint, jshint, jscs, standard, inject, transform, falafel, image-size, csslint, coffeelint, tslint, parker, sjsp, amdcheck, manifest, gulp-rev, html-test, stylelint, stylefmt, scsslint, htmlhint, documentation, sassdoc, performance-loader


Tom Dale
@tomdale
Following
Where is your god now?
Kornel @kornelski
Run PHP in the browser (with source maps!) via Babel transform. This is the stupidest project I've ever done: gitlab.com/kornelski/babe…
7:20 AM - 11 Jul 2017 from Manhattan, NY
82 Retweets 202 Likes
5 82 202
Tweet your reply
Stephen Fluin @stephenfluin · Jul 11
Replying to @tomdale @TheLarkInn
Now if there was only some way to use PHP to se
1 4
Matt Davis @johnmattdavis · Jul 11
This idea continues to fill me with so many ambiv
2
Boz-Textual @boztek · Jul 11
Replying to @tomdale @TheLarkInn
Who do you think provided the source maps?
1
test.php
1 Hello <?php
2 define('FOO', max(floatval($c),
3 $bar['x'][][$b] = json_enco
4 class Foo extends Bar\Baz {
5 var $z = "hello" . "world";
6 function __construct($some = a
7 parent::__construct(func_get
8 self::${$k} = "{$this->z[10]
9 }
10 }
11
Paused on breakpoint
Watch
bar: Object
x: []
__proto__: Object
Call Stack
(anonymous) test.php:3
Scope
Script
FOO: 3

The Core Concepts

Entry

Output

Loaders

Tells Webpack HOW to interpret and translate files. Transformed on a per-file basis before adding to the dependency graph

PLUGINS

The Core Concepts: Plugins

Objects (with an `apply` property)

Allow you to hook into the entire compilation lifecycle

webpack has a variety of built in plugins

The Core Concepts: Plugins

```
function BellOnBundlerErrorPlugin () { }

BellOnBundlerErrorPlugin.prototype.apply = function(compiler) {
  if (typeof(process) !== 'undefined') {

    // Compiler events that are emitted and handled
    compiler.plugin('done', function(stats) {
      if (stats.hasErrors()) {
        process.stderr.write('\x07');
      }
    });

    compiler.plugin('failed', function(err) {
      process.stderr.write('\x07');
    });

  }
}

module.exports = BellOnBundlerErrorPlugin;
```

Basic Plugin Example

A plugin is an ES5 ‘class’ which implements an *apply* function.

The compiler uses it to emit events.

The Core Concepts: Plugins

```
// require() from node_modules or webpack or local file
var BellOnBundlerErrorPlugin = require('bell-on-error');
var webpack = require('webpack');

module.exports = {
  //...
  plugins: [
     new BellOnBundlerErrorPlugin(),

     // Just a few of the built in plugins
     new webpack.optimize.CommonsChunkPlugin('vendors'),
     new webpack.optimize.UglifyJsPlugin()
  ]
  //...
}
```

How to use Plugins

require() plugin from *node_modules* into config.

add *new instance of plugin to plugins* key in config object.

provide additional info for arguments

CLICK HERE TO SEE THE LIST OF PLUGINS

The Core Concepts: Plugins

5b25024 on Jun 8
TheLarkInn Merge

80% of webpack is made up of its own plugin system

17 contributors

300 lines (280 sloc) | 10.6 KB

Raw Blame History

```
1  /*
2          MIT License http://www.opensource.org/licenses/mit-license.php
3          Author Tobias Koppers @sokra
4  */
5  var assign = require("object-assign");
6  var OptionsApply = require("./OptionsApply");
7
8  var LoaderTargetPlugin = require("./LoaderTargetPlugin");
9  var FunctionModulePlugin = require("./FunctionModulePlugin");
10 var EvalDevToolModulePlugin = require("./EvalDevToolModulePlugin");
11 var SourceMapDevToolPlugin = require("./SourceMapDevToolPlugin");
12 var EvalSourceMapDevToolPlugin = require("./EvalSourceMapDevToolPlugin");
13
14 var EntryOptionPlugin = require("./EntryOptionPlugin");
15 var RecordIdsPlugin = require("./RecordIdsPlugin");
```


MARIEPHANTOMHIVE.TUMBLR.COM

Web Performance

The Core Concepts

Entry
Output
Loaders
Plugins

Adds additional functionality to *Compilations(optimized bundled modules)*. More powerful w/ more access to CompilerAPI. Does everything else you'd ever want to in webpack.


WAT
4GIFS.com

Exercise Time

Chapter 3 - Starting Out Right

webpack

ACADEMY

Instant Loading

https://github.com/thelarkinn/webpack-workshop-2018

Top 3 Web Page Load Time Causes:

Amount of JavaScript For Initial Download

Amount of CSS For Initial Download

AMount of Network Requests on Initial Download

Goals:

<=200kB (uncompressed) Initial JavaScript [total]

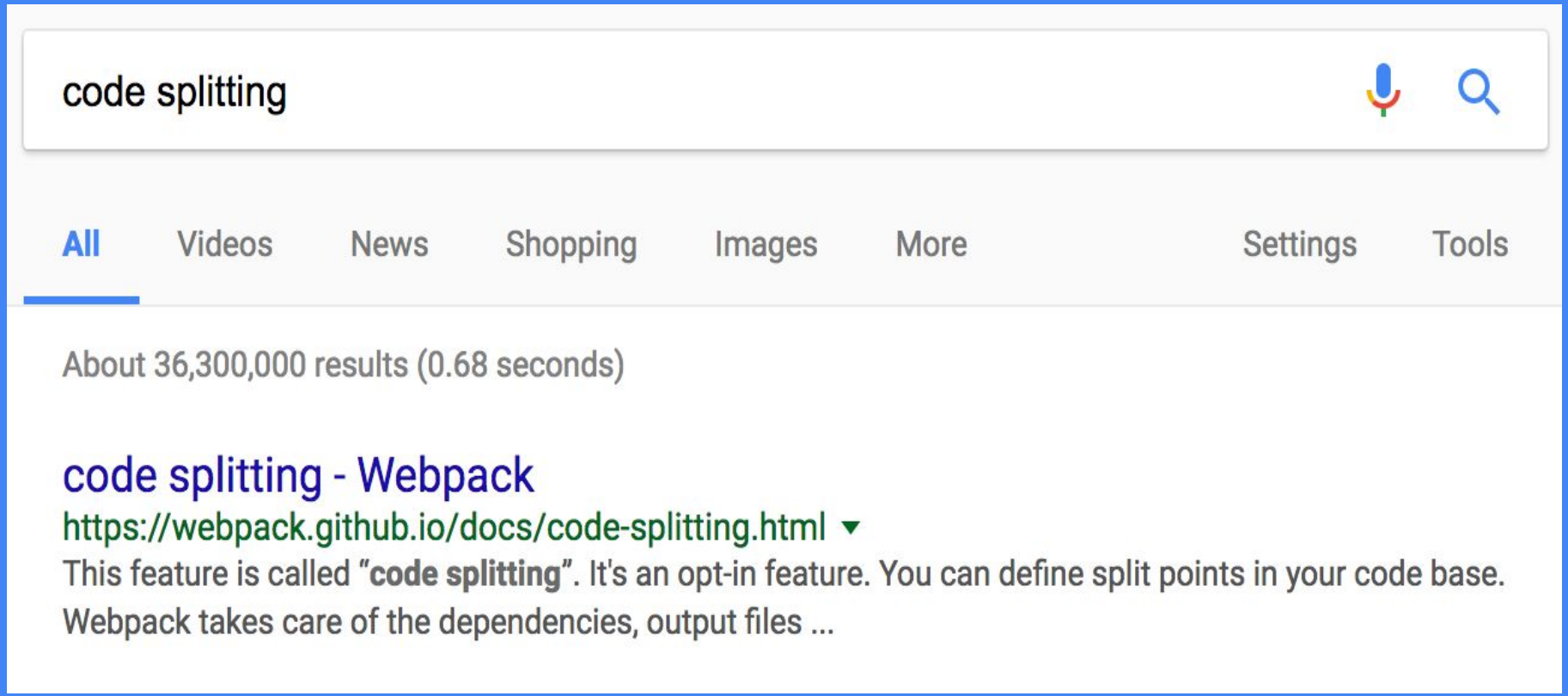
<=100kB (uncompressed) Initial CSS [total]

HTTP: <= 6 Initial Network Calls
HTTP/2: <= 20 Initial Network Calls

90% Code Coverage (only 10% code unused)

Code Splitting

Code Splitting



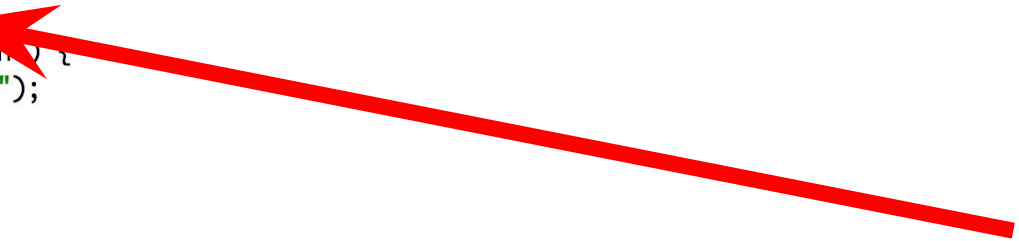

GWT

For example, here is the initial, unsplit Hello sample that comes with GWT:

```
public class Hello implements EntryPoint {
  public void onModuleLoad() {
    Button b = new Button("Click me", new ClickHandler() {
      public void onClick(ClickEvent event) {
        Window.alert("Hello, AJAX");
      }
    });
```

Suppose you wanted to split out the `Window.alert` call into a separate code download. The following code accomplishes this:

```
public class Hello implements EntryPoint {
  public void onModuleLoad() {
    Button b = new Button("Click me", new ClickHandler() {
      public void onClick(ClickEvent event) {
        GWT.runAsync(new RunAsyncCallback() {
          public void onFailure(Throwable caught) {
            Window.alert("Code download failed");
          }

          public void onSuccess() {
            Window.alert("Hello, AJAX");
          }
        });
      }
    });

    RootPanel.get().add(b);
  }
}
```

