WEBPACK: IT'S NOT MAGIC

Hi everyone, thank you for coming and welcome! My name is Naomi Jacobs. I'm a software engineer at Mavenlink in San Francisco, and I'm here to talk with you about Webpack. Let's get started.

WHAT ARE WE TALKING ABOUT?

Webpack is a tool lots of people are using to compile their front-end assets

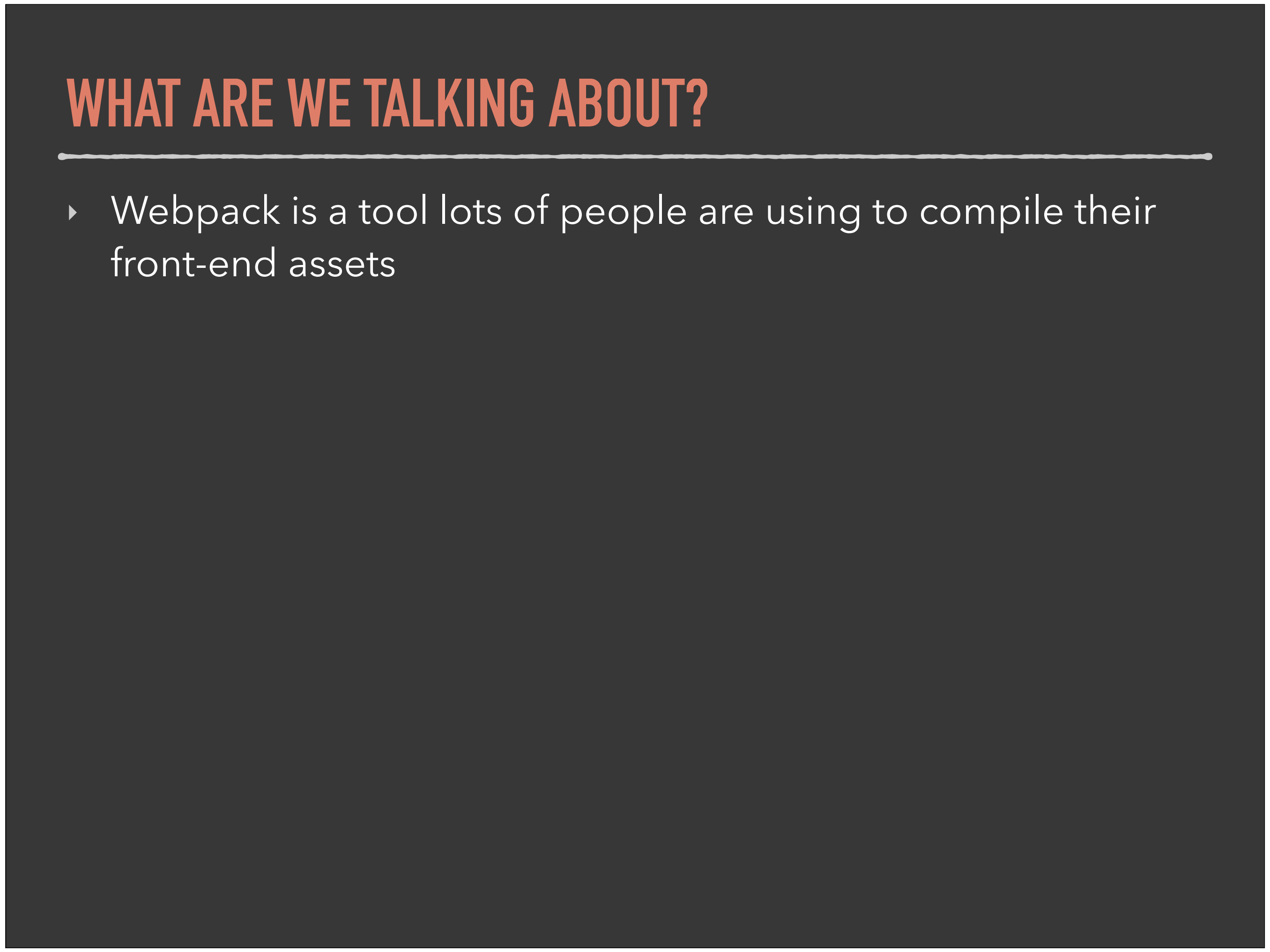
As we learn new tools, there are three questions we should ask ourselves:

What problems does it solve?

How do I use it?

How does it work?

There is tons of information online about how to use Webpack



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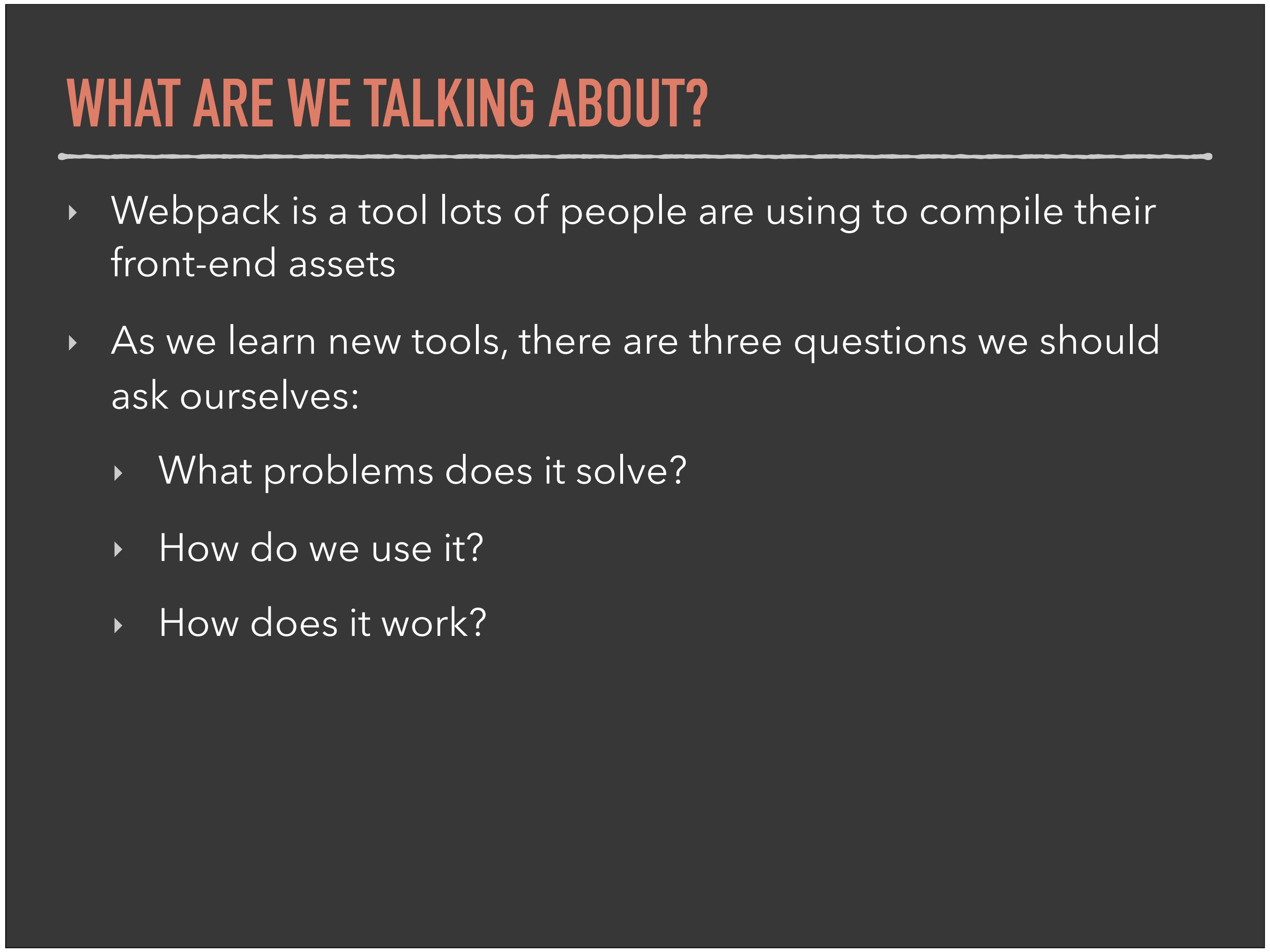

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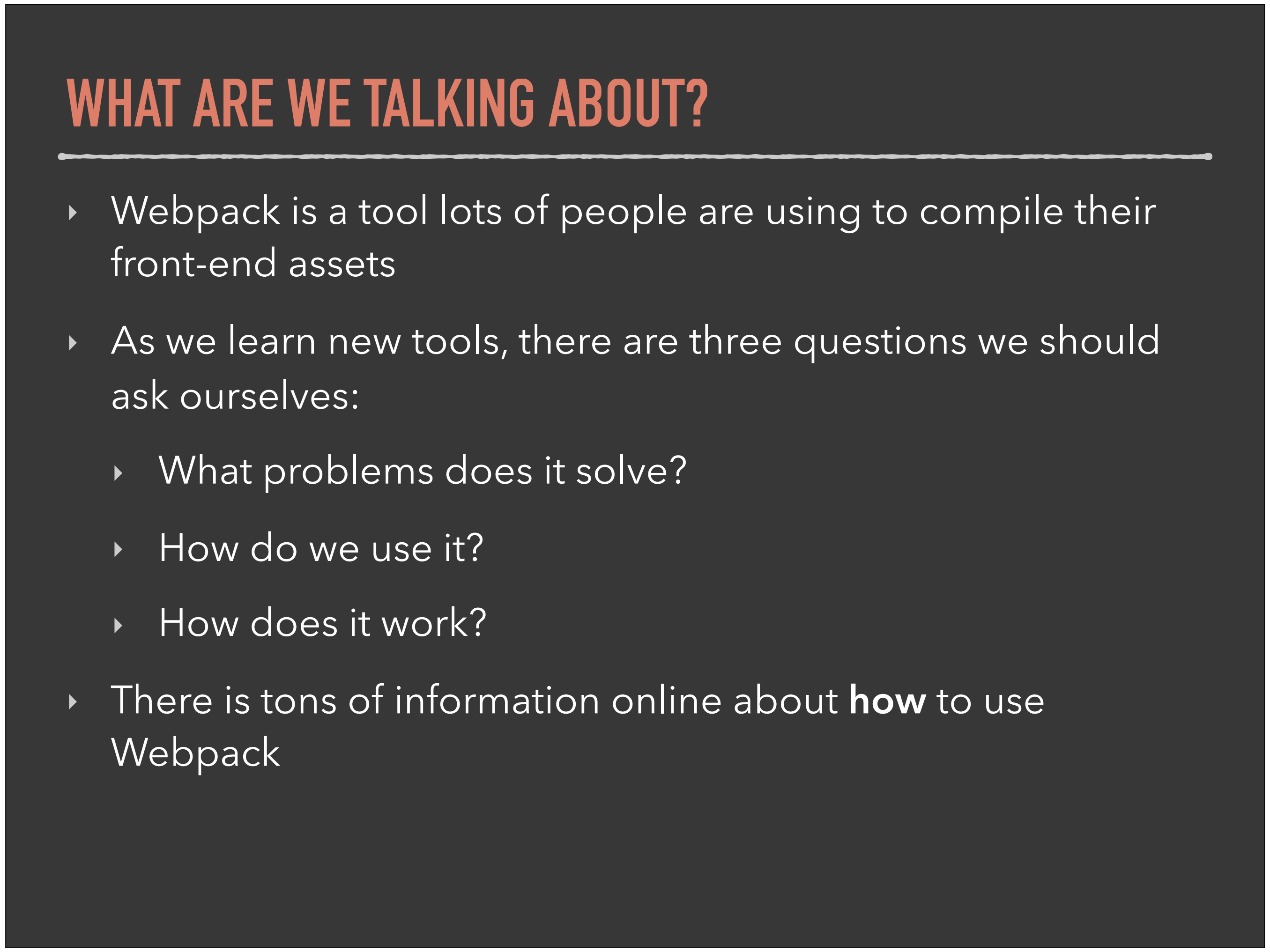

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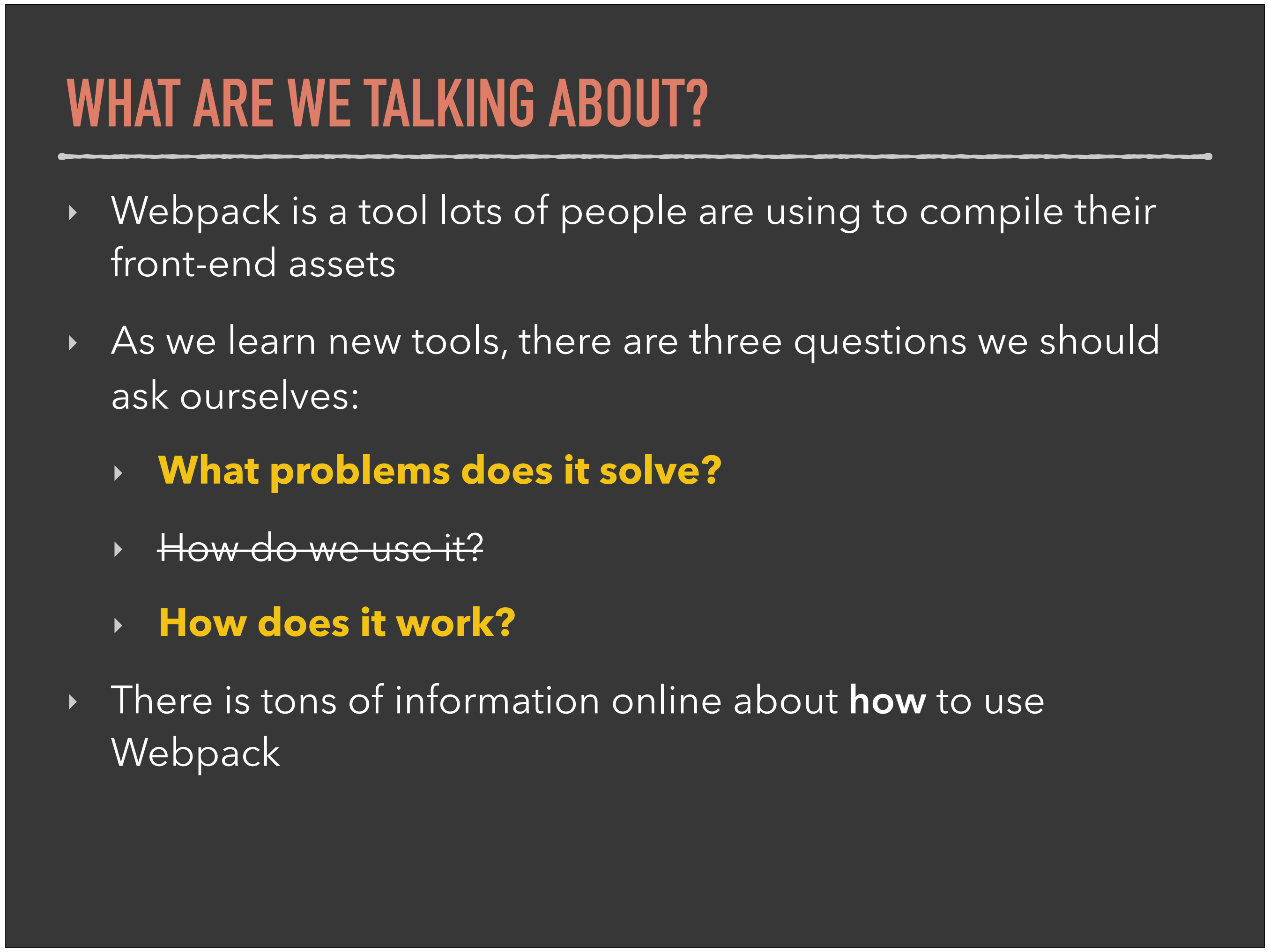

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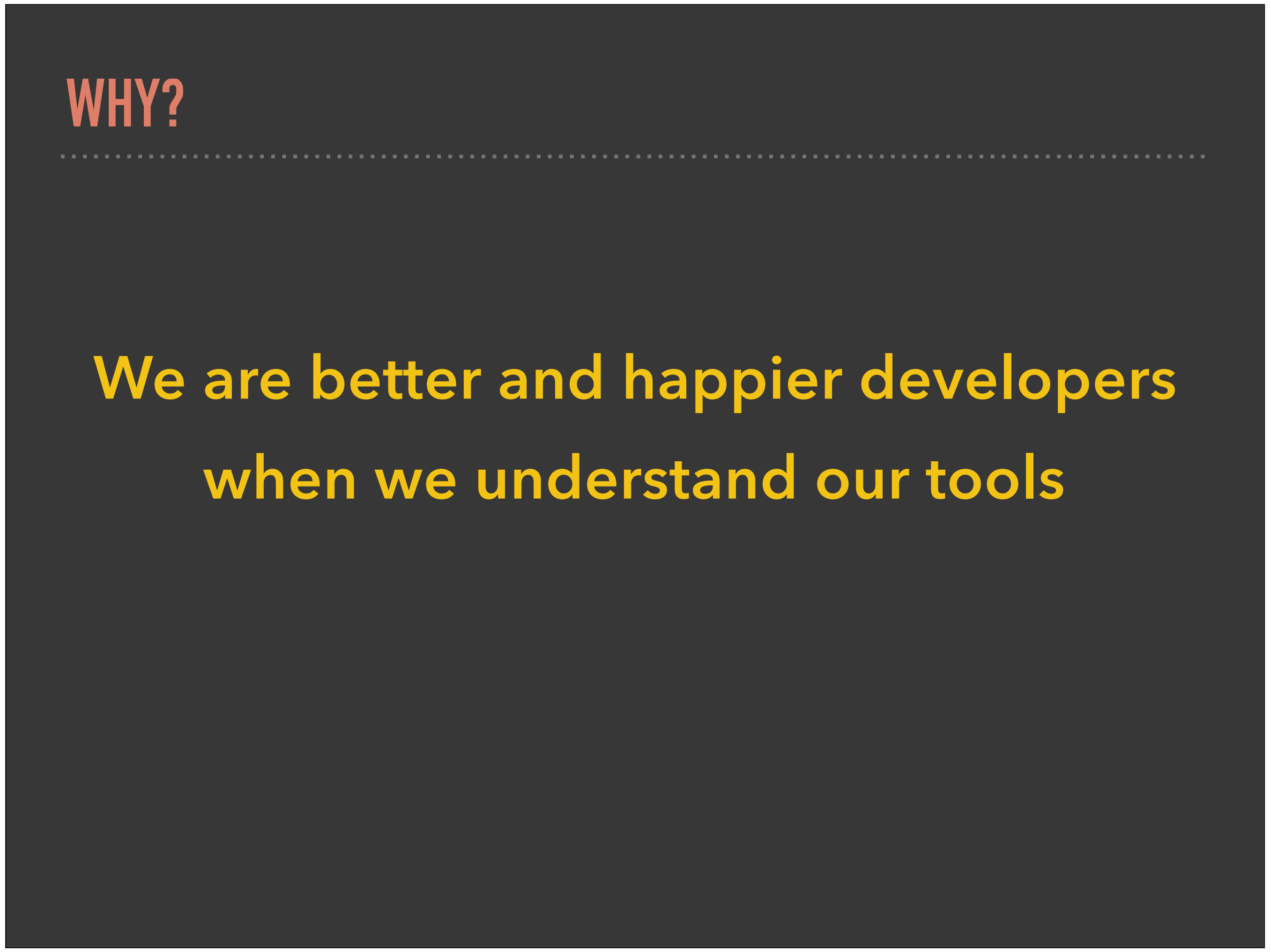
So today, we’re going to focus on the other two: a little bit on what problems it solves, and lots of time on how it actually works.