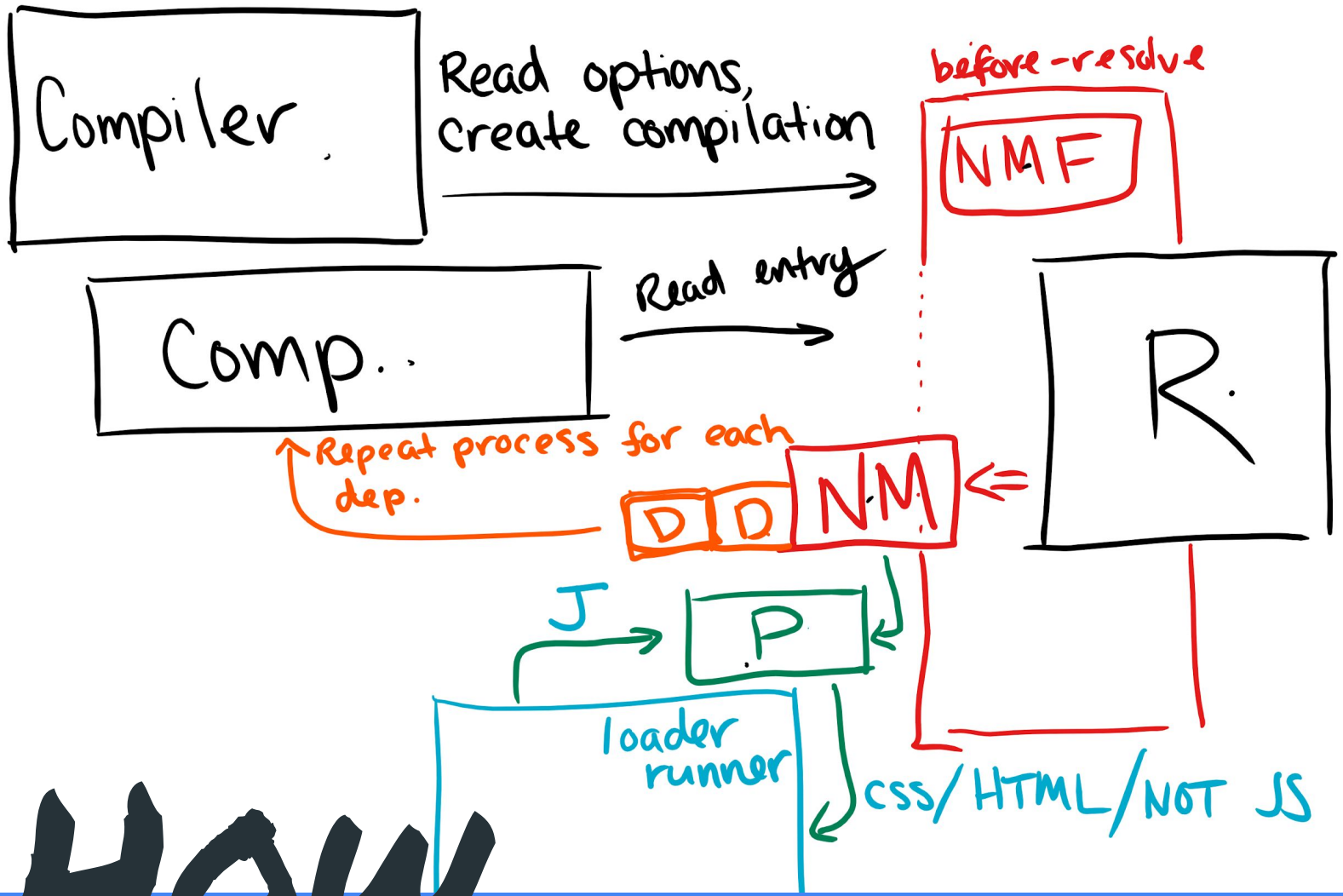


webpack

Code Splitting

Process of splitting pieces of your code into async chunks [at build time]

How Does it Work?


Compiler
Read options, create compilation
before-resolve
NMF
Comp..
Read entry
R.
Repeat process for each dep.
D
D
NM
J
P
loader runner
CSS/HTML/NOT JS

HOW...

Why should I care?

Why...

The future of web is mobile

The average mobile website takes 14 seconds to get interactive

Load less code => interactive faster.

Faster load times mean more chances for engagement

We saw a correlation between slow mobile sites and high bounce rates. When sites load slowly, users are more likely to abandon the page — every time a user leaves your site, you lose traffic to monetize.

Imagine you're headed to a museum to see the hot new exhibit, and you have a choice between waiting in the longer regular line or the fast-moving VIP line. You'll want to pick the shorter VIP line, of course. Meanwhile, if the regular line is too long, it might convince you to turn around and go home if it's your only option.

It's the same with mobile speed. **Creating a fast and smooth mobile web experience keeps users engaged.** Quick sites make people more likely to click through to more pages, reading further to consume more content.

Sites that loaded in 5 seconds vs 19 seconds were observed to have:

60% greater pageviews per visit[21]

35% lower bounce rates[22]

21. Google Data, Aggregated, anonymized Google Analytics data from a sample of mWeb sites opted into sharing benchmark data, n=3.8K, Global, March 2016
22. Google Data, Aggregated, anonymized Google Analytics data from a sample of mWeb sites opted into sharing benchmark data, n=2.8K, Global, March 2016

Sites that loaded within 5 seconds vs 19 seconds were observed to have:

70% longer average sessions[25]

25% higher viewability[26]

25. Google Data, Aggregated, anonymized Google Analytics data from a sample of mWeb sites opted into sharing benchmark data, n=3.5K, Global, March 2016
26. DoubleClick for Publishers, Google Active View ad viewability for 10.7K mWeb homepage domains with >70% measurable ad viewability, Global, February 2016

Less time spent waiting means more time on site

We also found a correlation between mobile speed and both pageviews per session and session lengths. And as people spend more time on the site, ad viewability also likely increases, as display ads must be on the screen for one full second to be considered viewable.[23] In a world where advertisers place more emphasis on viewable impressions, this is an important metric for publishers to track.

These metrics are important but publishers ultimately care about revenue. While there are several factors impacting revenue, our model projects that publishers whose mobile sites load within 5 seconds earn up to **2X greater mobile ad revenue** than those whose sites load within 19 seconds.[24]

23. For more information on what it means for something to be considered viewable, visit the DoubleClick for Publishers help section.
24. Google Data, Aggregated, anonymized Google Analytics and DoubleClick AdExchange data from a sample of mWeb sites opted into sharing benchmark data, n=4.5K, Global, June 2015 - May 2016

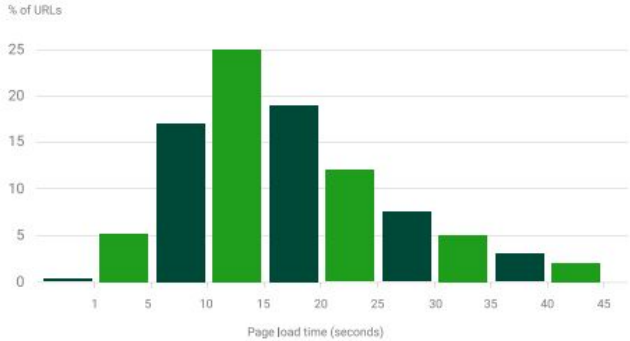
77% of mobile sites take longer than 10 seconds to load on 3G networks

19 seconds is the average load time for mobile sites on 3G networks

Measuring mobile sites

You could finish washing your hands faster than the time it takes most sites to load on a 3G or 4G connection.[7] Three out of four mobile sites we analyzed took 10 seconds or longer to load.[8] And that's just homepages. Leaf pages — which constitute the majority of web content — tend to be almost half as slow.[9]

Average load times are even slower. On 3G networks, the average load time for a homepage is 19 seconds.[10] You could go up 60 floors in one of the world's fastest elevators[11] and still be waiting for a single page to load. **On a 4G network the average time isn't much better: 14 seconds.**[12]



7. CBS, "95 percent of people wash their hands improperly. Are you one of them?", June 2013
8. Webpagetest.org, Sampled 11.8K global mWeb homepage domains loaded using a fast 3G connection timing first view only (no cached resources), February 2016
9. Webpagetest.org, Sampled 11.8K global mWeb homepage domains loaded using a fast 3G connection timing first view only (no cached resources), February 2016
10. Webpagetest.org, Sampled 11.8K global mWeb homepage domains loaded using a fast 3G connection timing first view only (no cached resources), February 2016
11. Business Insider, "Asian Skyscrapers Dominate A New List Of The World's Fastest Elevators", January 2013
12. Webpagetest.org, Sampled 11.8K global mWeb homepage domains loaded using a fast 3G connection timing first view only (no cached resources), February 2016

Two Types

Two Types

Static

"Dynamic"

Static

When to use:

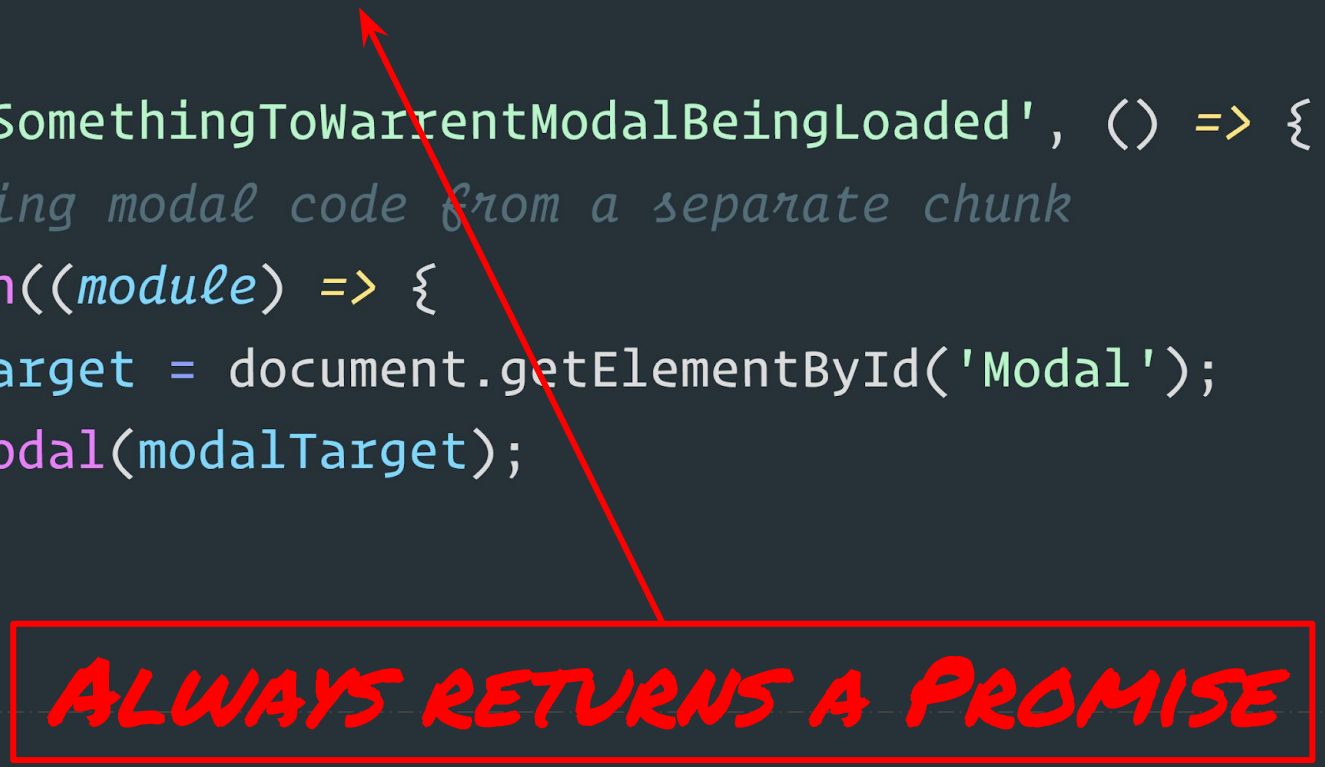
"Heavy" JavaScript

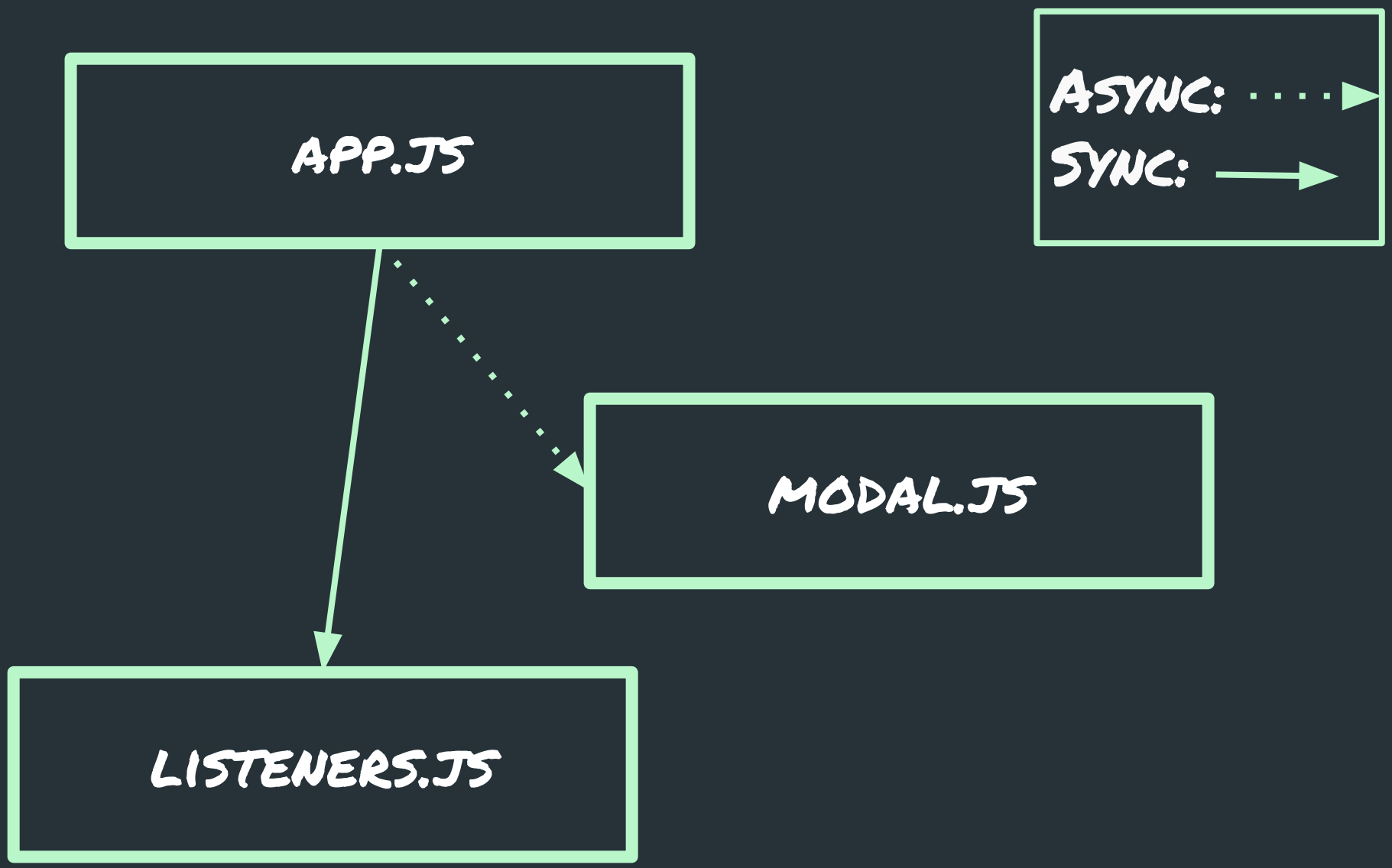
Anything temporal

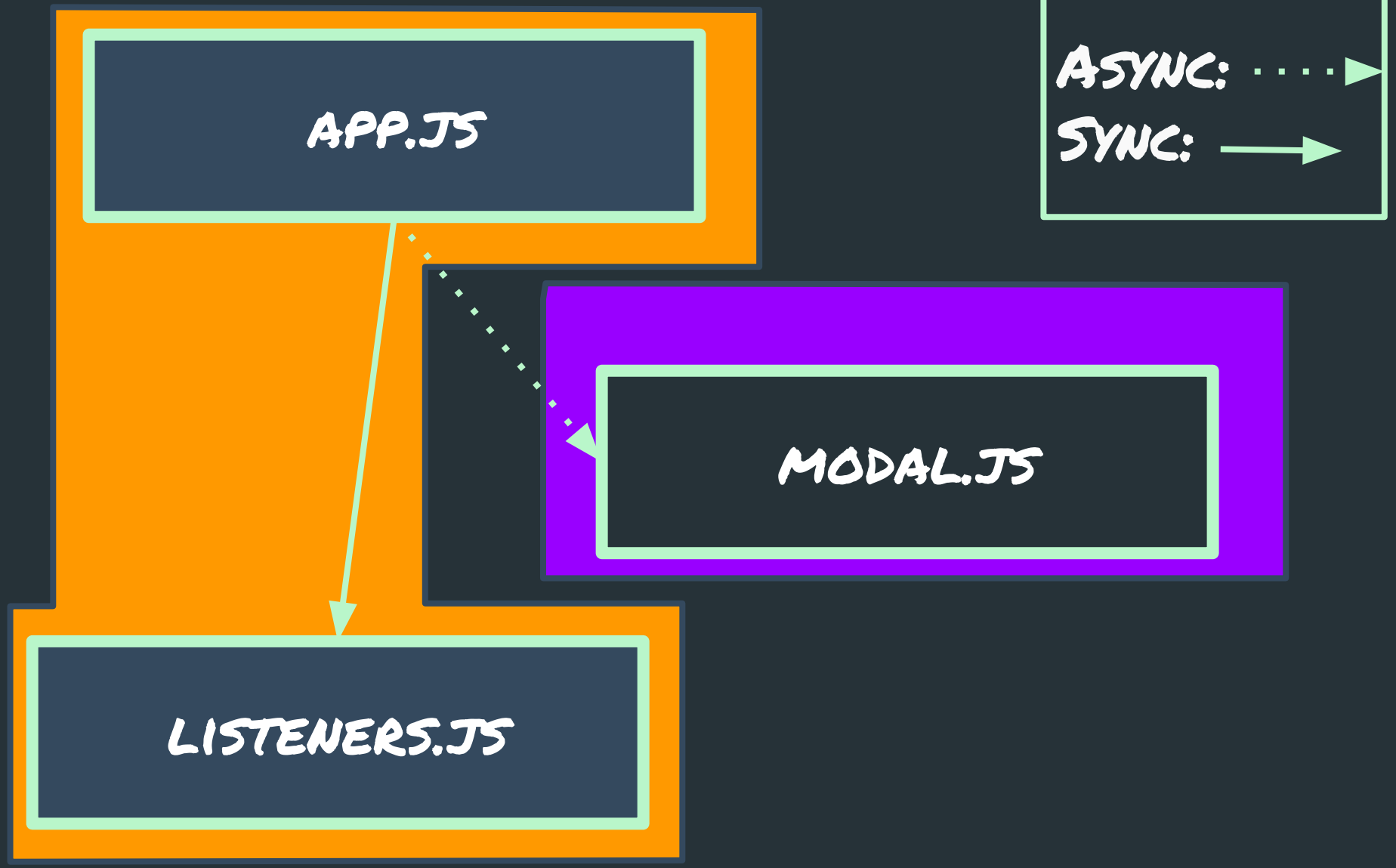
Routes

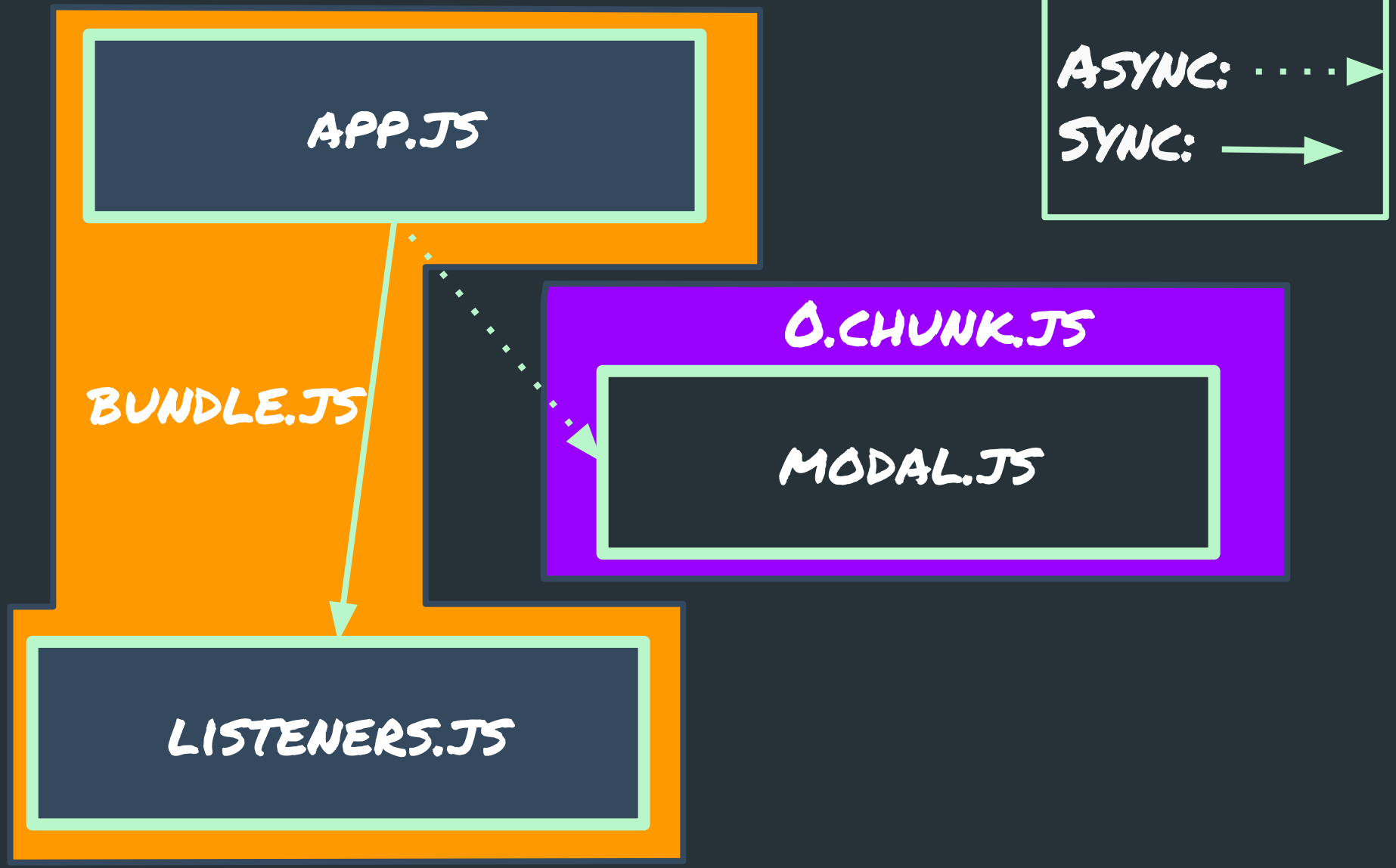
```
import Listener from './listeners.js';

const getModal = () => import('./src/modal.js');

Listener.on('didSomethingToWarrentModalBeingLoaded', () => {
  // Async fetching modal code from a separate chunk
  getModal().then((module) => {
    const modalTarget = document.getElementById('Modal');
    module.initModal(modalTarget);
  });
});
```

```
import Listener from './listeners.js';

const getModal = () => import('./src/modal.js');

Listener.on('didSomethingToWarrentModalBeingLoaded', () => {
  // Async fetching modal code from a separate chunk
  getModal().then((module) => {
    const modalTarget = document.getElementById('Modal');
    module.initModal(modalTarget);
  });
});
```