WHY?

We are better and happier developers when we understand our tools

Why? Because we are better and happier developers when we understand our tools. The idea here is to demystify what Webpack is doing when it creates an asset, because that will make it easier for you to understand what's going on when you're debugging, or trying to figure out why a build failed, and will lay the foundation for being able to understand the fancier things Webpack can do.

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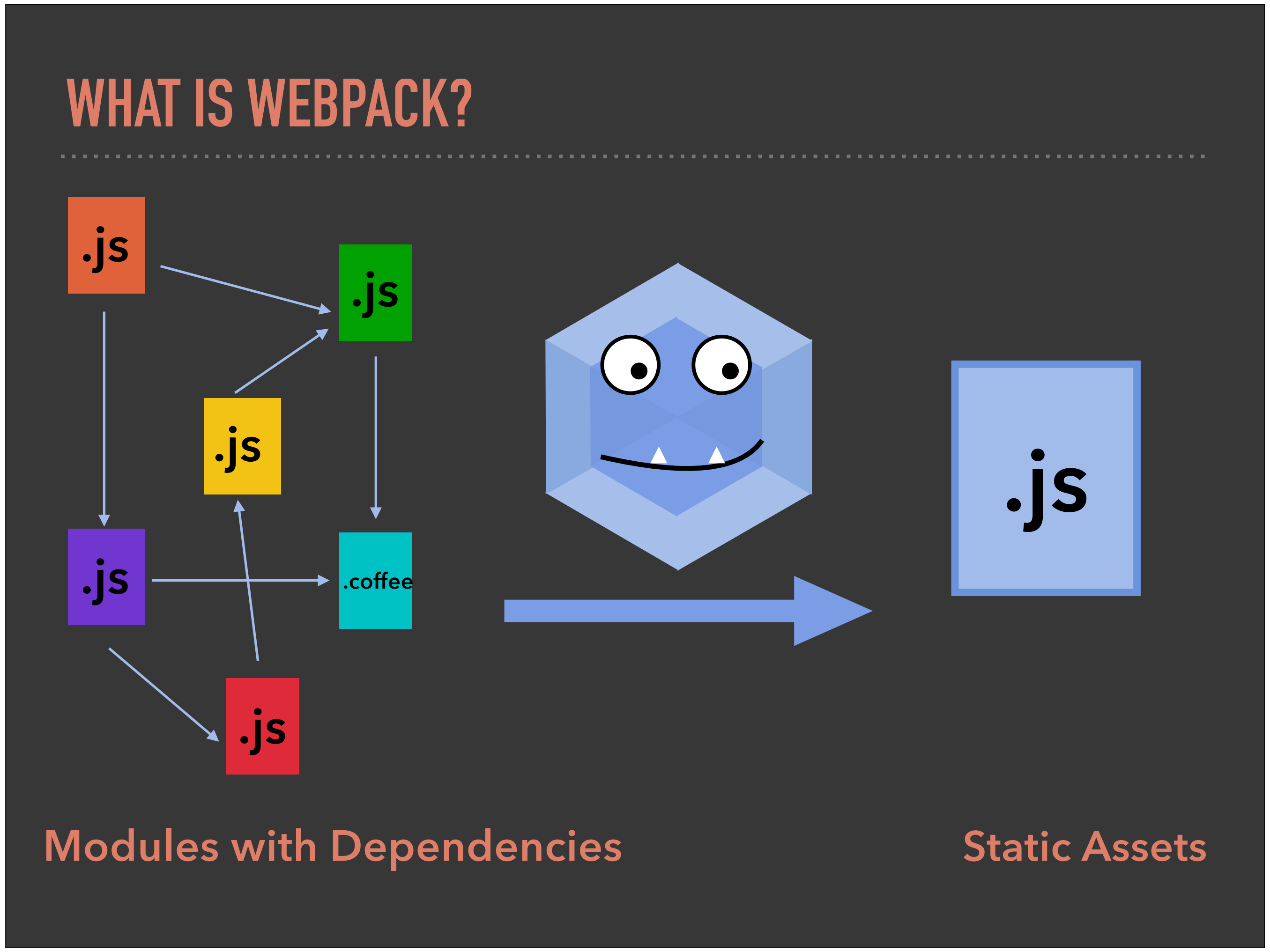
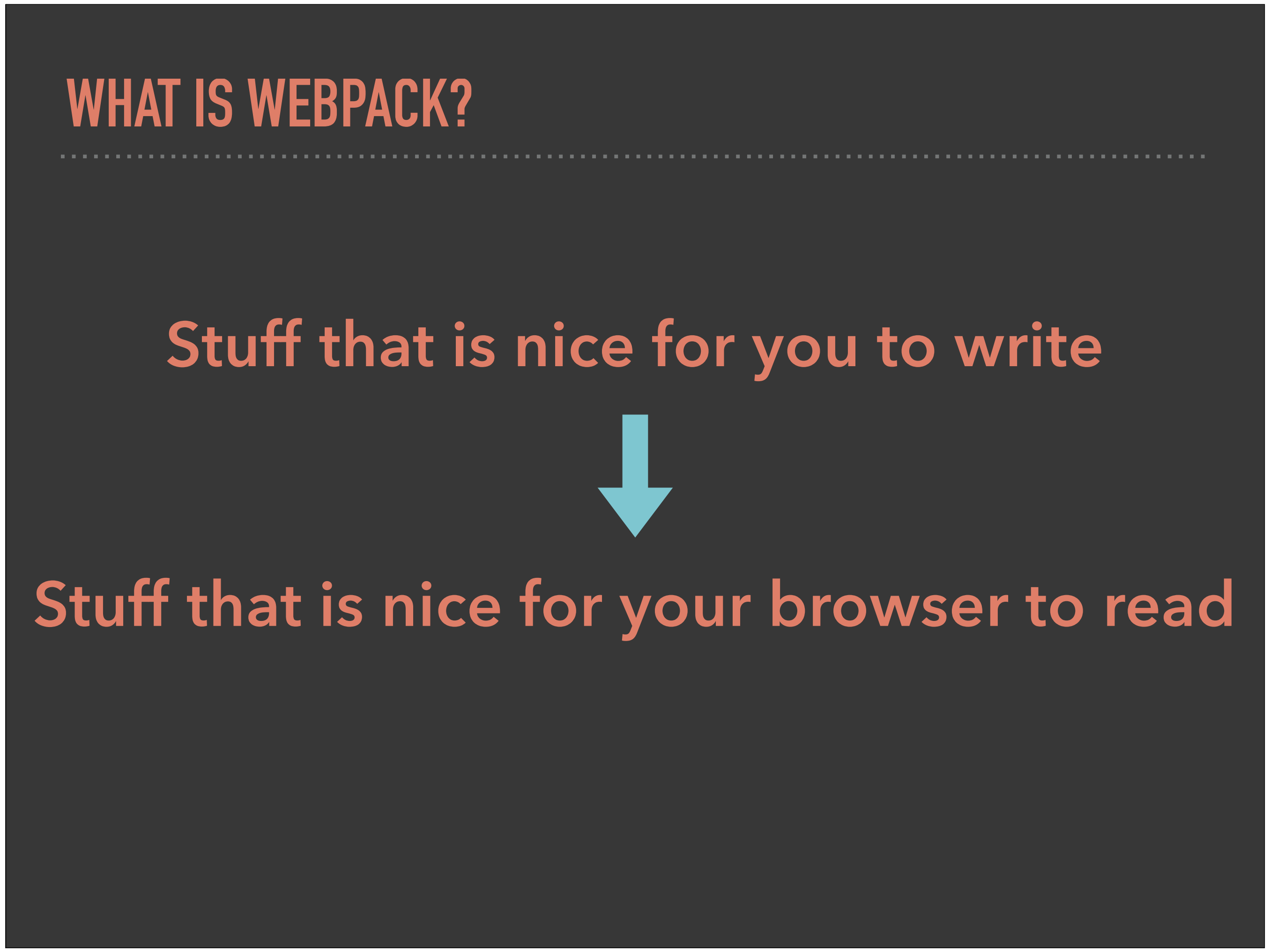


WHAT IS WEBPACK?

Modules with Dependencies

Static Assets

As Webpack puts it: Webpack is a module bundler that takes modules with dependencies and emits static assets representing those modules.



WHAT IS WEBPACK?

Stuff that is nice for you to write

↓

Stuff that is nice for your browser to read

As I like to put it: Webpack takes stuff that is nice for you to write and turns it into stuff that is nice for your browser to read

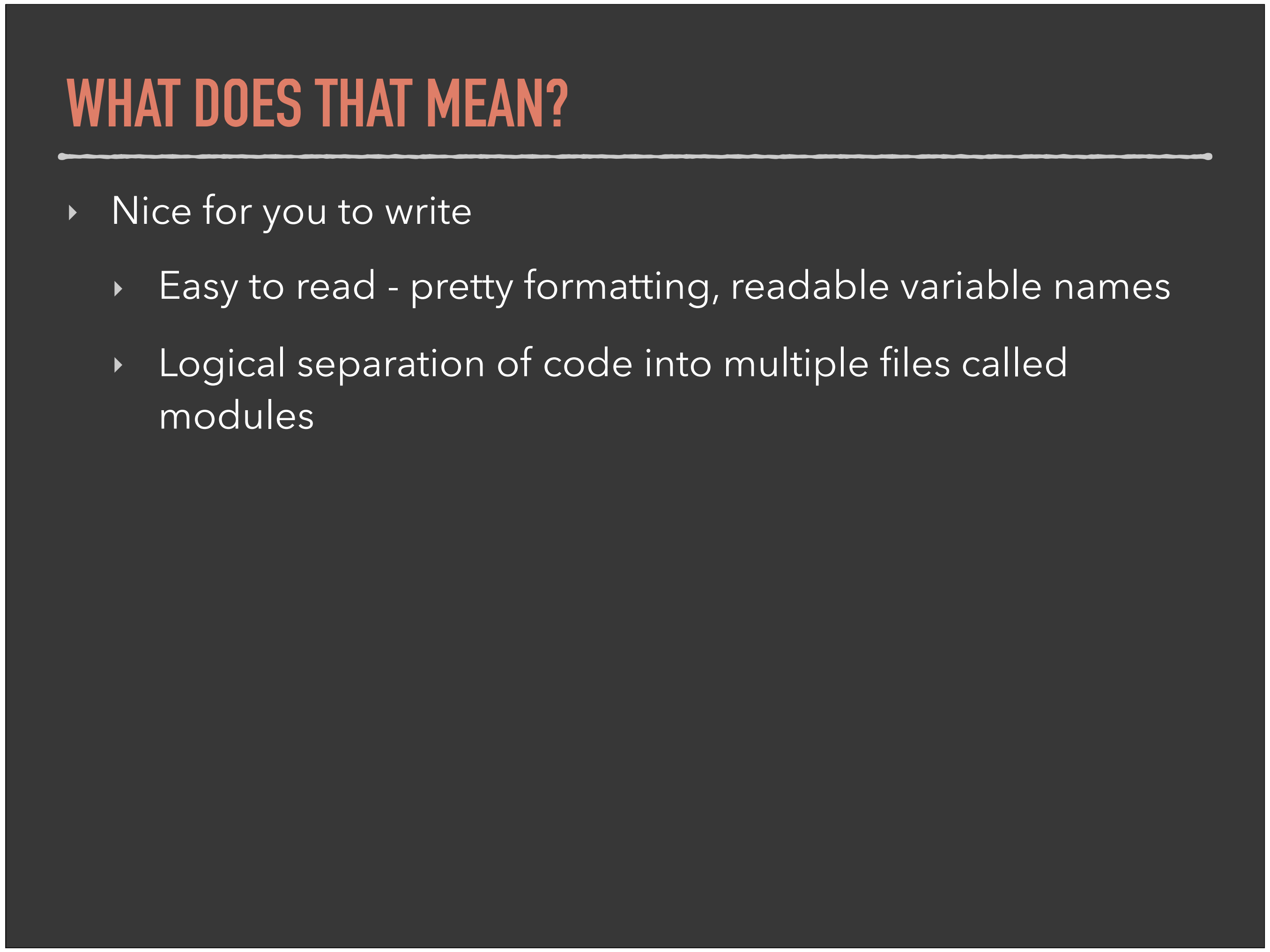
WHAT DOES THAT MEAN?