APP.JS
ASYNC:
SYNC:
MODAL.JS
LISTENERS.JS


APP.JS
ASYNC:
SYNC:
MODAL.JS
LISTENERS.JS


APP.JS
ASYNC:
SYNC:
BUNDLE.JS
0.CHUNK.JS
MODAL.JS
LISTENERS.JS

"DYNAMIC"

```
const getTheme = (themeName) => import(`./src/themes/${themeName}`);

// Using `import()` 'dynamically'
if (window.feeling.stylish) {
  getTheme("stylish").then((module) => {
    module.applyTheme();
  });
} else if (window.feeling.trendy) {
  getTheme("trendy").then((module) => {
    module.applyTheme();
  });
}
```

```
const getTheme = (themeName) => import(`./src/themes/${themeName}`);

// Using `import()` 'dynamically'
if (window.feeling.stylish) {
  getTheme("stylish").then((module) => {
    module.applyTheme();
  });
} else if (window.feeling.trendy) {
  getTheme("trendy").then((module) => {
    module.applyTheme();
  });
}
```


WAT
4GIFS.com

Breakdown

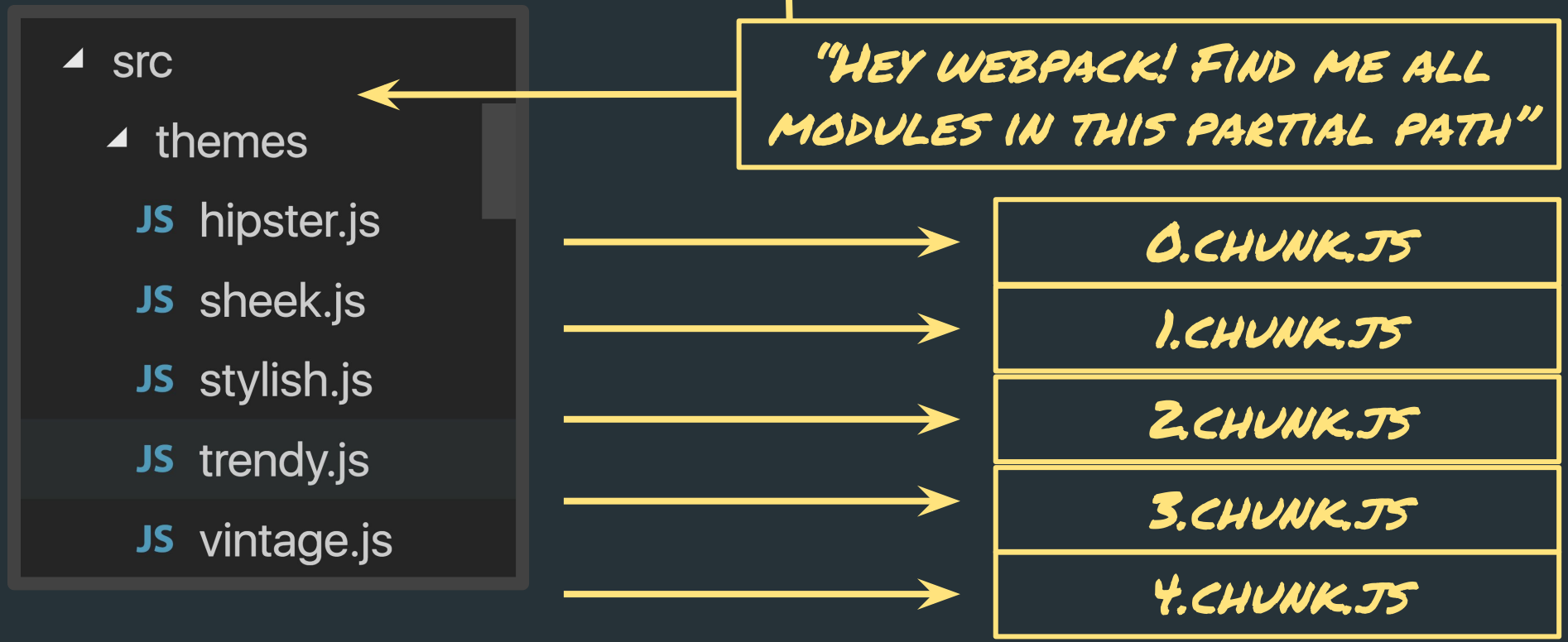
```
const getTheme = (themeName) =>
  import(`./src/themes/${themeName}`);
```

```
const getTheme = (themeName) =>
  import(`./src/themes/${themeName}`);
```

PARTIAL PATH	EXPRESSION
DIRECTORY	RESOLVABLE
CONTEXT	MODULE

CONTEXTMODULE!!!

```
const getTheme = (themeName) =>
  import(`./src/themes/${themeName}`);
```



When to use:

AB Testing

Theming

Convenience

Exercise Time

NOTE: ALWAYS FOCUS ON SPLITTING BEFORE CACHING

Perf Scenarios

HTTP/2

Service Worker

Progressive Web Applications

Performance Hints

Building For Node?

SHOULD YOU?

Building For Node?

SHOULD YOU?

Building For Electron?

SHOULD YOU?

Building For Libs?

SHOULD YOU?

What is Tapable?

What is Tapable?

- ~200 line plugin library

What is Tapable?

- ~200 line plugin library
- The backbone of the plugin system


Compiler.js
458
459 Compiler.prototype.compile = function(callback) {
460 var self = this;
461 var params = self.newCompilationParams();
462 self.applyPluginsAsync("before-compile", params, function(err) {
463 if(err) return callback(err);
464
465 self.applyPlugins("compile", params);
466
467 var compilation = self.newCompilation(params);
468
469 self.applyPluginsParallel("make", compilation, function(err) {
470 if(err) return callback(err);
471
472 compilation.finish();
473
474 compilation.seal(function(err) {
475 if(err) return callback(err);
476
477 self.applyPluginsAsync("after-compile", compilation, function(err) {
478 if(err) return callback(err);
479
480 return callback(null, compilation);
481 });
482 });
483 });
484 });
485 };
486
compiler event
compiler event

```
class BasicPlugin {
    constructor() {}

    apply(compiler) {
        compiler.plugin("make", (compilation) => {
            console.log("I now have access to the compilation!!!!!");
        });
    }
}

module.exports = BasicPlugin;
```

What is Tapable?

```
class SomePlugin {
  ① apply(compiler){
      compiler.plugin("run", (c, cb)=>{


      });
  }
}
```

```
class Compiler extends Tapable {
  someFunct() {
    this.applyPluginsAsync("run", this, ()=>
  } );
```

① Plugin is registered via compilers inherited apply fn. (from Tapable)

What is Tapable?

```
class SomePlugin {
  ① apply(compiler){
      compiler.plugin("run", (c, cb)=>{

      });
  }
}
```

```
class Compiler extends Tapable {
  someFunct() {
    ② this.applyPluginsAsync("run", this, ()=>
    } );
```

① Plugin is registered via compilers inherited apply fn. (from Tapable)

② Tapable instances call "applyPlugins()" and pass the event and state through to plugin.

What is Tapable?

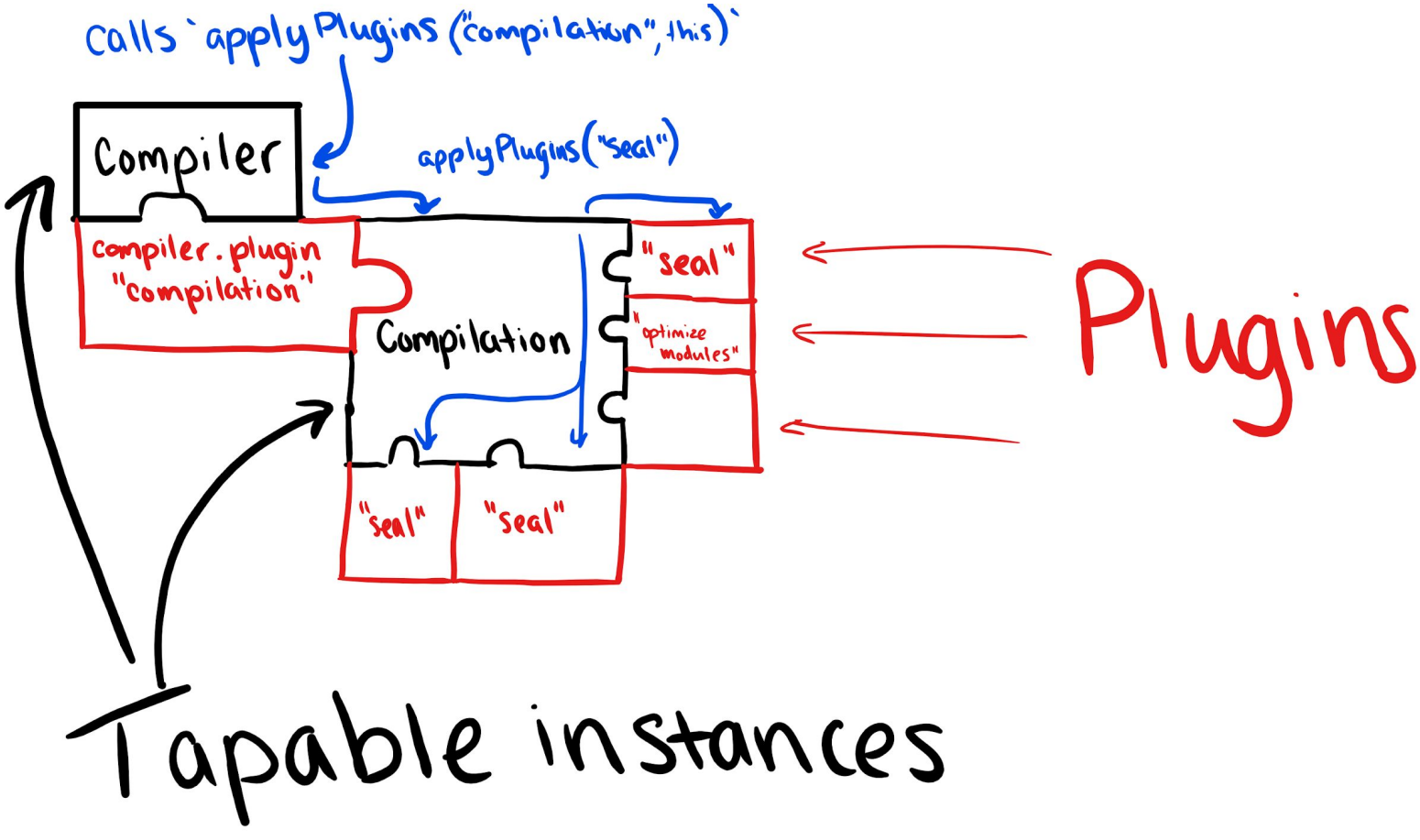
- Tapable instance

What is Tapable?

- Tapable instance

  A class/object that extends Tapable

  (aka something you can plug into!!)


Calls `applyPlugins("compilation", this)`
Compiler
applyPlugins("seal")
compiler.plugin
"compilation"
Compilation
"seal"
"optimize modules"
"seal"
"seal"
Plugins
Tapable instances

7ish Tapable Instances (aka classes)

Compiler!

7ish Tapable Instances (aka classes)

Compiler!

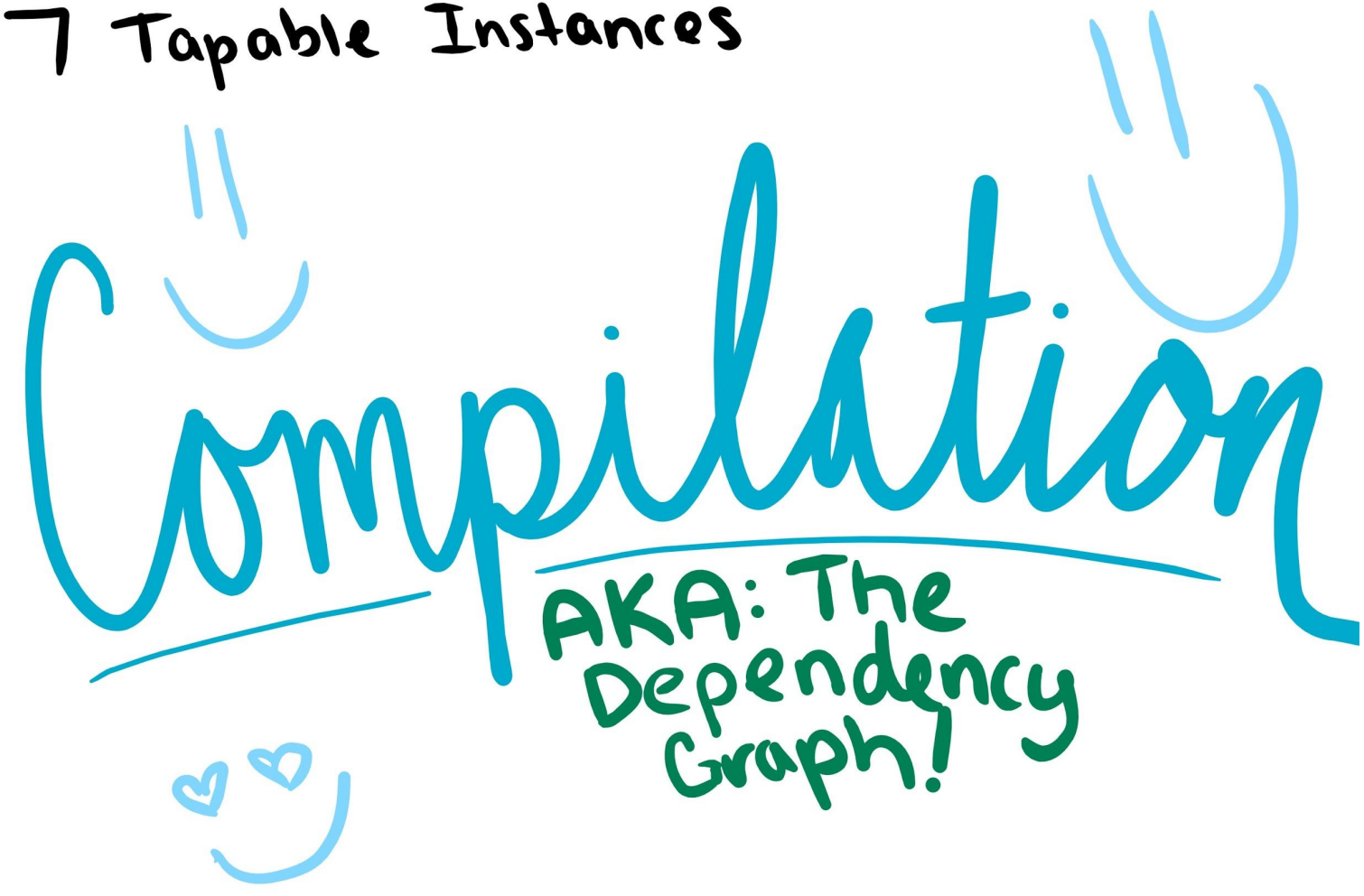
- Exposed via Node API
- Central Dispatch
- Start / Stop

7 Tapable Instances

Compilation

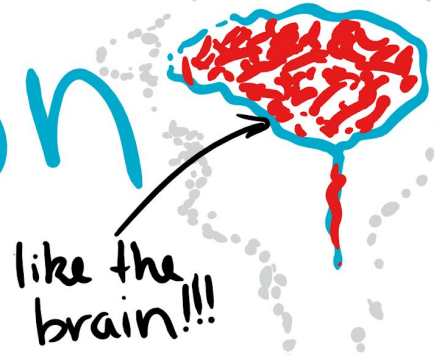
AKA: The Dependency Graph!

7 Tapable Instances



7 Tapable Instances

Compilation



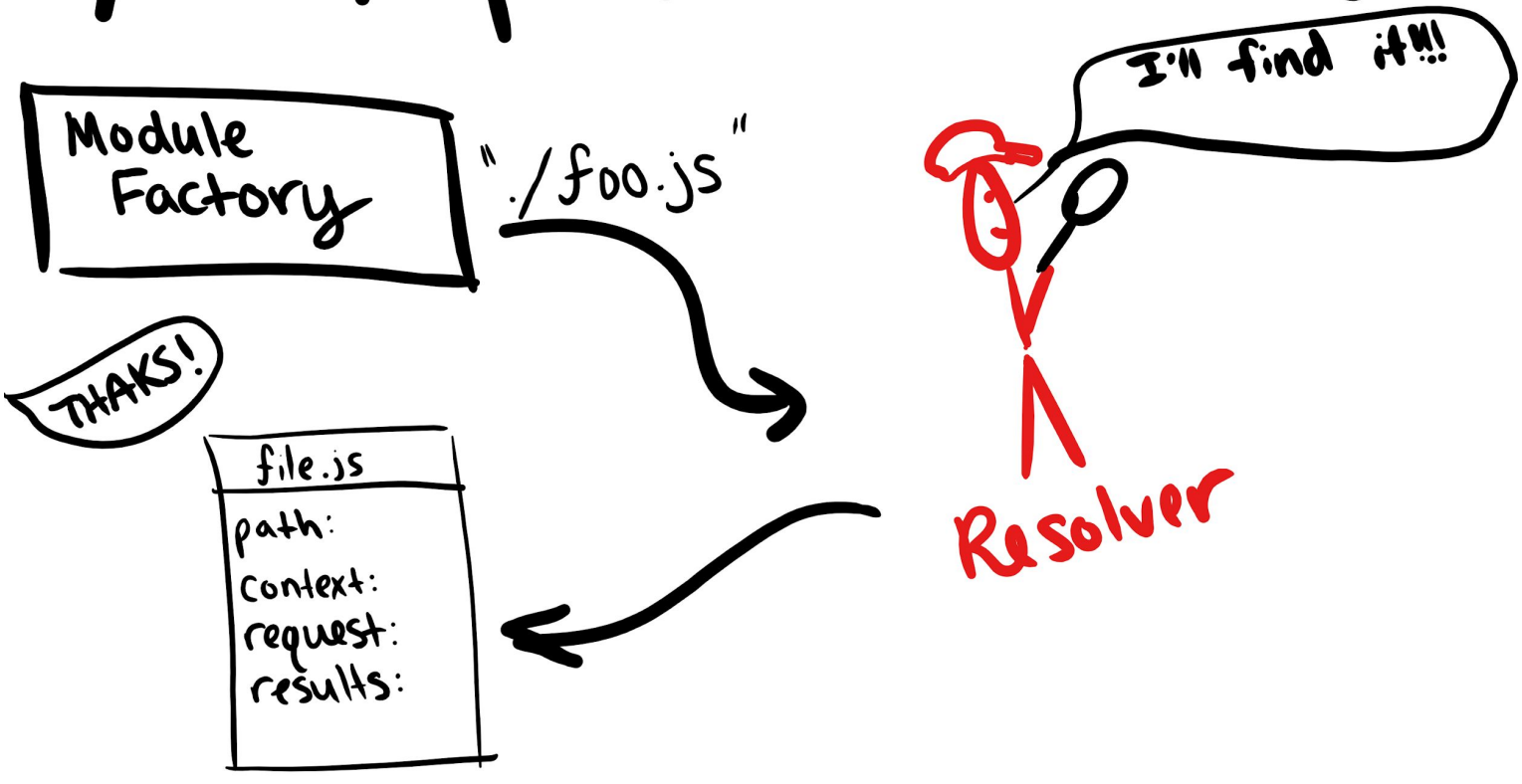
- Created by the Compiler.
- Contains dep graph traversal algo.

7ish Tapable instance

The "Bloodhound"

The Resolver

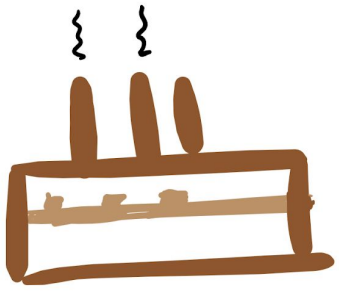
7ish Tapable Instances



ResolverFactory.js ×

```
*/
var Resolver = require("./Resolver");

var SyncAsyncFileSystemDecorator = require("./SyncAsyncFileSystemDecorator");

var ParsePlugin = require("./ParsePlugin");
var DescriptionFilePlugin = require("./DescriptionFilePlugin");
var NextPlugin = require("./NextPlugin");
var TryNextPlugin = require("./TryNextPlugin");
var ModuleKindPlugin = require("./ModuleKindPlugin");
var FileKindPlugin = require("./FileKindPlugin");
var JoinRequestPlugin = require("./JoinRequestPlugin");
var ModulesInHierachicDirectoriesPlugin = require("./ModulesInHierachicDirectoriesPlugin");
var ModulesInRootPlugin = require("./ModulesInRootPlugin");
var AliasPlugin = require("./AliasPlugin");
var AliasFieldPlugin = require("./AliasFieldPlugin");
var ConcordExtensionsPlugin = require("./ConcordExtensionsPlugin");
var ConcordMainPlugin = require("./ConcordMainPlugin");
var ConcordModulesPlugin = require("./ConcordModulesPlugin");
var DirectoryExistsPlugin = require("./DirectoryExistsPlugin");
var FileExistsPlugin = require("./FileExistsPlugin");
var SymlinkPlugin = require("./SymlinkPlugin");
var MainFieldPlugin = require("./MainFieldPlugin");
var UseFilePlugin = require("./UseFilePlugin");
var AppendPlugin = require("./AppendPlugin");
var ResultPlugin = require("./ResultPlugin");
var ModuleAppendPlugin = require("./ModuleAppendPlugin");
var UnsafeCachePlugin = require("./UnsafeCachePlugin");

exports.createResolver = function(options) {

    //// OPTIONS ////
```

7ish Tapable Instances



Module Factories

7ish Tapable Instances

Module Factories

- Takes Succesfully Resolved Requests.