Nice for you to write

- Easy to read - pretty formatting, readable variable names
- Logical separation of code into multiple files called modules

Nice for your browser to read

- Fewer requests (good for bad internet connections)
- Smaller responses
- No whitespace
- Mangled variable names



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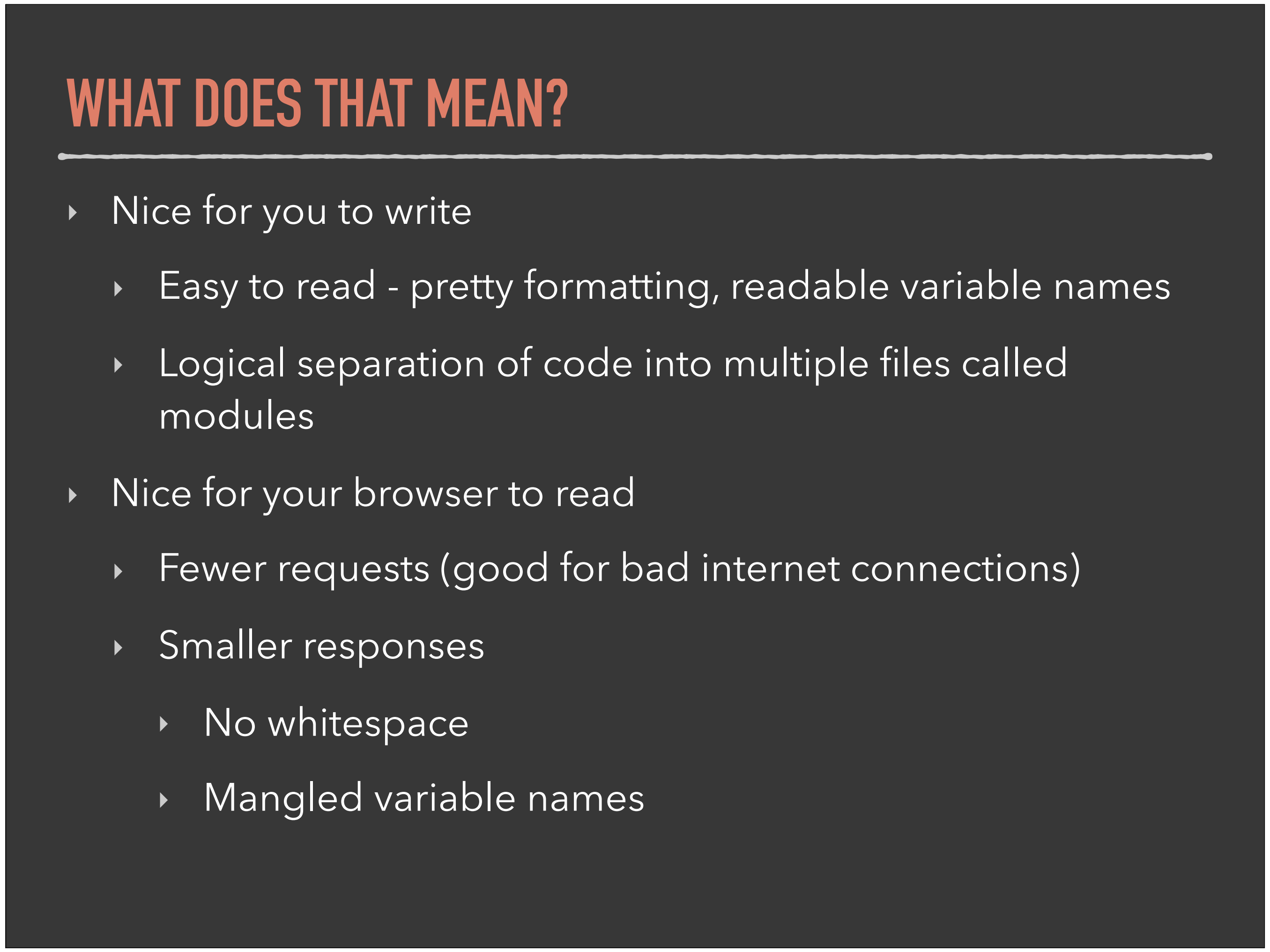

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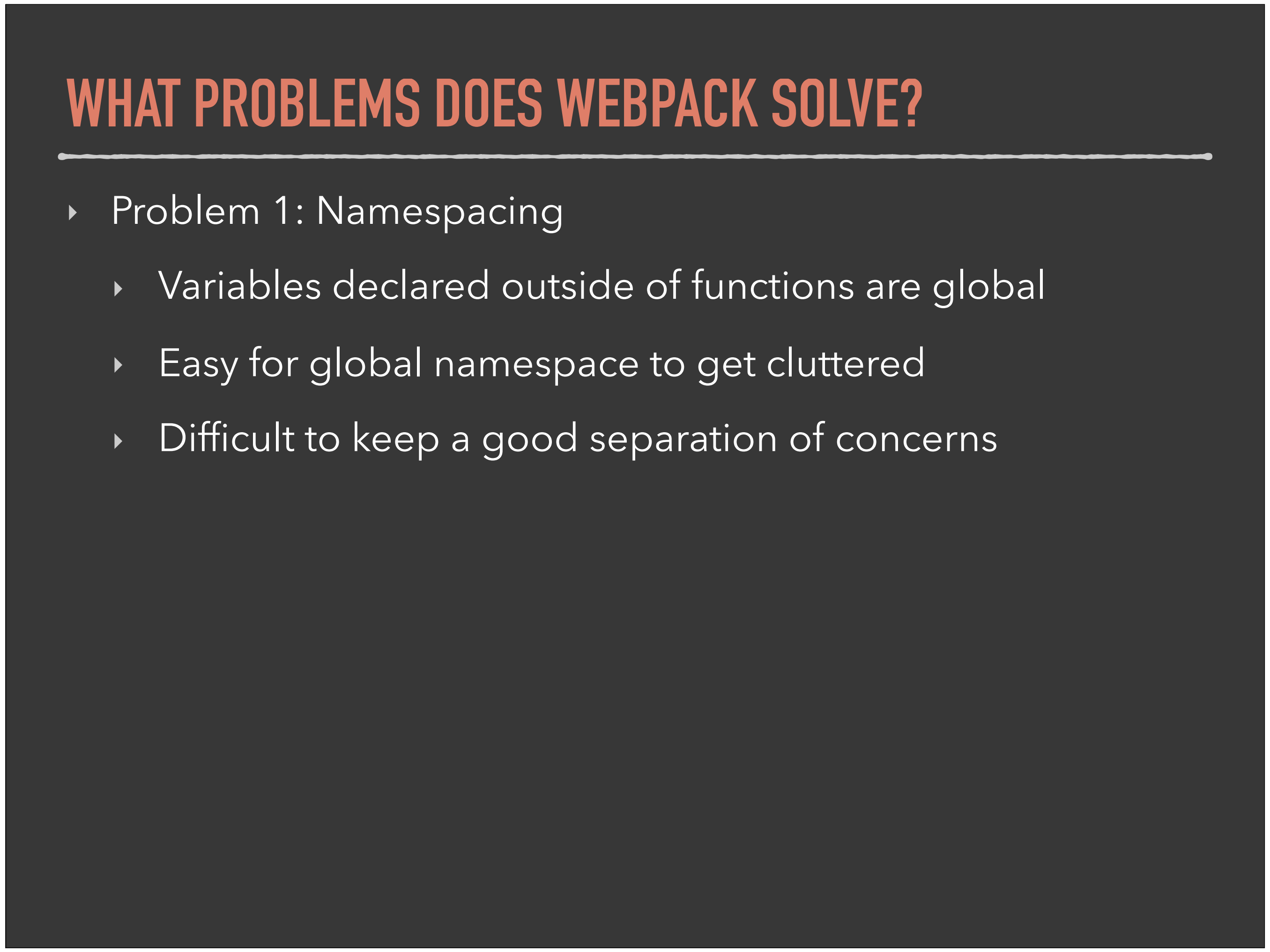

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- Problem 1: Namespacing
  - Variables declared outside of functions are global
  - Easy for global namespace to get cluttered
  - Difficult to keep a good separation of concerns

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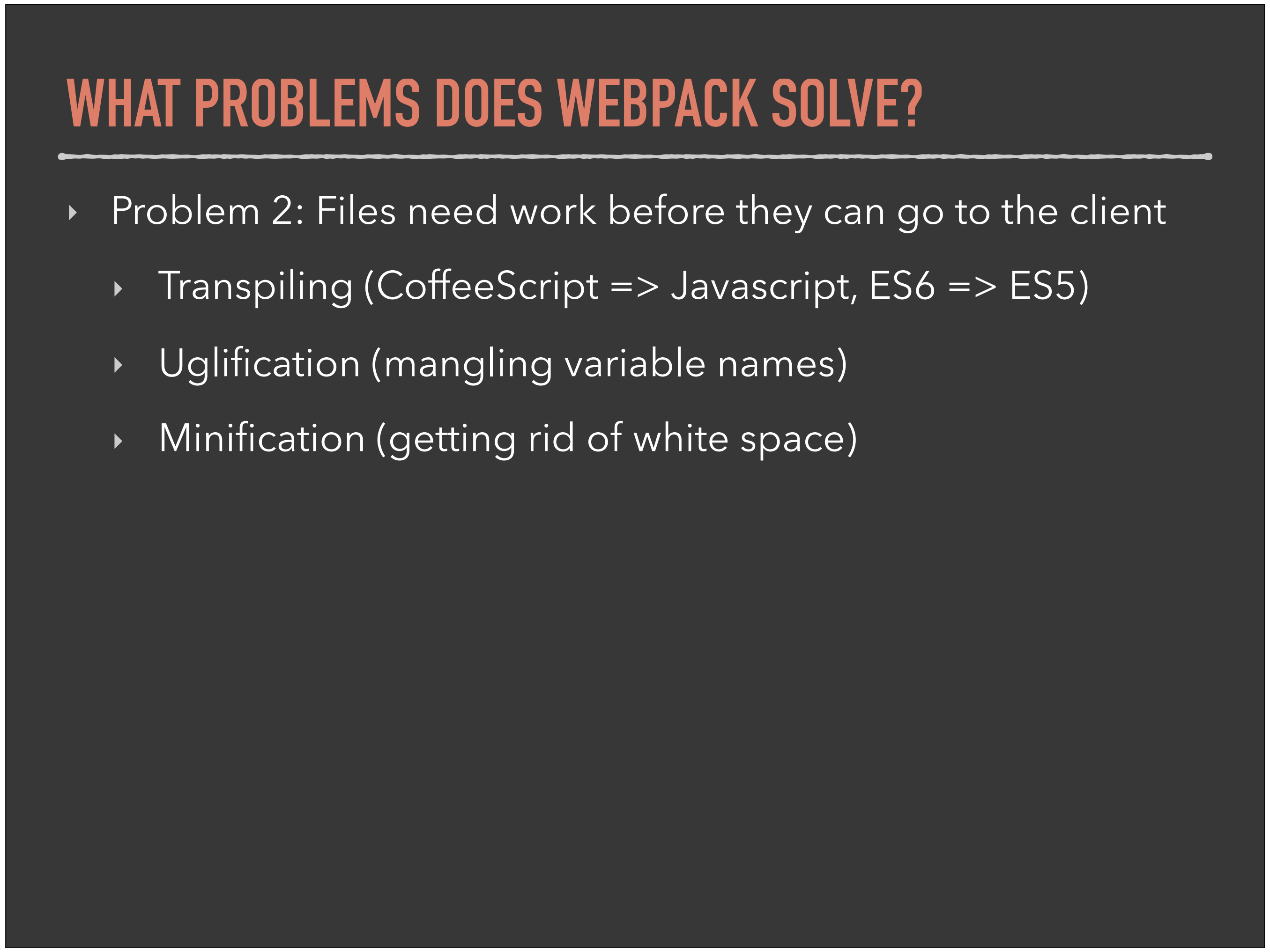