7ish Tapable Instances

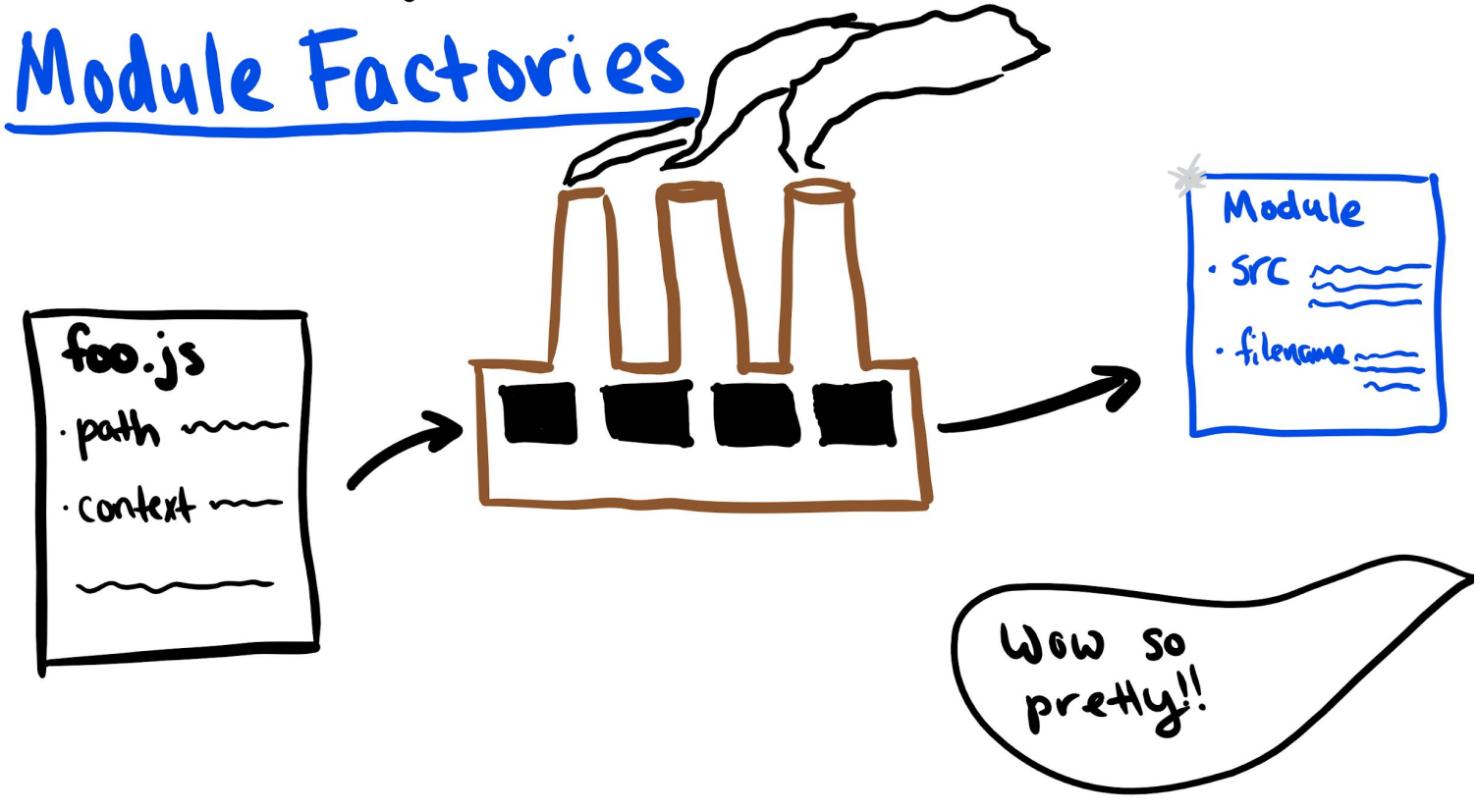
Module Factories

- Takes Succesfully Resolved Requests.

- Collects source for that file. Creates a Module obj.

7 ish Tapable Instances

Module Factories



7ish Tapable Instances

PARSER

I can haz ASTs

7ish Tapable Instances

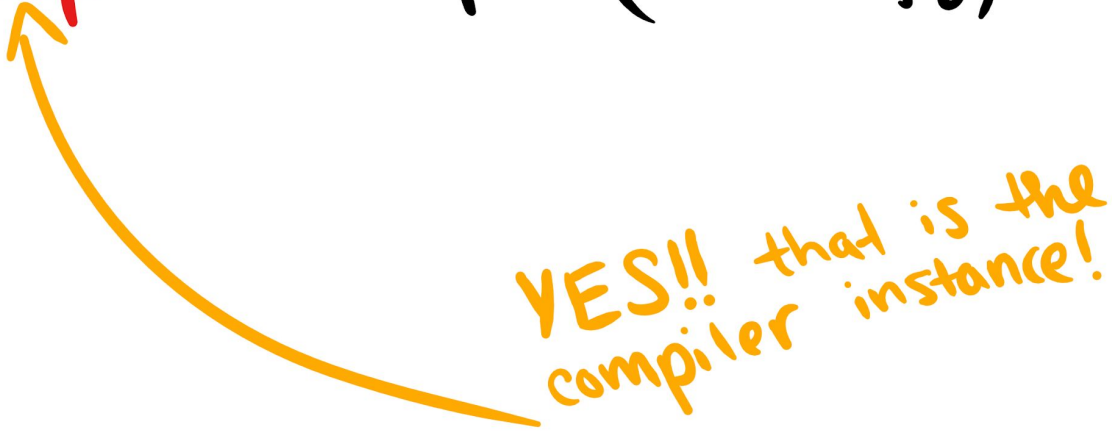
Parser

- Parses!!!!
- Takes a Module Object, turns into AST to parse

7ish Tapable Instances (aka classes)

COMPILER?

```
const webpack = require("webpack");
const compiler = webpack(someConfig);
```



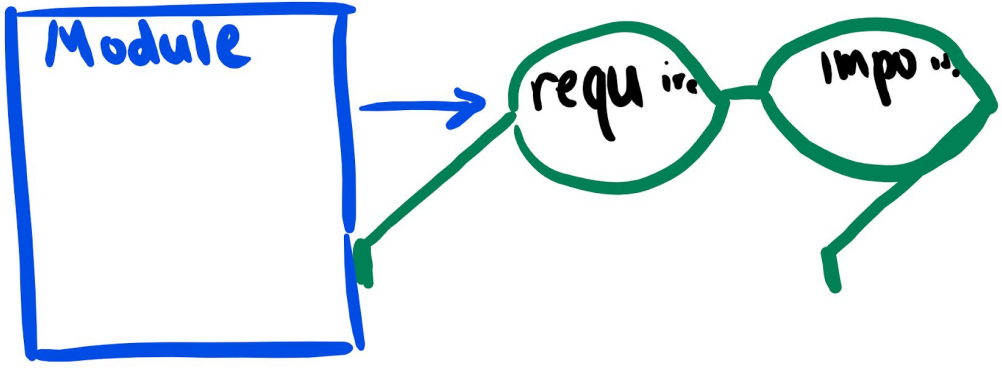
7ish Tapable Instances

Parser

- Parses!!!!
- Takes a Module Object, turns into AST to parse
- Find all require's imports, create Dependency's

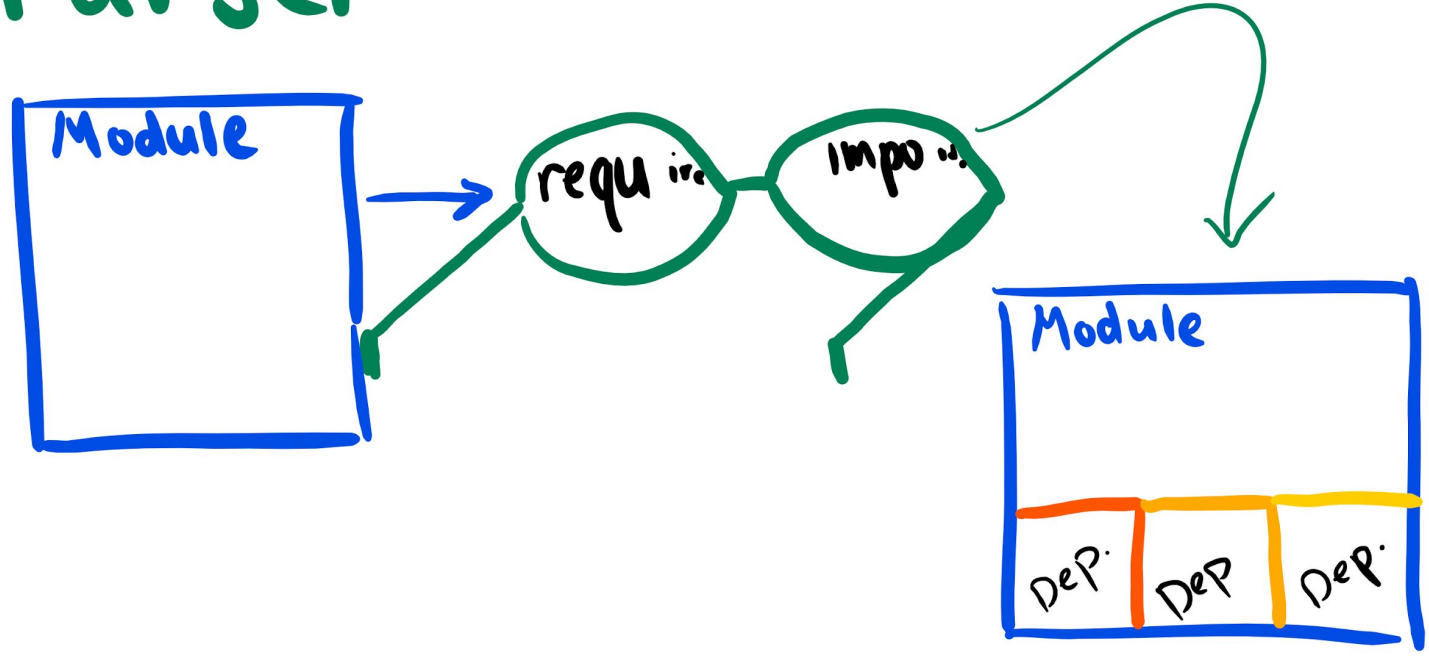
7^ish Tapable Instances

Parser



7ish Tapable Instances

Parser



7ish Tapable Instances

{TEMPLATE}

7ish Tapable Instances

Template

- Data binding for your modules

7^ish Tapable Instances

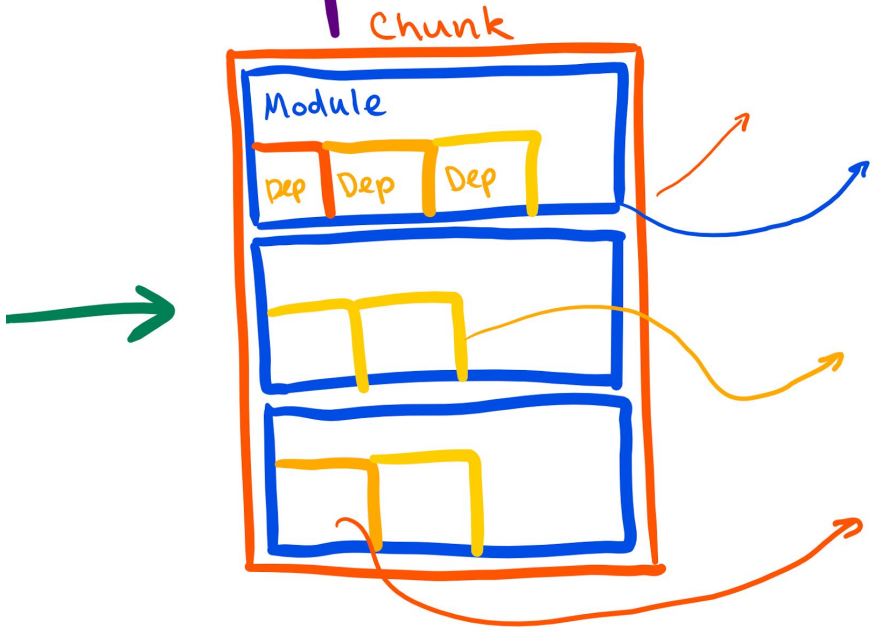
Template

- Data binding for your modules
- Creates the code you see in your bundles.