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  - Transpiling (CoffeeScript => Javascript, ES6 => ES5)
  - Uglification (mangling variable names)
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  - One request per file would be insane
  - It’s slow
  - Hard to manage order dependency

```html
<head>
  <script path='path/to/file/1.js'></script>
  <script path='path/to/file/2.js'></script>
  <script path='path/to/file/3.js'></script>
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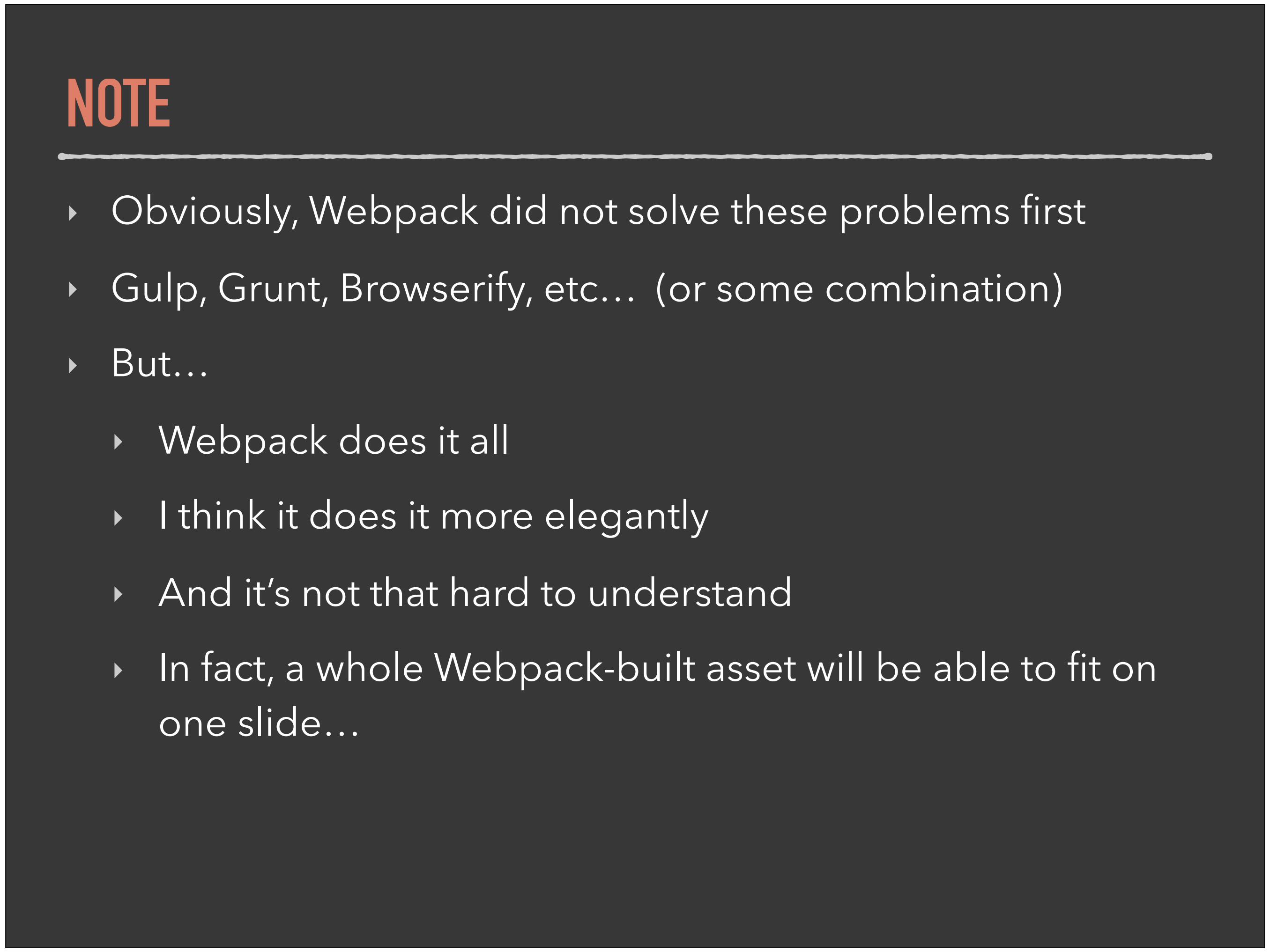

NOTE

- Obviously, Webpack did not solve these problems first
- Gulp, Grunt, Browserify, etc… (or some combination)
- But…
  - Webpack does it all
  - I think it does it more elegantly
  - And it’s not that hard to understand
  - In fact, a whole Webpack-built asset will be able to fit on one slide…

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- What problems does Webpack solve?
- **How does Webpack work?**

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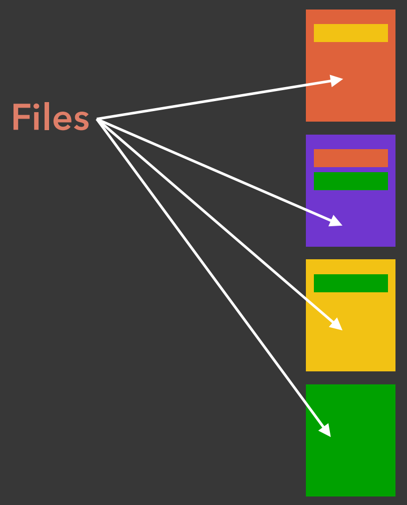

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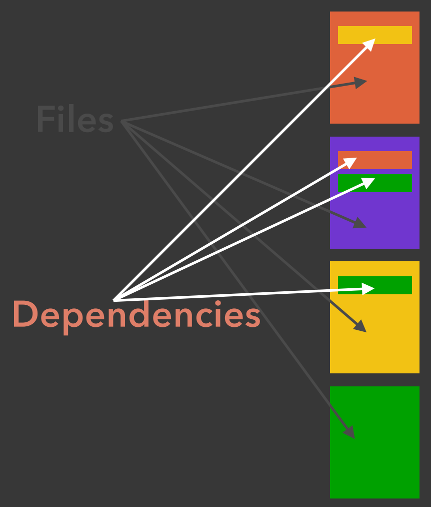

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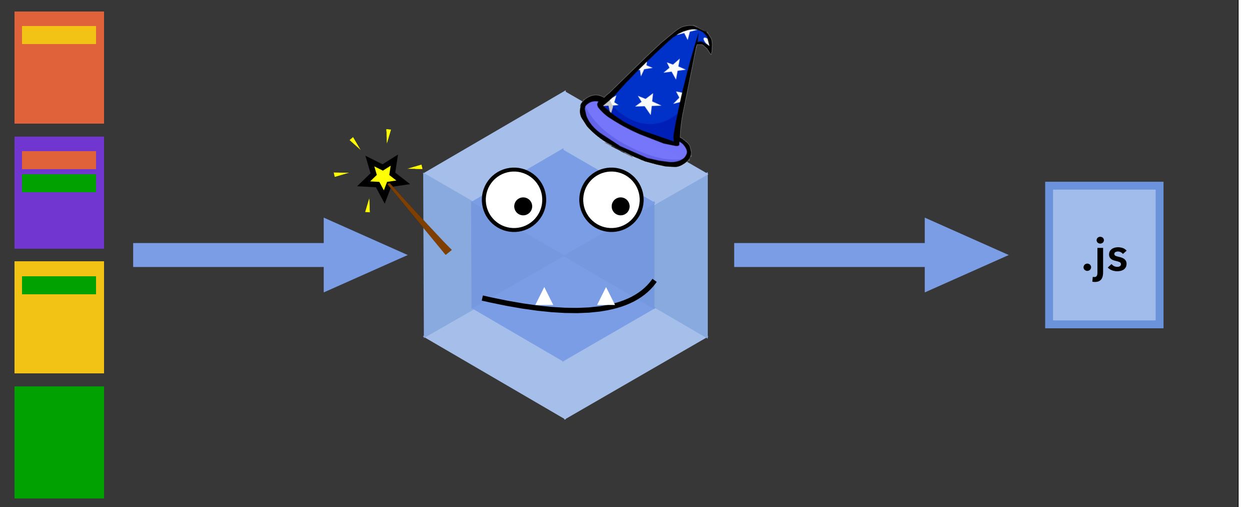

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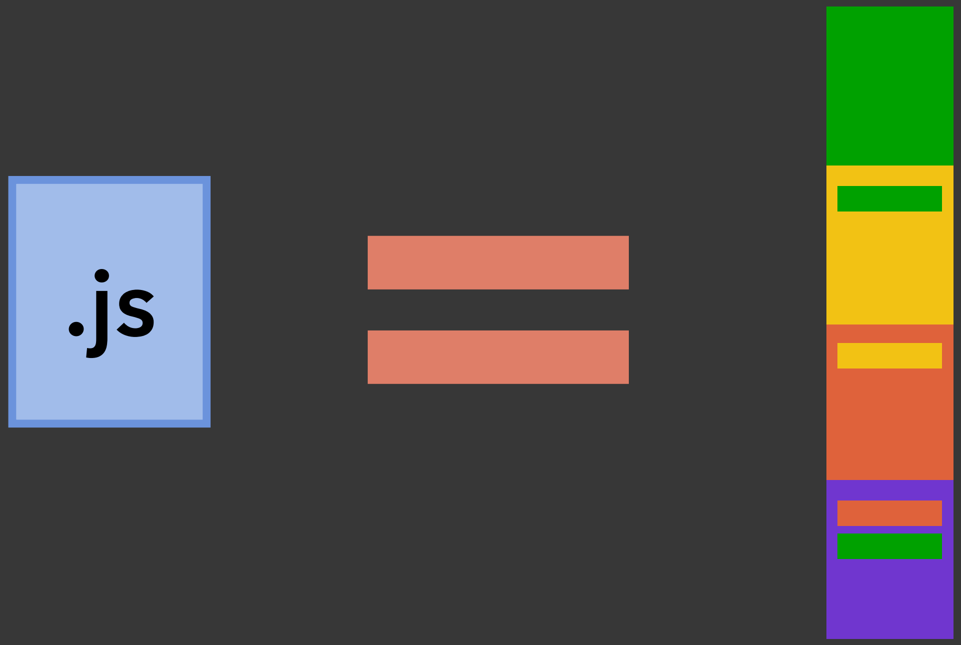

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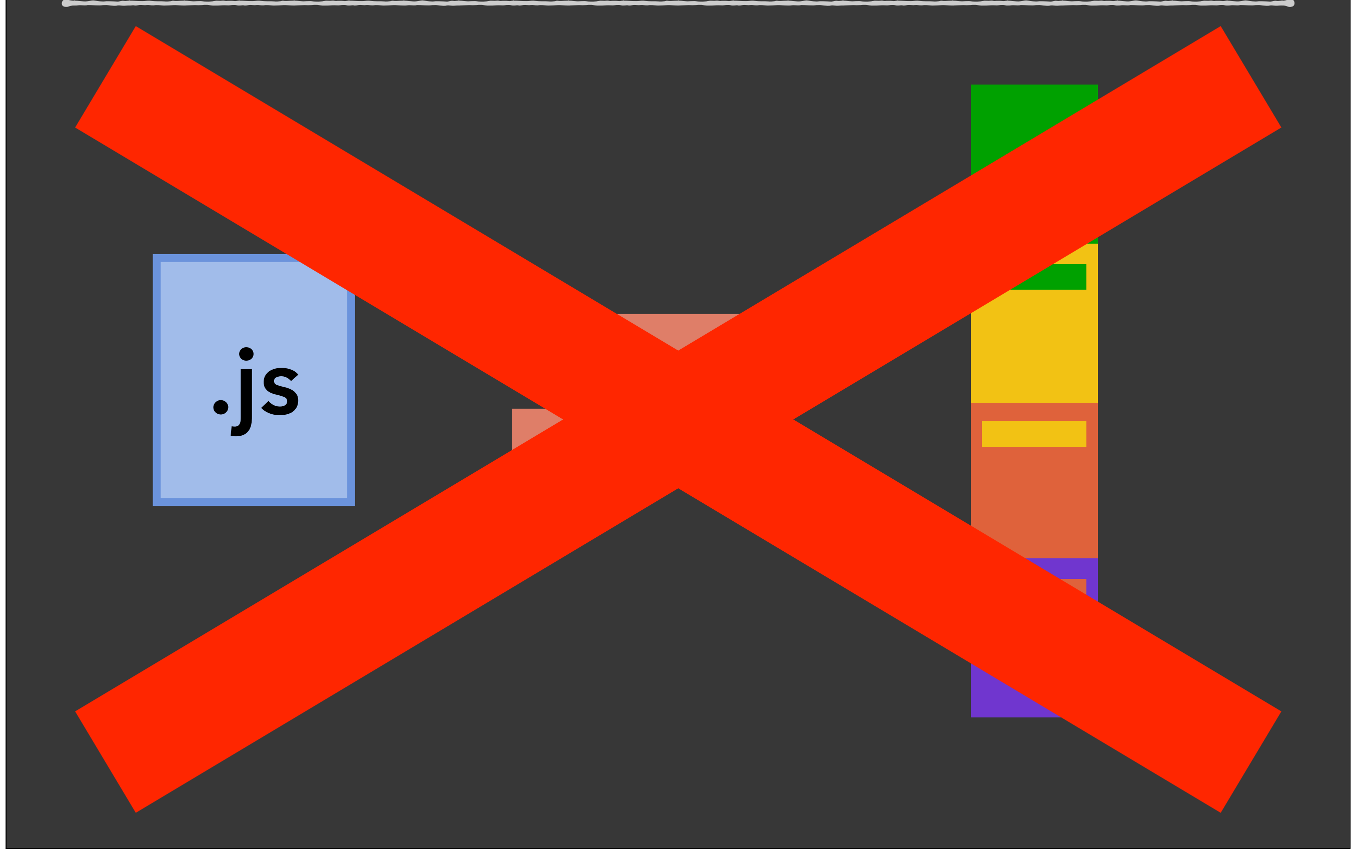