7ish Tapable Instances

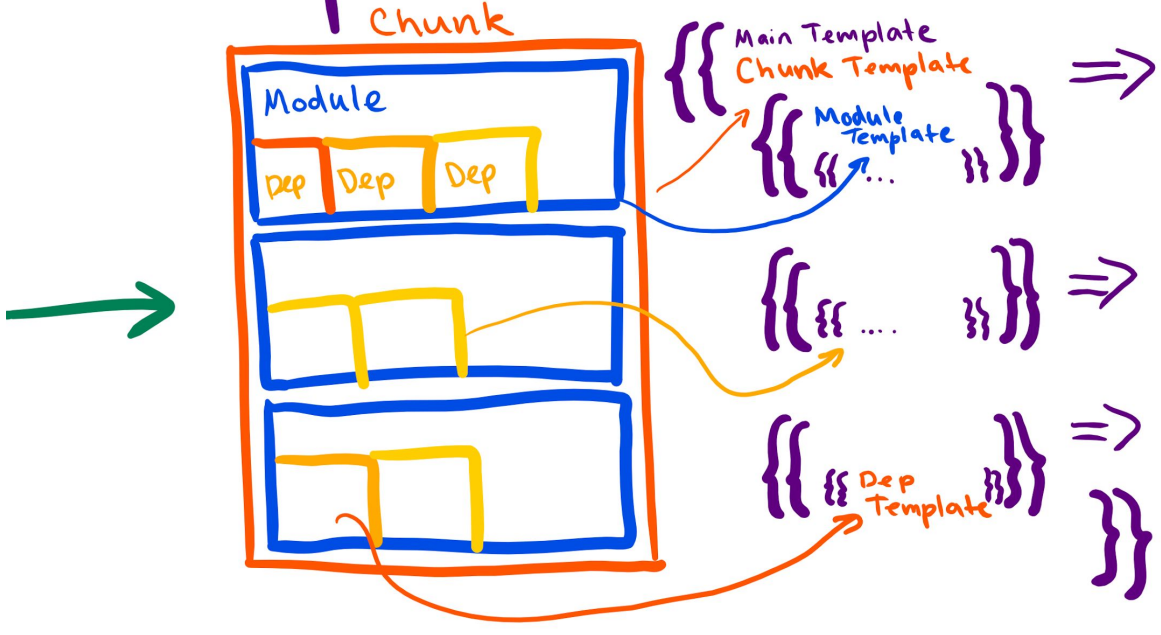
Template

"render"



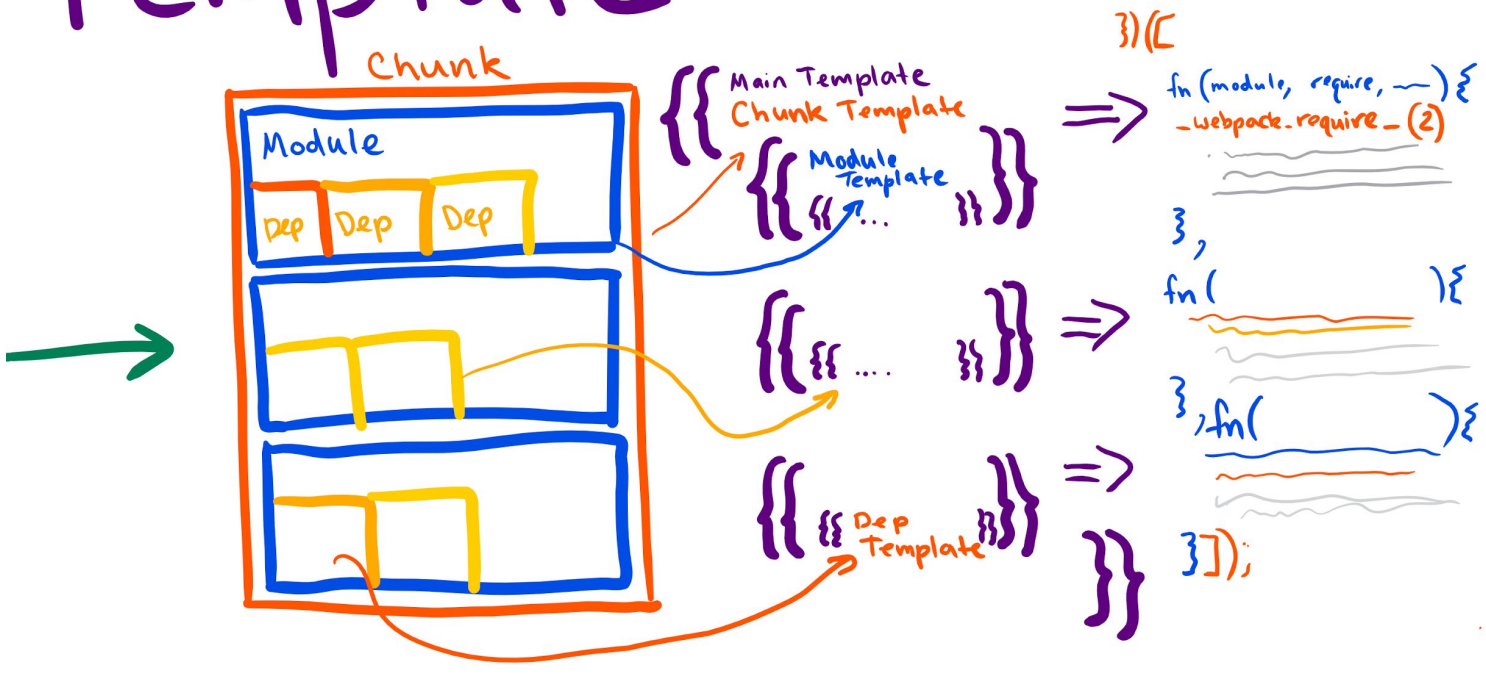
7ish Tapable Instances

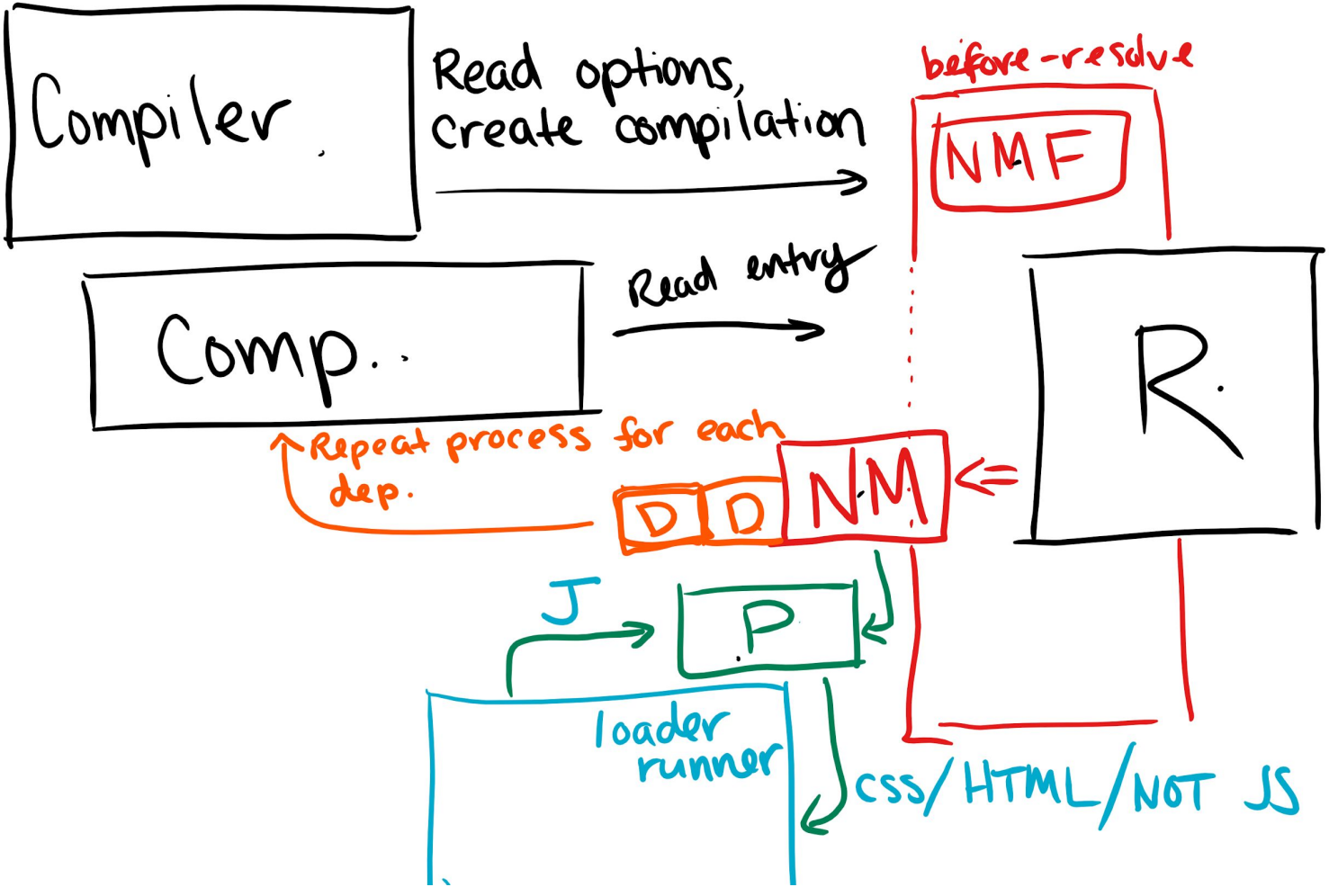
Template



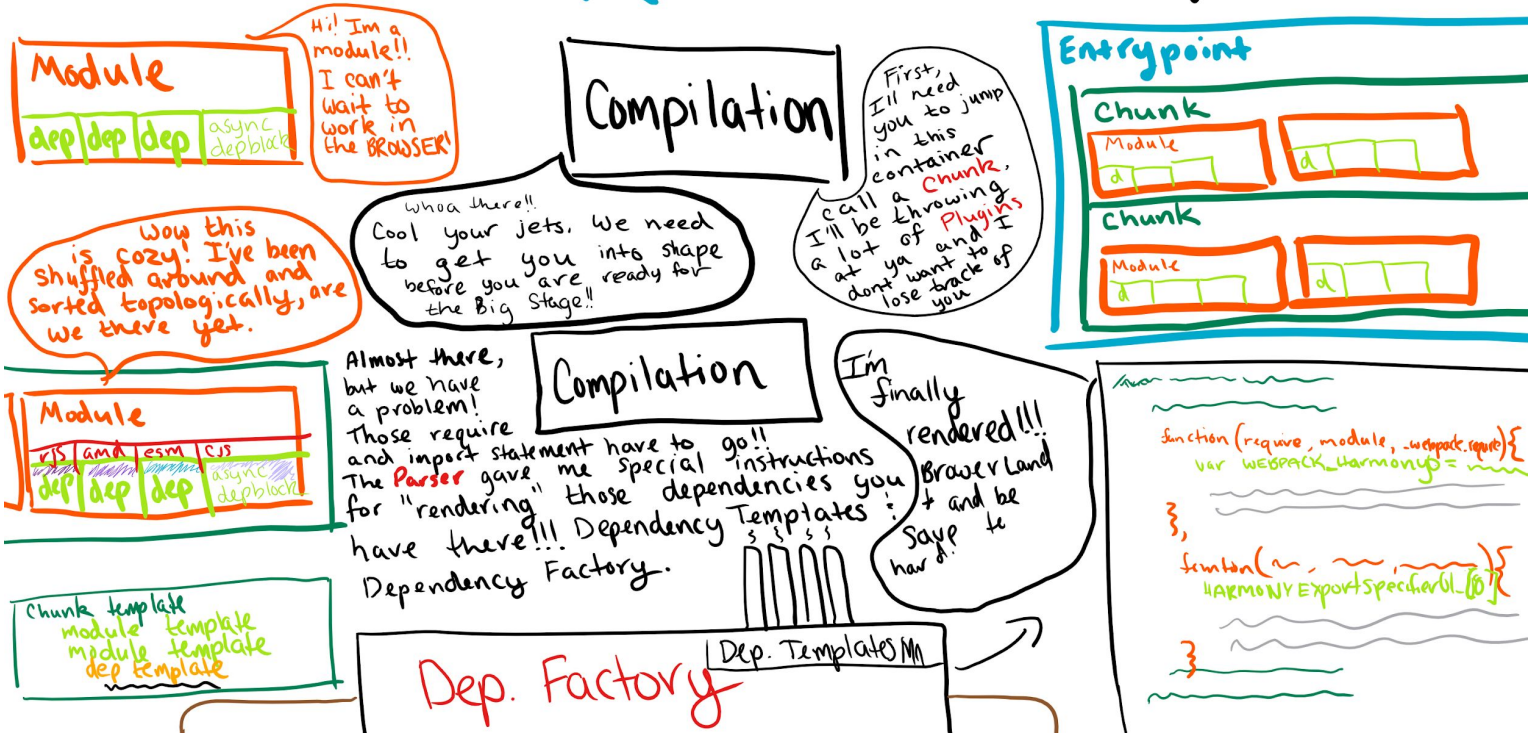
7ish Tapable Instances

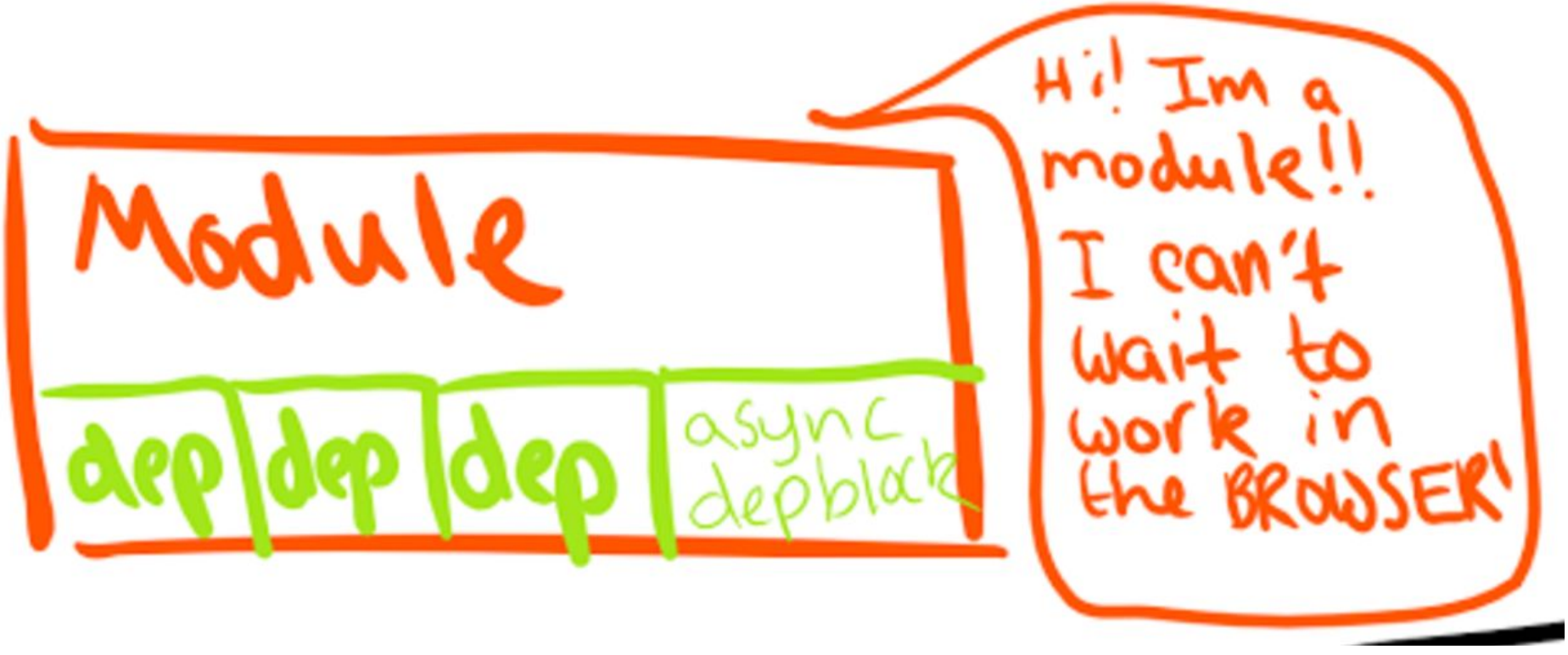
Template




Compiler
Read options, create compilation
before-resolve
NMF
Comp..
Read entry
R.
Repeat process for each dep.
D
D
NM
J
P
loader runner
CSS/HTML/NOT JS

How a Module gets to the BROWSER with webpack!



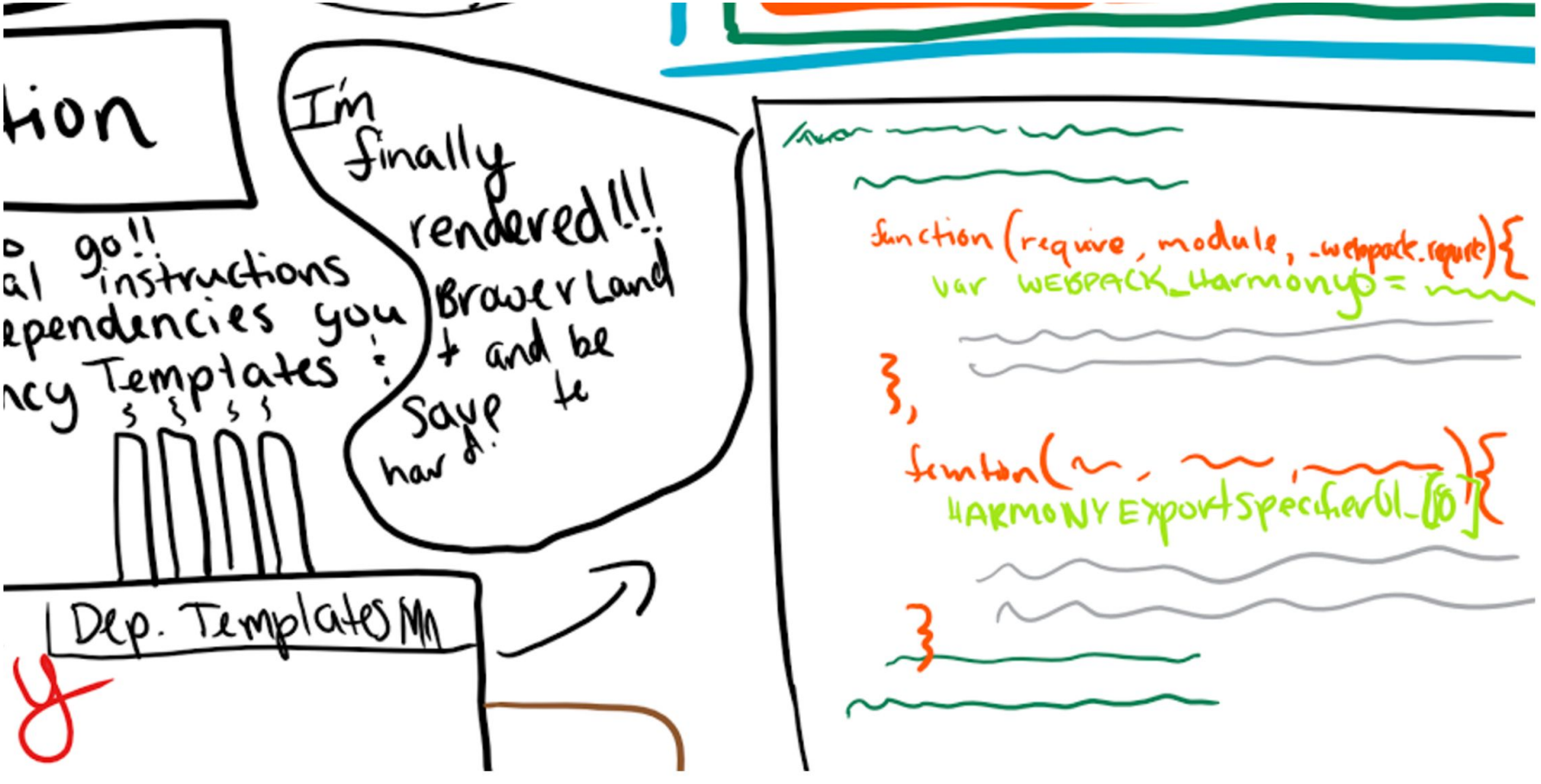

Module
dep
dep
dep
async dep block
Hi! Im a module!! I can't wait to work in the BROWSER!


Im a
dule!!
can't
it to
rk in
e BROWSER!
Compilation
First,
I'll need
you to jump
in this
container
call a Chunk,
I'll be throwing
a lot of Plugins
at ya and I
dont want to
lose track of
you
Whoa there!!
Cool your jets. We need
to get you into shape
before you are ready for
the Big Stage!!

Compilation

Almost there, but we have a problem! Those require and import statement have to go!!

The Parser gave me special instructions for "rendering" those dependencies you have there!!! Dependency Templates : Dependency Factory.


tion
go!!
al instructions
ependencies you
ncy Templates :
I'm finally rendered!!!
Brower Land
t and be
Save te
haw d!
Dep. Templates
function (require, module, __webpack_require__){
var WEBPACK_HARMONY_
},
function(
HARMONY EXPORT SPECIFIER_[0]

You just learned how webpack works entirely under the hood.

Chapter 6: Custom Plugins

Additional Resources: https://github.com/TheLarkInn/everything-is-a-plugin
Additional Workshop Video https://www.youtube.com/watch?v=4tQiJaFzuJ8