HOW WEBPACK ACTUALLY WORKS

To start: webpack takes a path to a single starting file

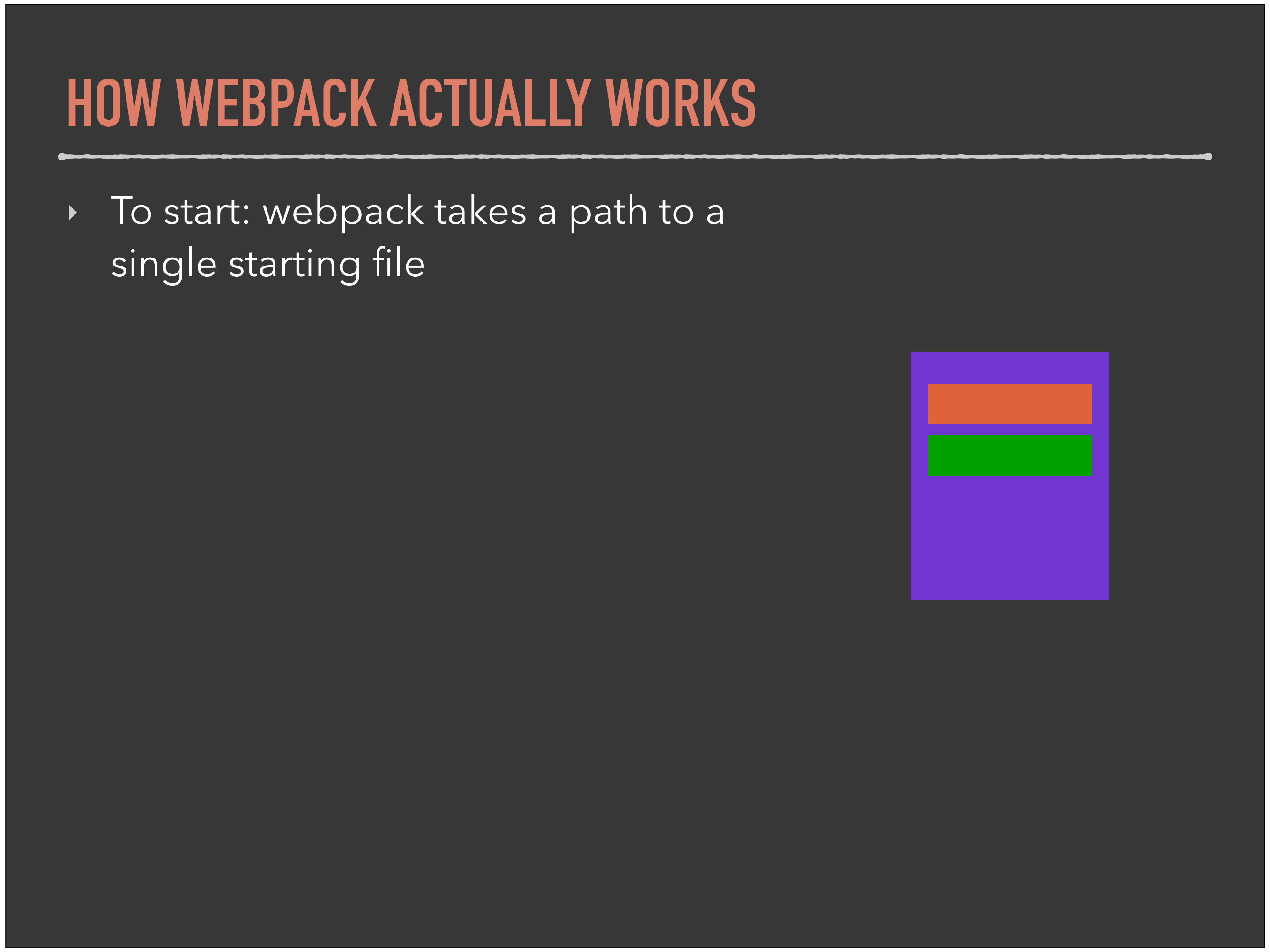
Webpack has four main steps

Find dependent files

Apply loaders

Implement module system

Create final asset



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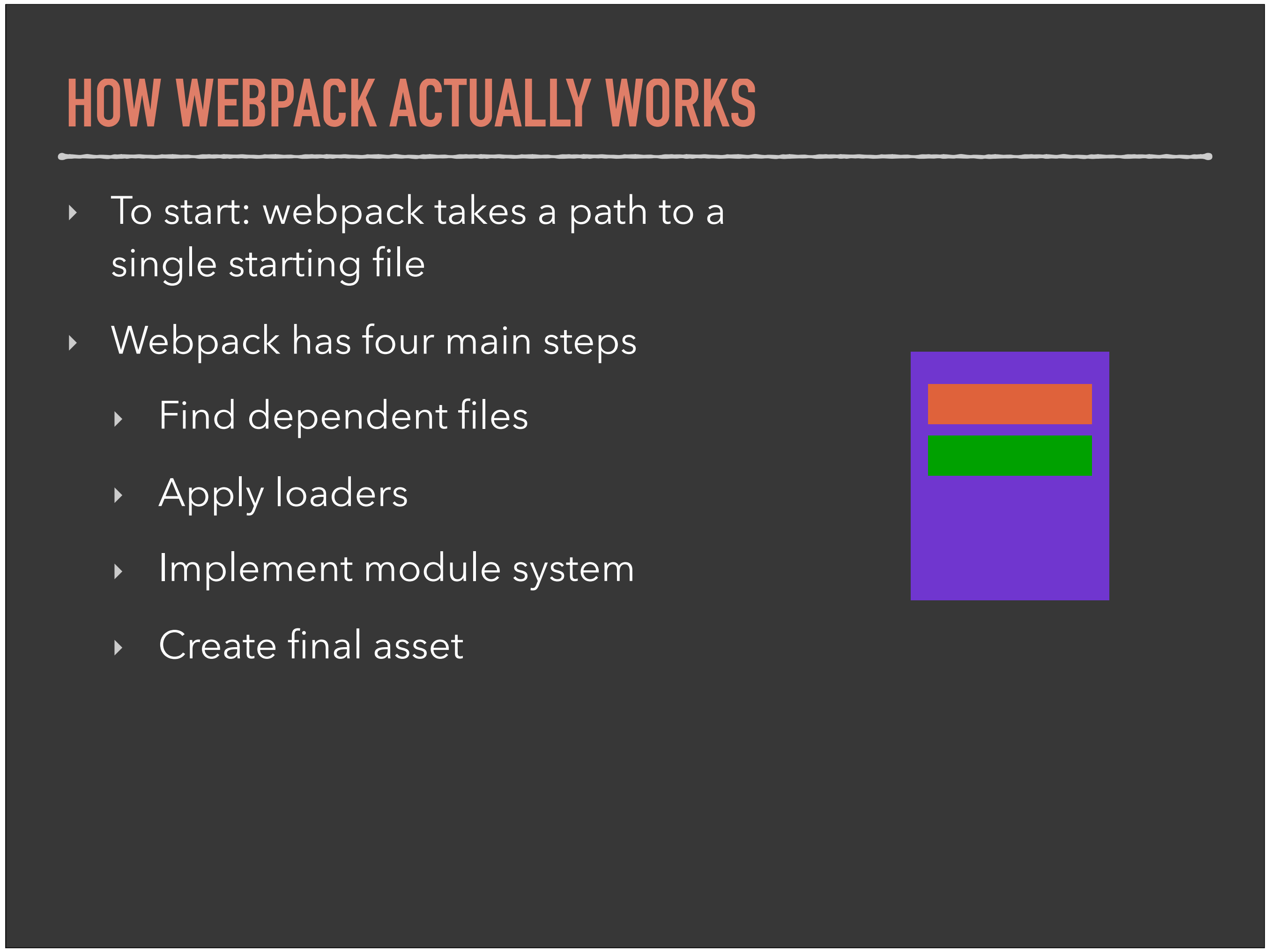

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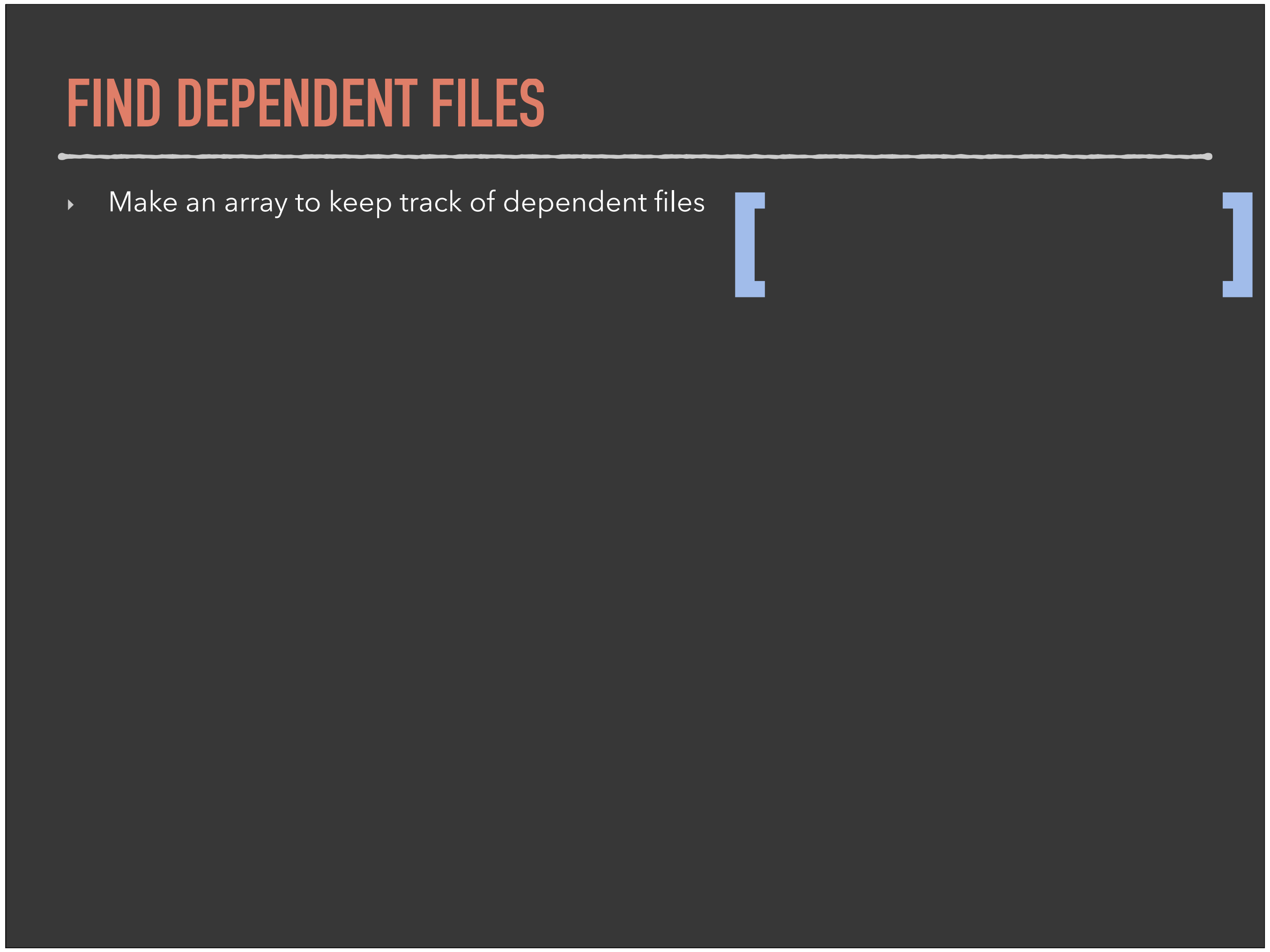
FIND DEPENDENT FILES

Make an array to keep track of dependent files
Start at entry file
Look for dependency declarations
require or import
ex. require foo from './foo';
Webpack supports multiple module systems
AMD, CommonJS, ES6 (more later)
For each dependency
Validate path
must lead to file or npm module
add file to array
Remember this array! It will be important later



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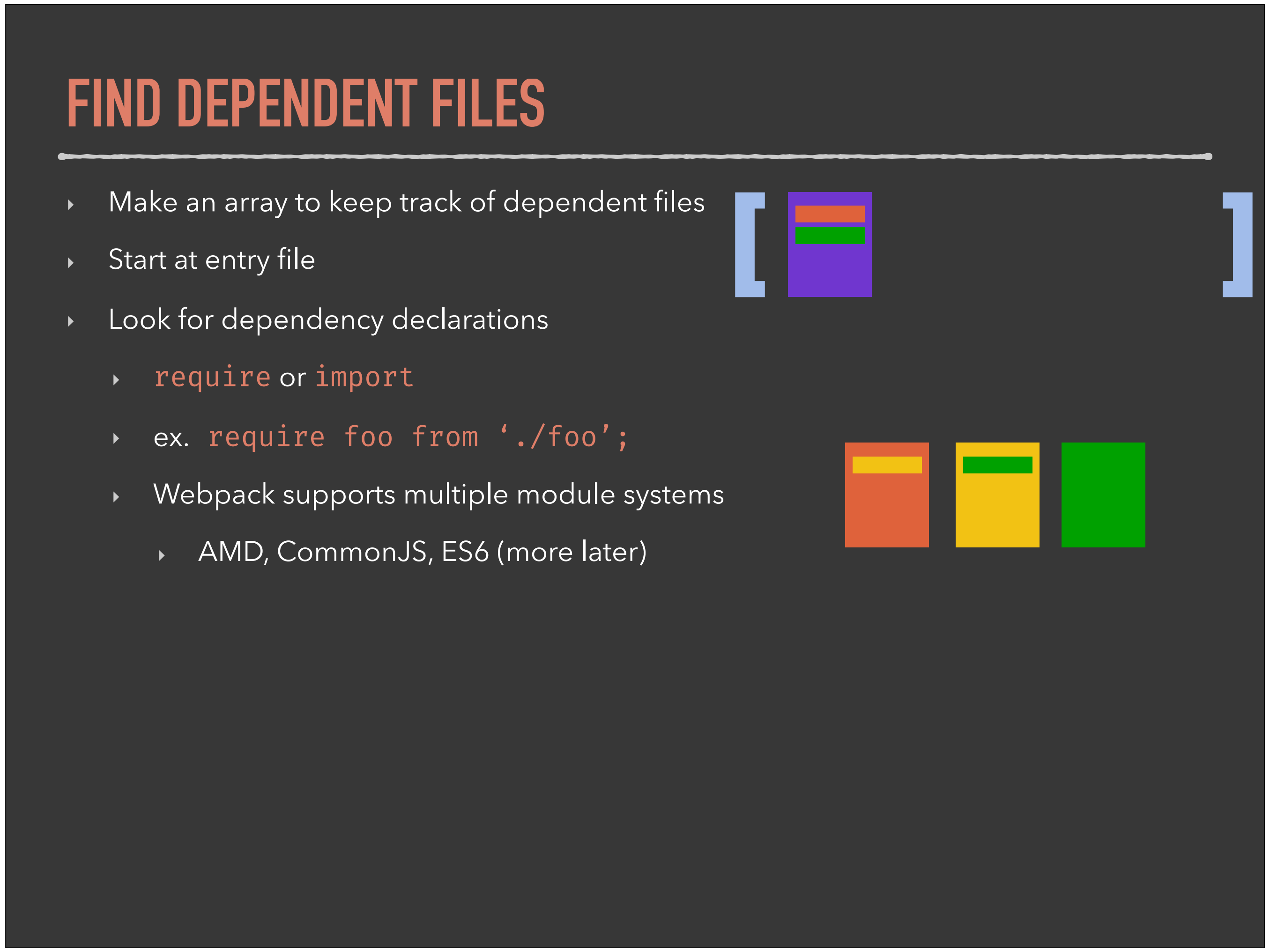

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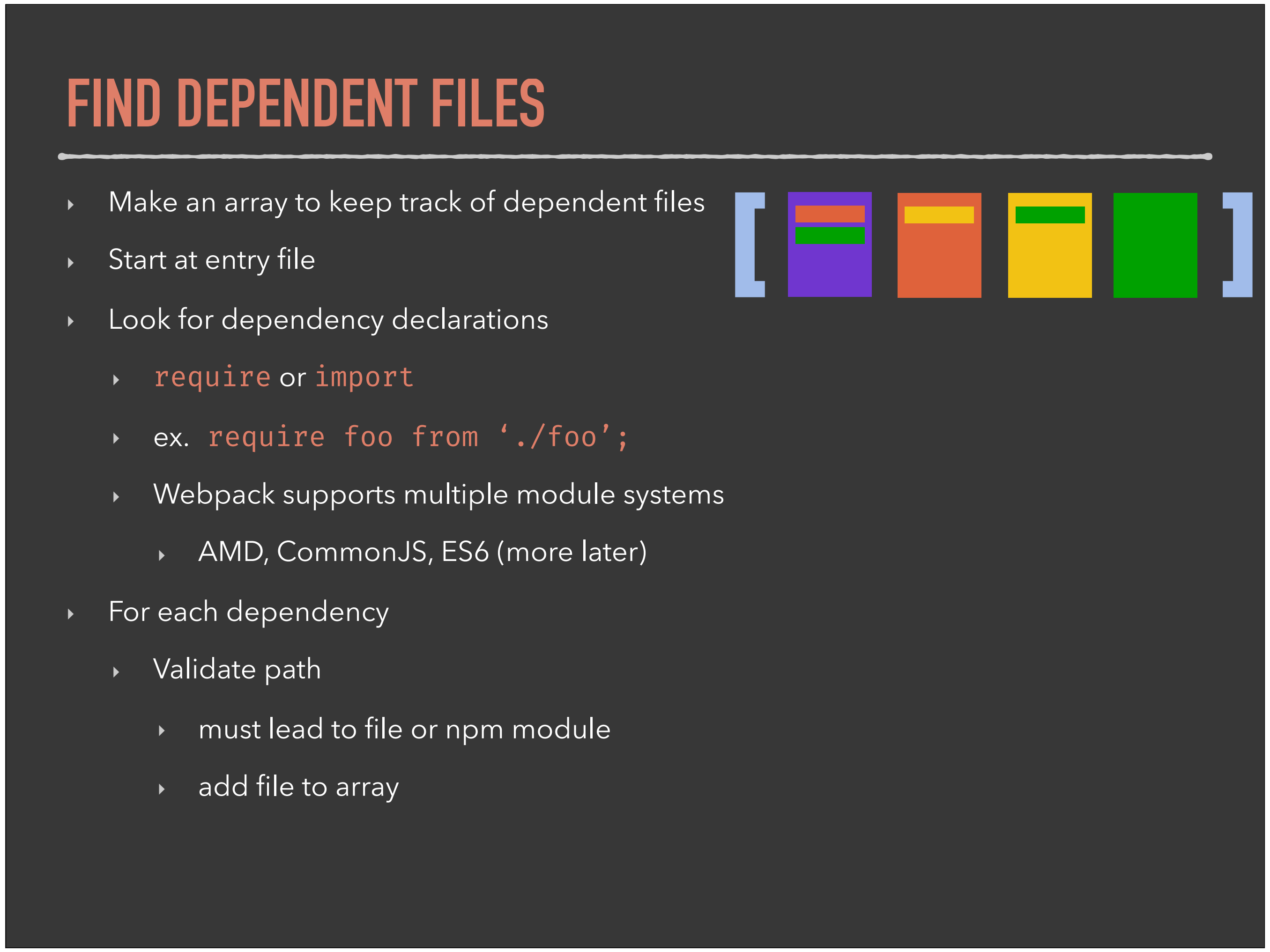

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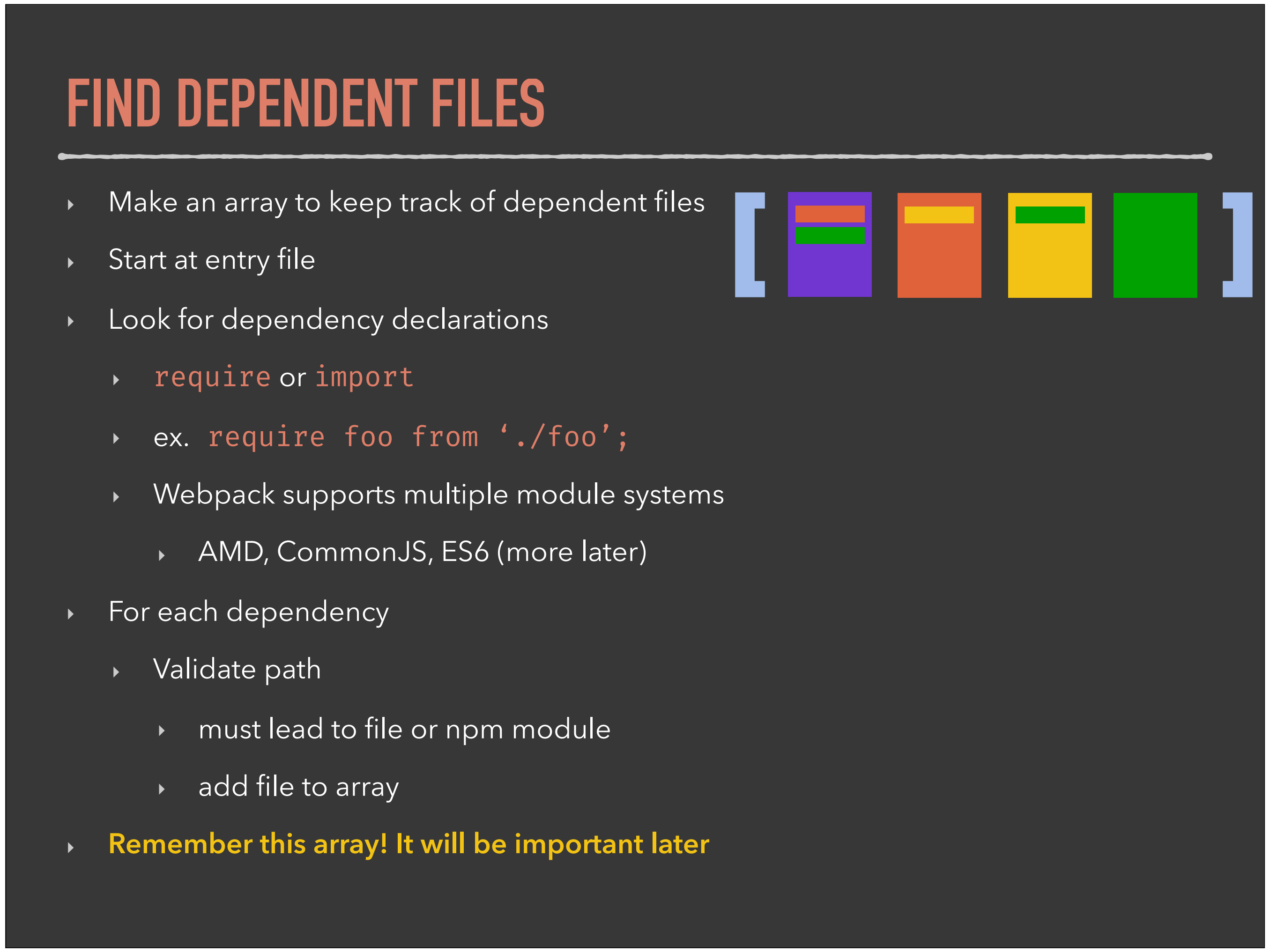

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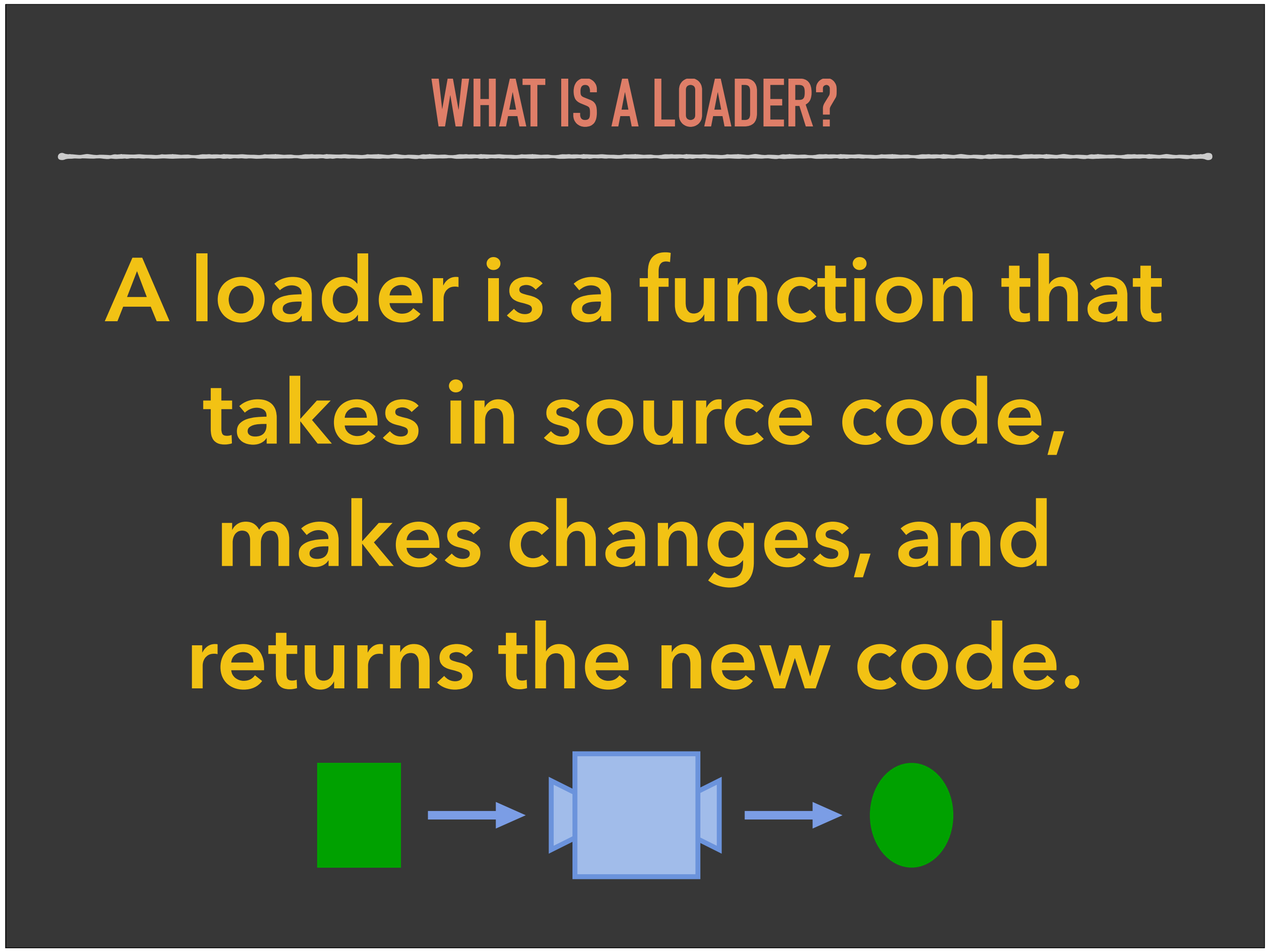

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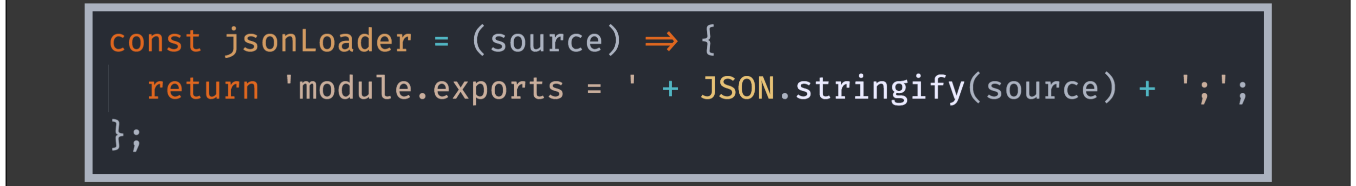
Example: JSON loader - converts code to JSON

https://github.com/webpack/json-loader



```
const jsonLoader = (source) => {
  return 'module.exports = ' + JSON.stringify(source) + ';';
};
```

MORE ABOUT LOADERS

Where do they come from?

Some come for free with Webpack

Others are available on npm - anyone can write one!

How are they used?

Tell Webpack what loaders to apply in your config file

Can be applied selectively with regex

They can be chained together in whatever order you want

Examples

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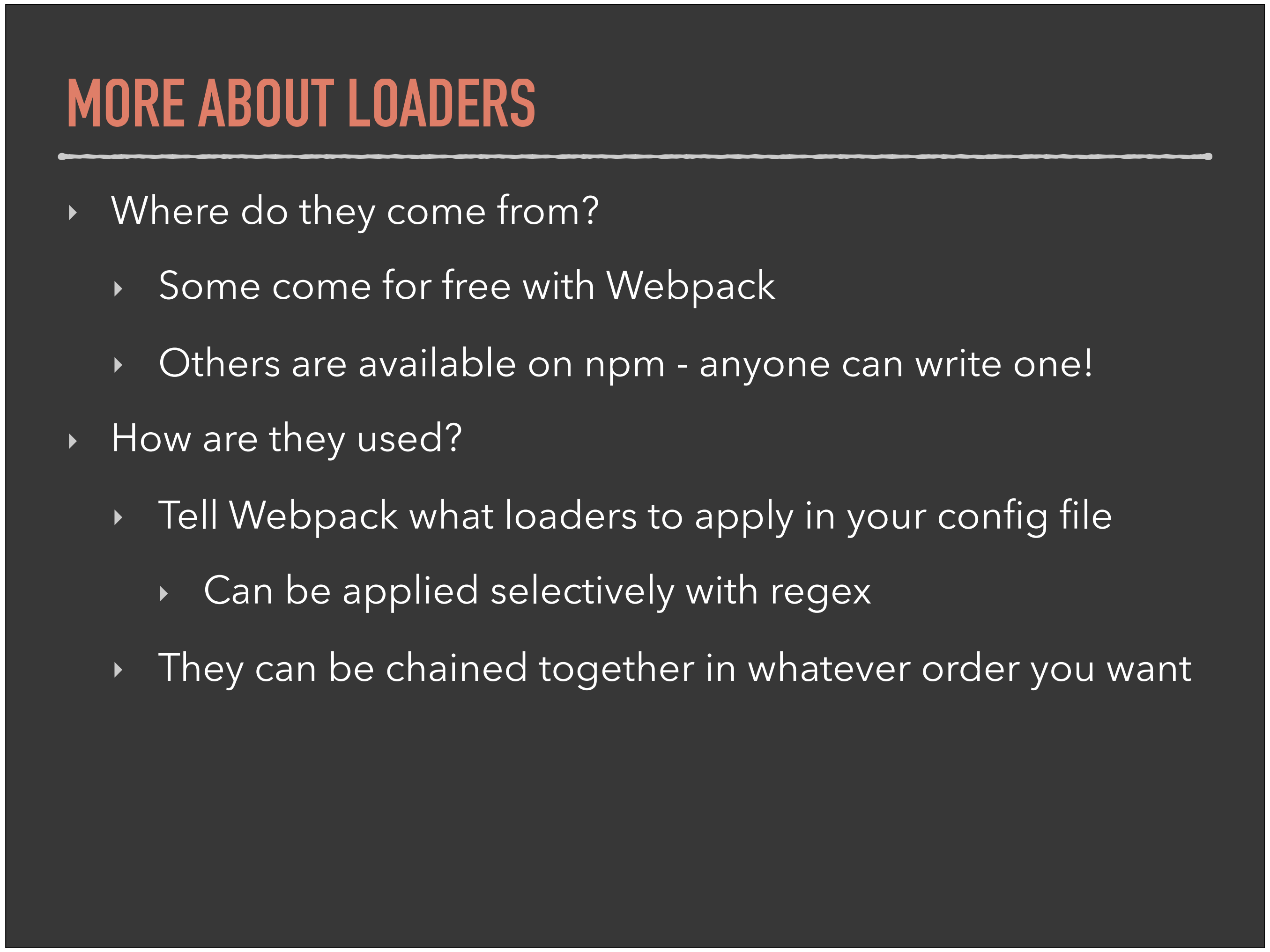

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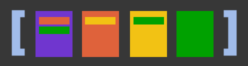
  - Find dependent files 
  - Apply loaders
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    - **CommonJS detour!**
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WHAT IS COMMONJS?

System of writing JS that allows files to declare dependencies on each other by importing and exporting modules from those files

Import modules by require-ing them (by name or path)

Ex. const express = require(‘express’);

Export modules by assigning them to module.exports

Standard, not a library

Write your code following this system

Webpack makes the system work by implementing the standard

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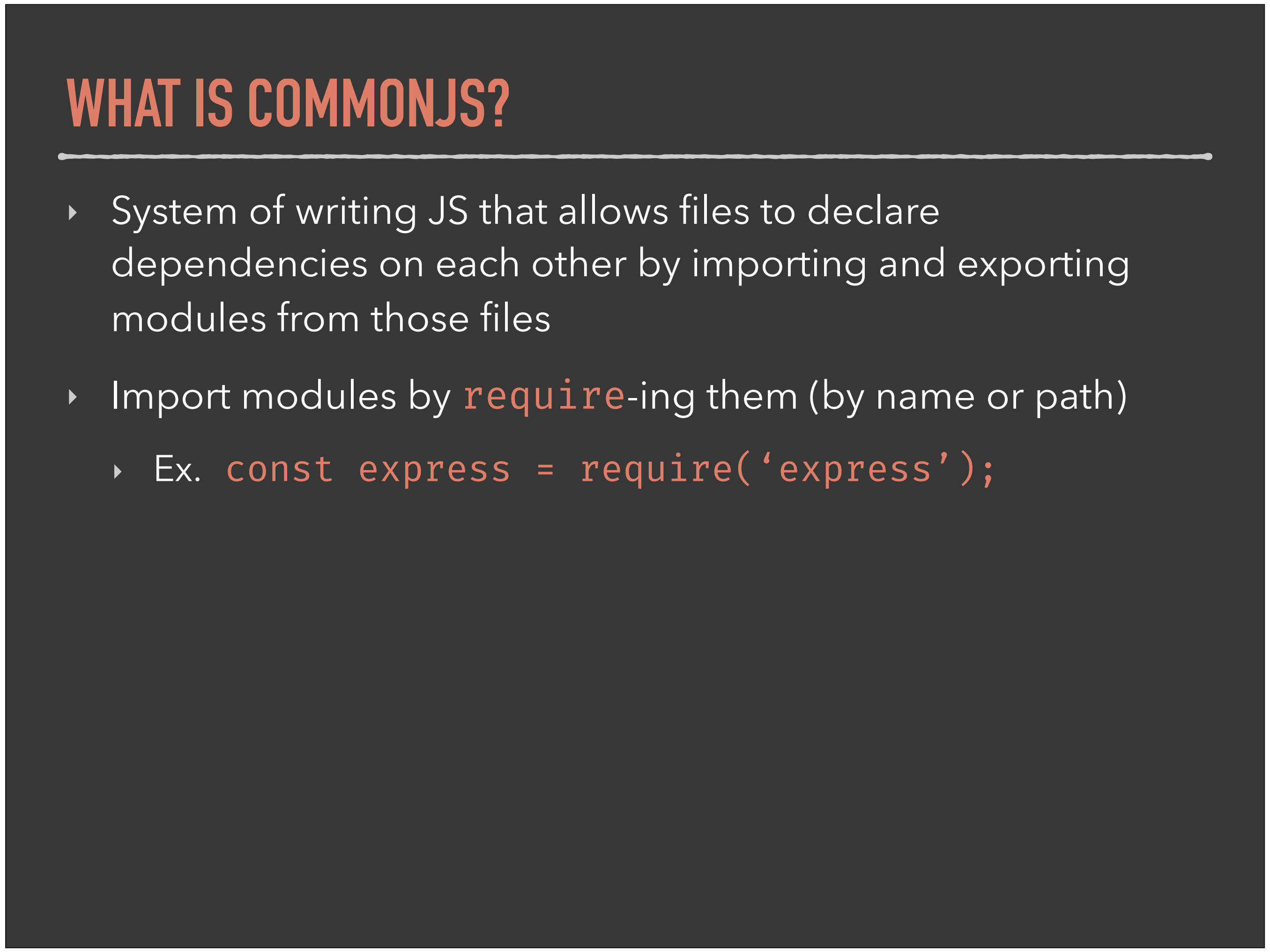

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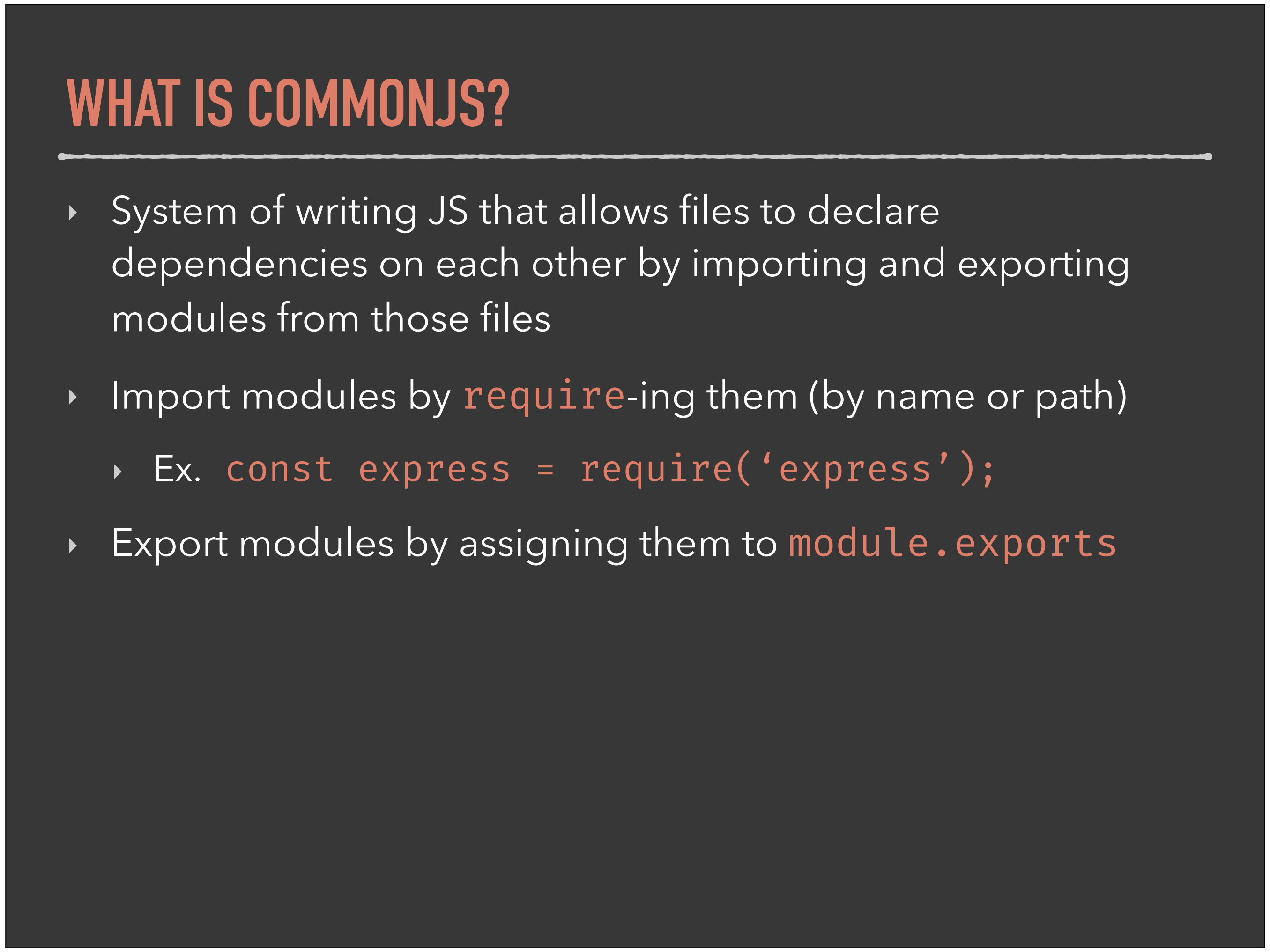

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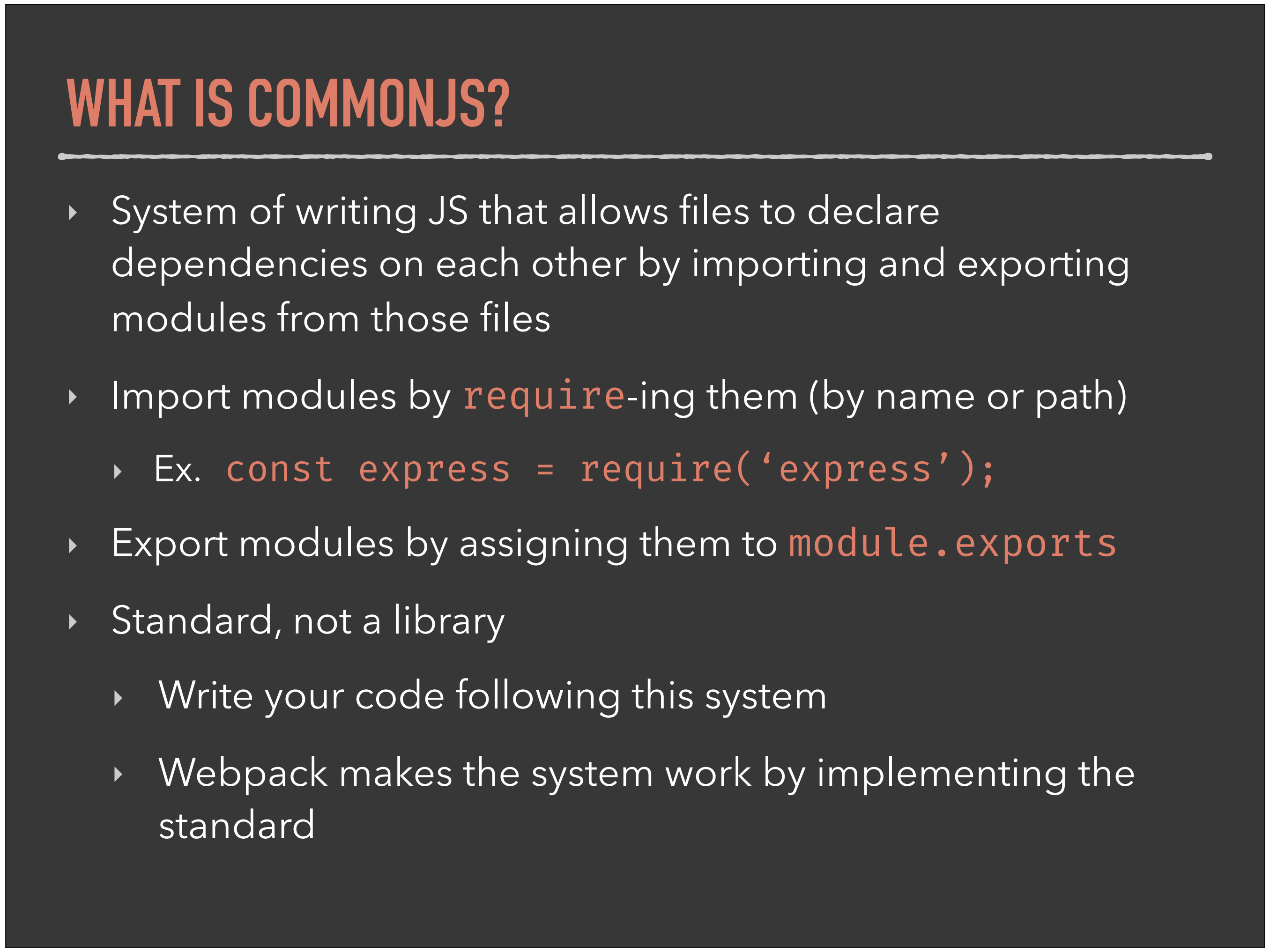

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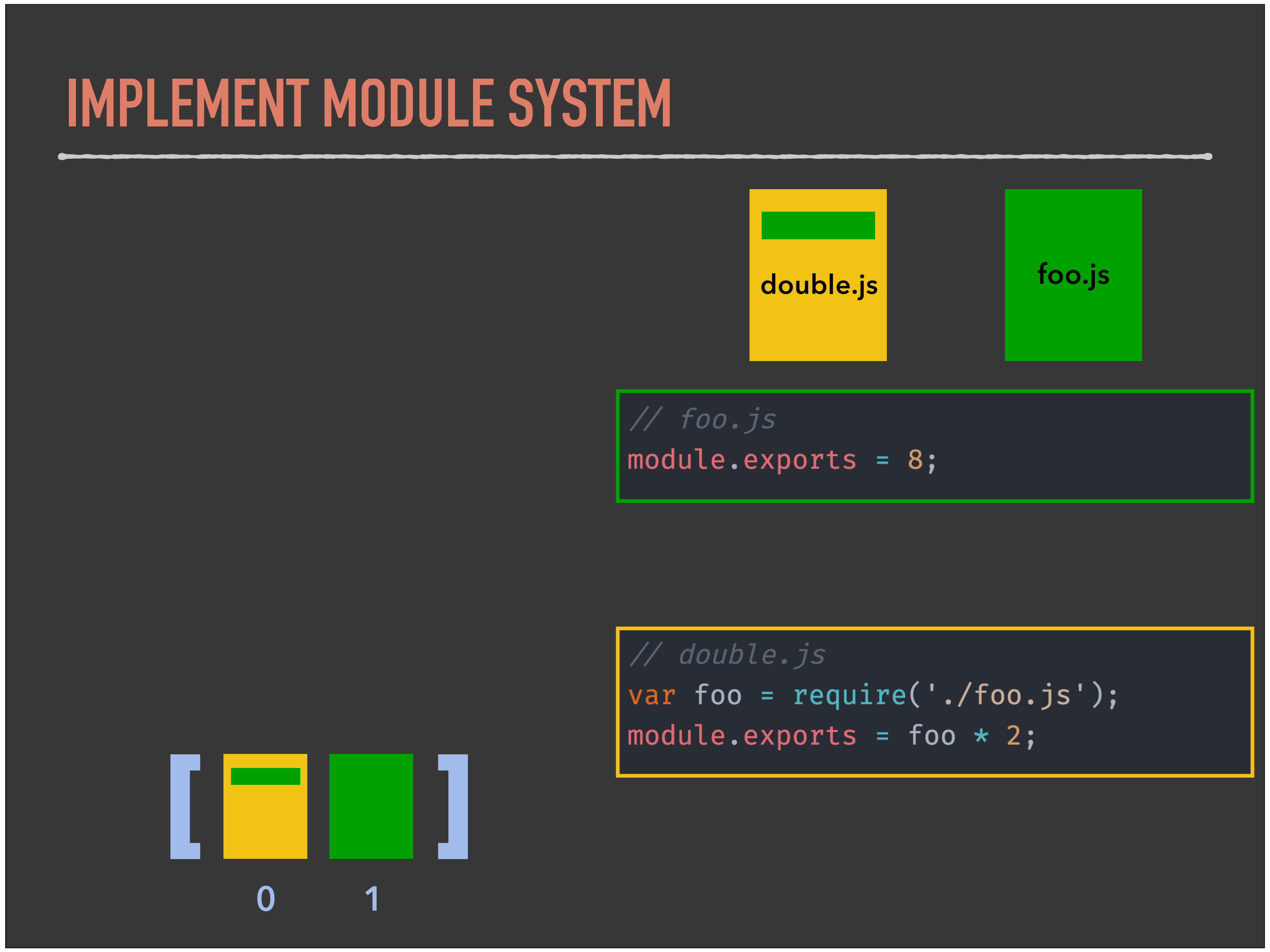


IMPLEMENT MODULE SYSTEM

```
// foo.js
module.exports = 8;
```

```
// double.js
var foo = require('./foo.js');
module.exports = foo * 2;
```

Webpack wraps each file in a function

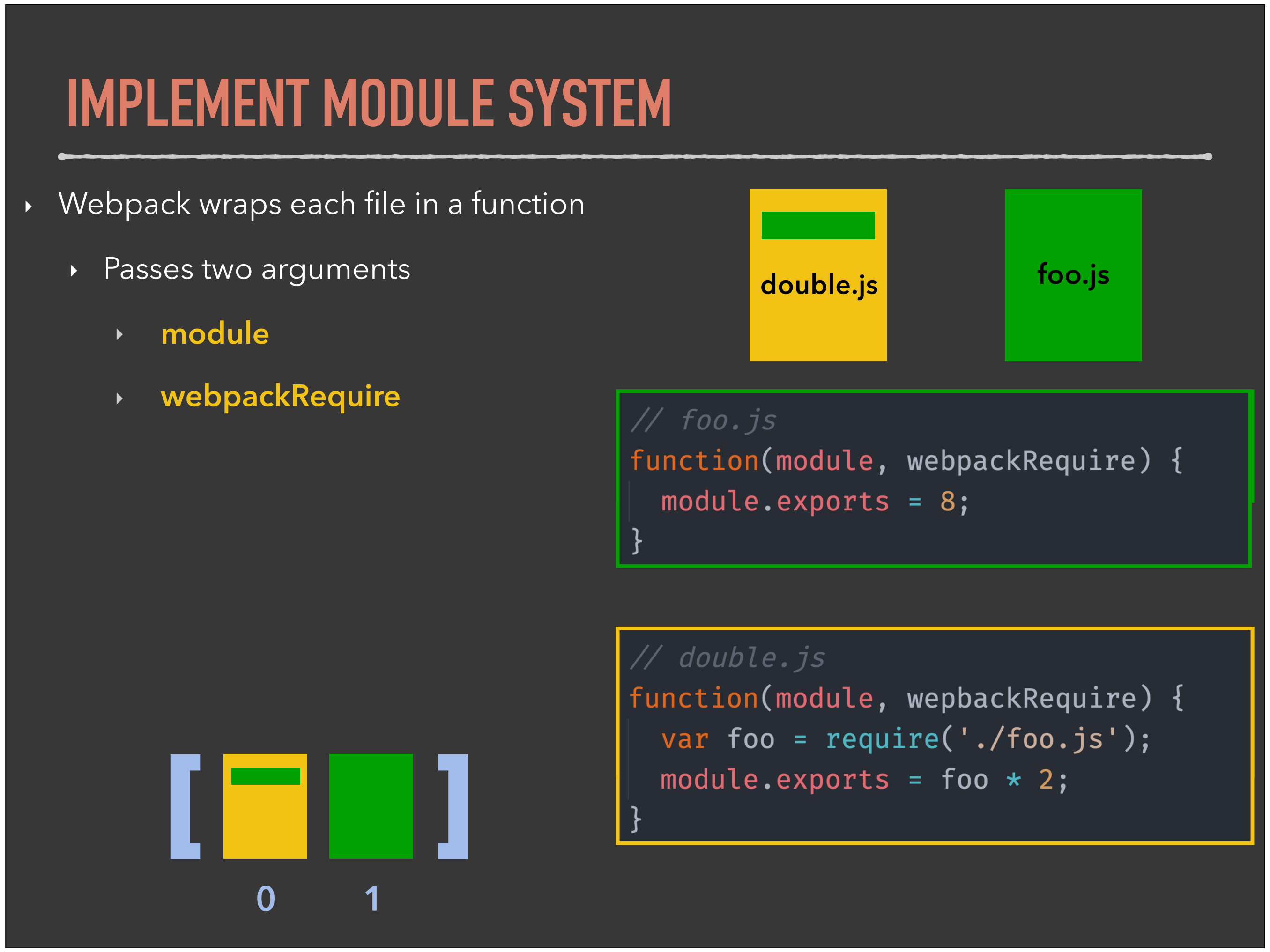
Passes two arguments

module

webpackRequire

Remember that array of modules?

Webpack replaces all instances of require(‘foo’) with webpackRequire(IndexOfFoo)



IMPLEMENT MODULE SYSTEM

- Webpack wraps each file in a function
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    - webpackRequire

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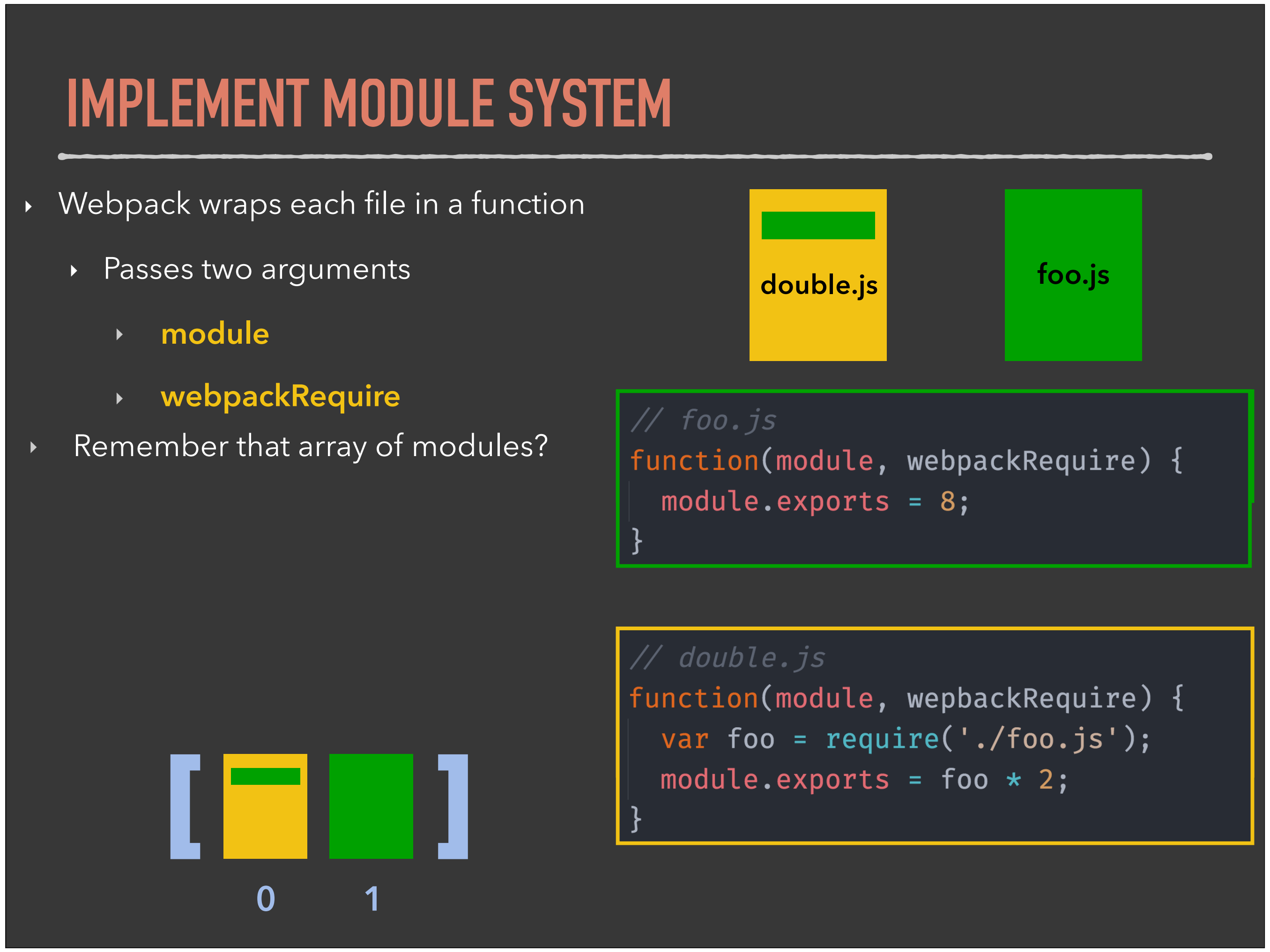

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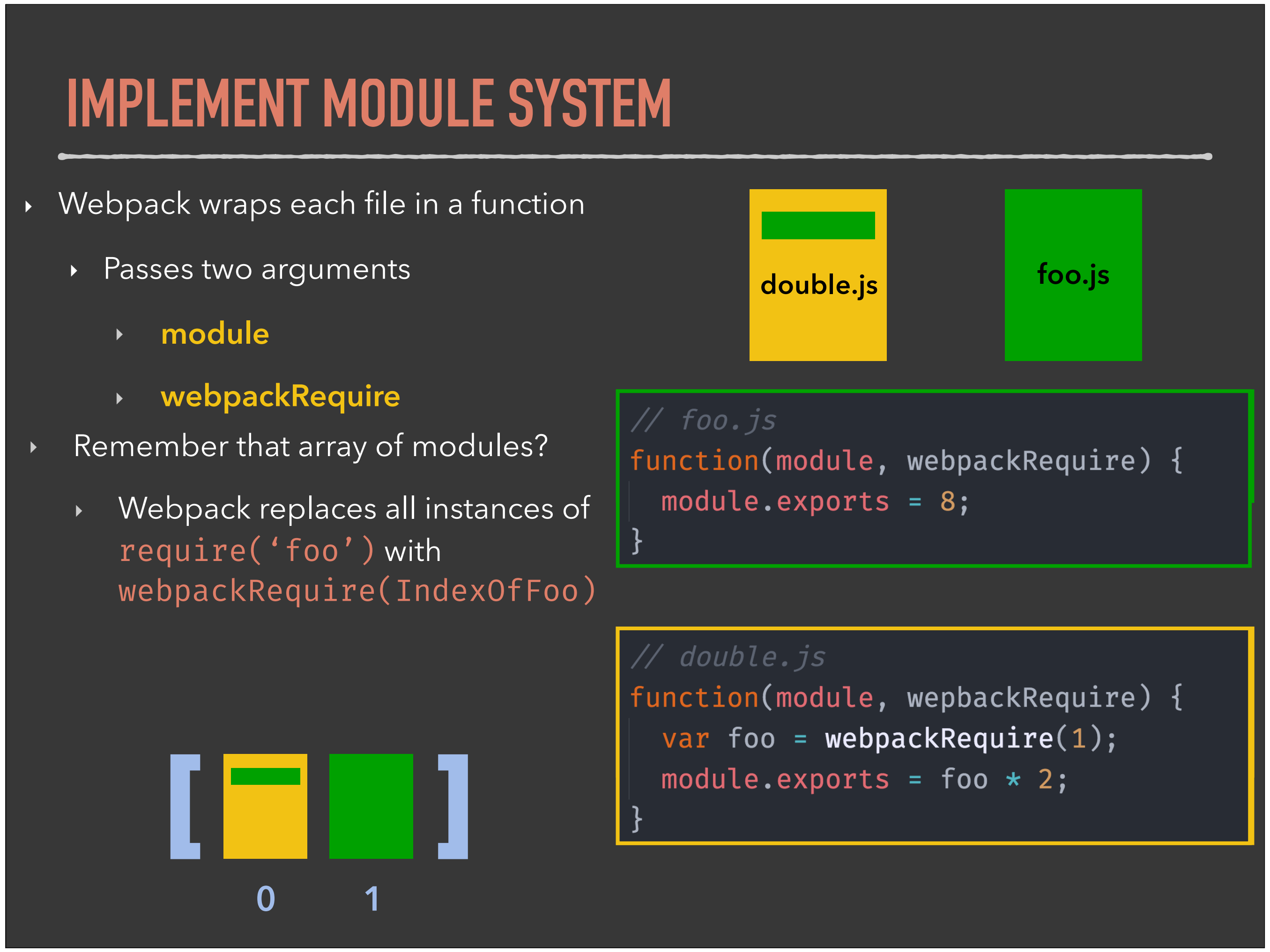

IMPLEMENT MODULE SYSTEM

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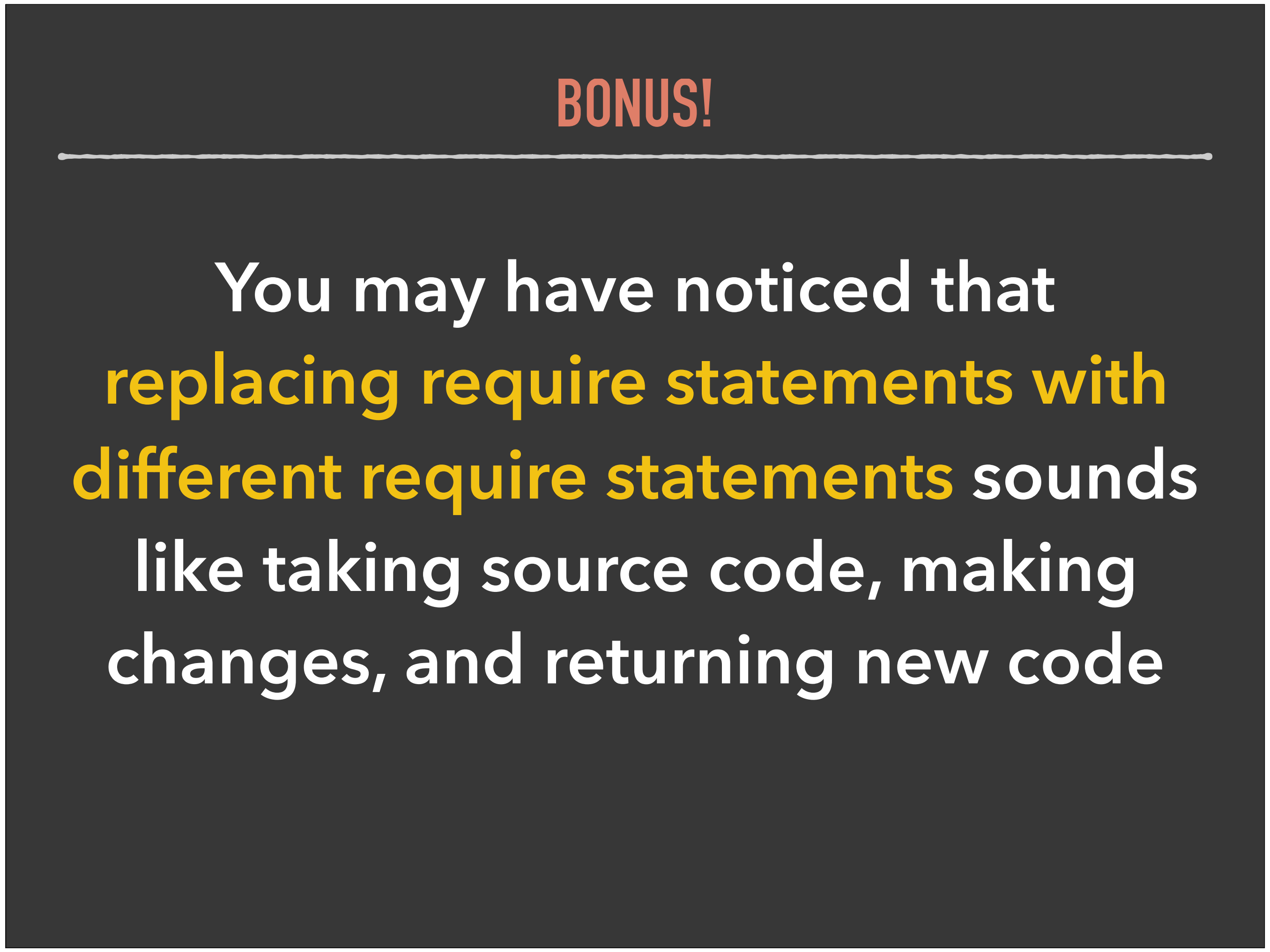

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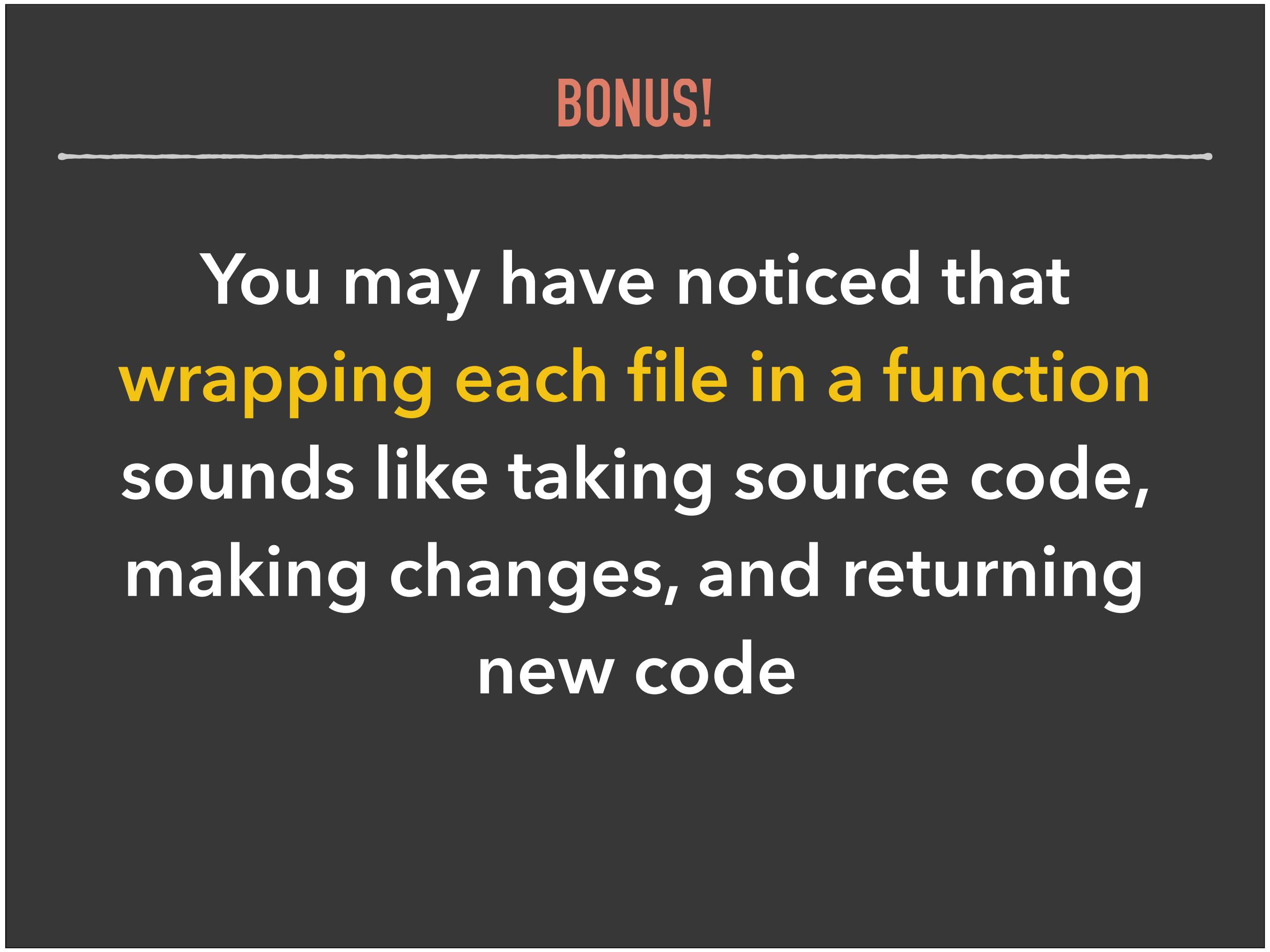

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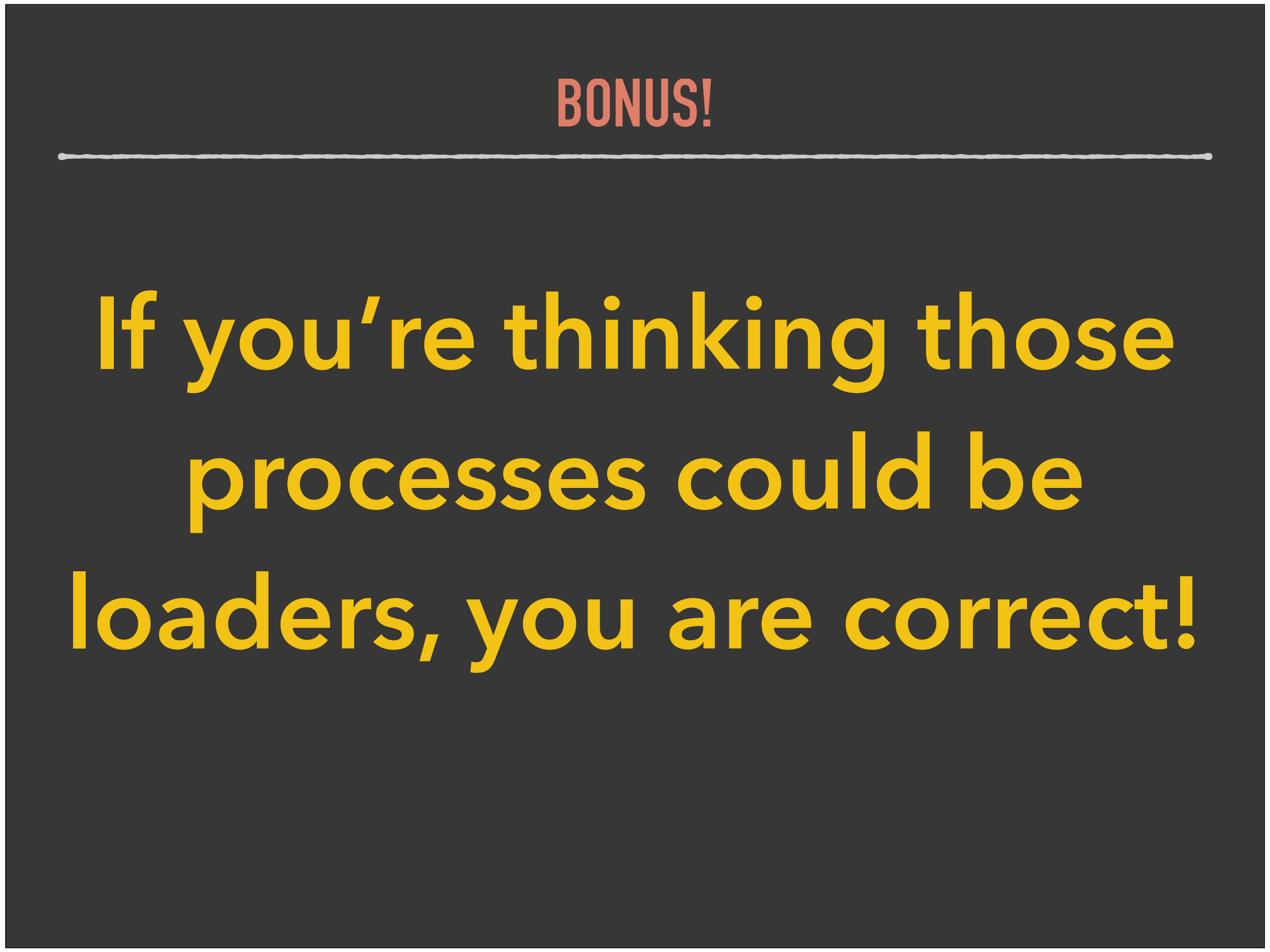

BONUS!

If you’re thinking those processes could be loaders, you are correct!

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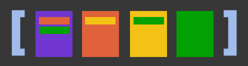
OVERVIEW

- What is Webpack?
- What problems does Webpack solve?
- **How does Webpack work?**
  - Find dependent files 
  - Apply loaders
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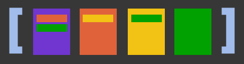
  - Find dependent files 
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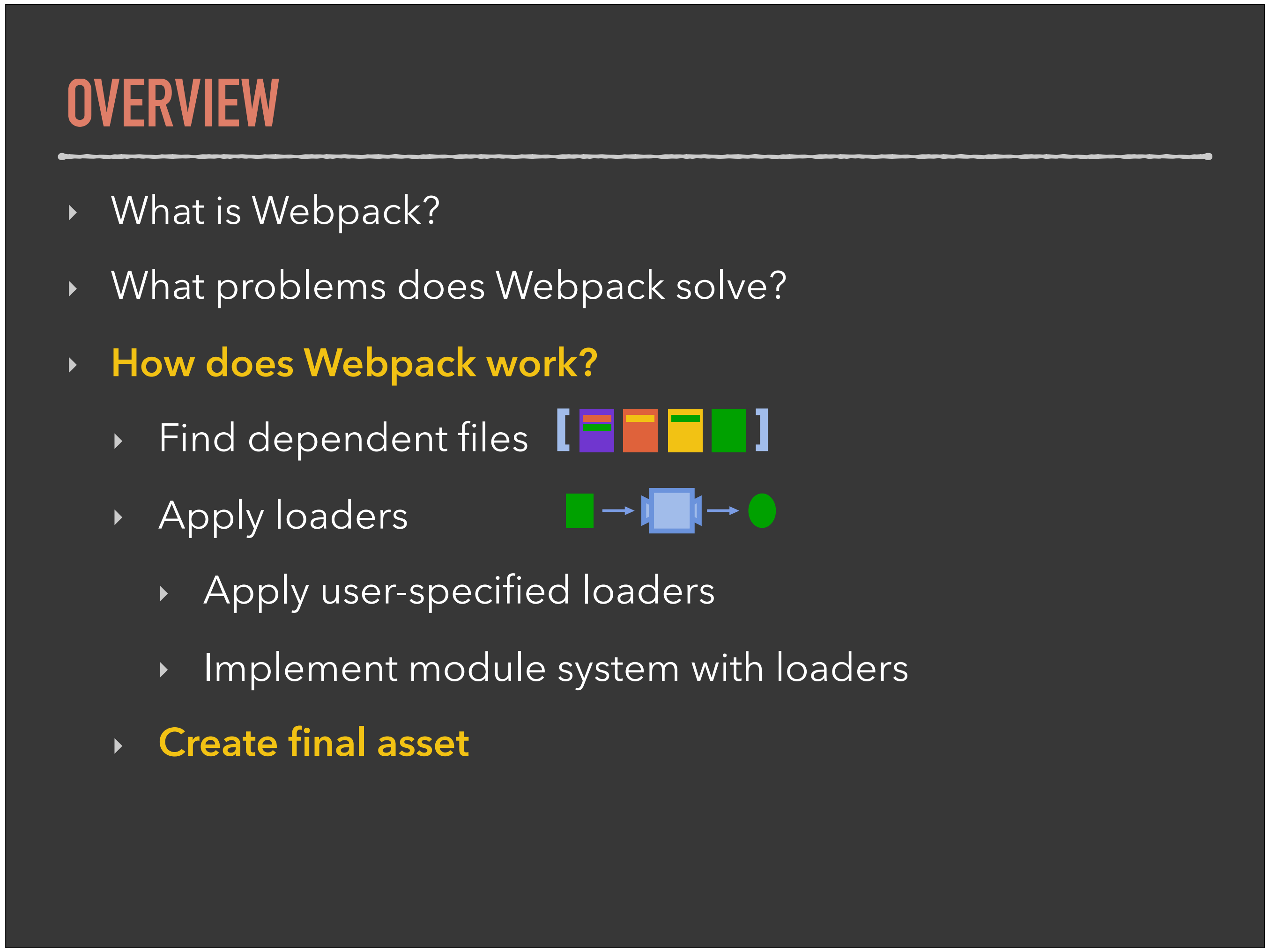
    - Apply user-specified loaders
    - **Implement module system with loaders**
  - Create final asset



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Find dependent files
Apply loaders
Apply user-specified loaders
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CREATE FINAL ASSET

- What does our final asset need to do?
  - Must have all of our code (entry file and its dependencies)
  - Must define the webpackRequire function
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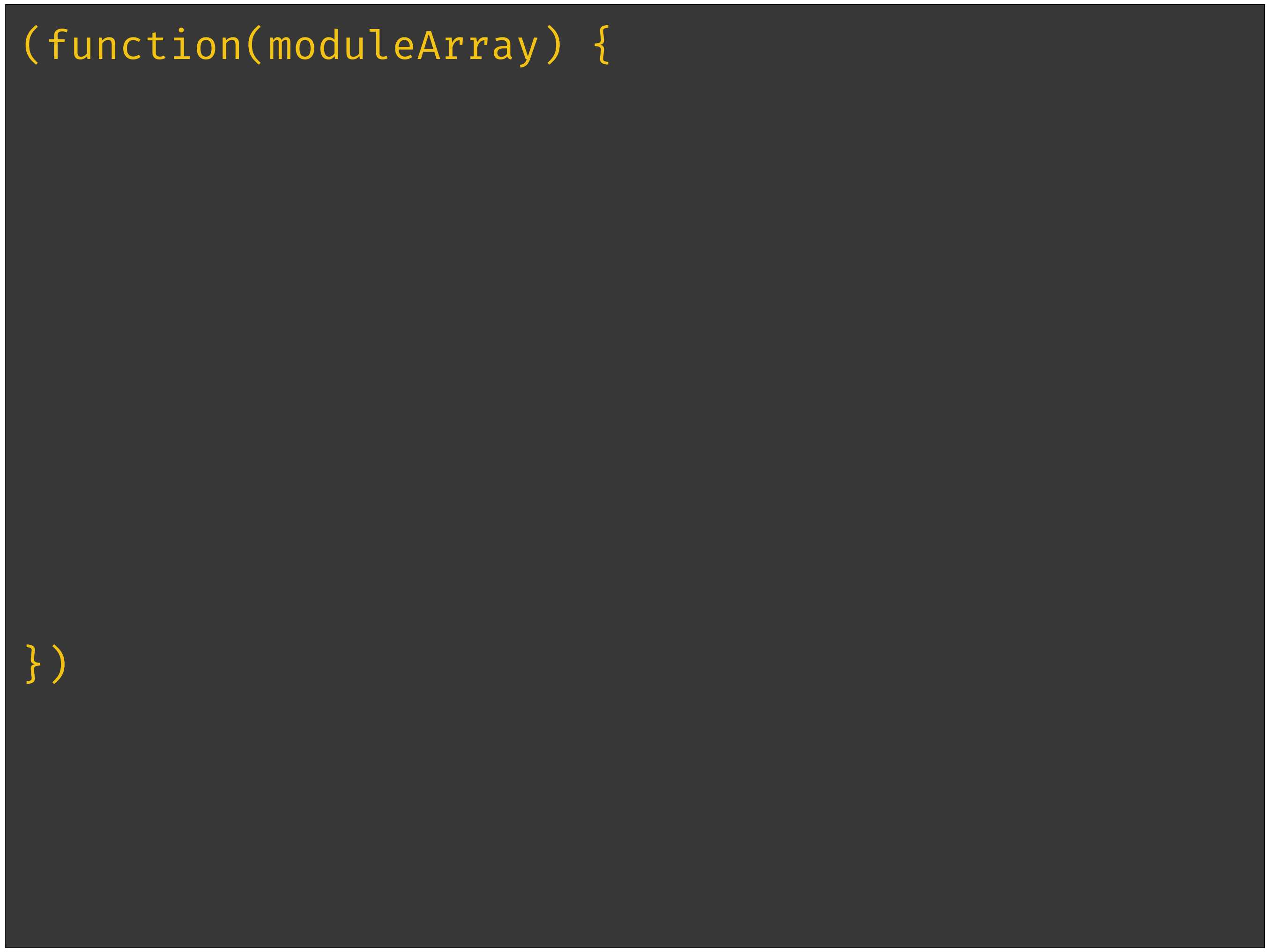

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(function(moduleArray) {



})
```

```
// declare function that takes in moduleArray
(function(moduleArray) {
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    var cache = {};
    // define webpackRequire
    function webpackRequire(index) {
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        // create module object with exports property
        var module = { exports: {} };
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        var file = moduleArray[index];
        // invoke the function to populate module.exports
        file(module, webpackRequire);
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})
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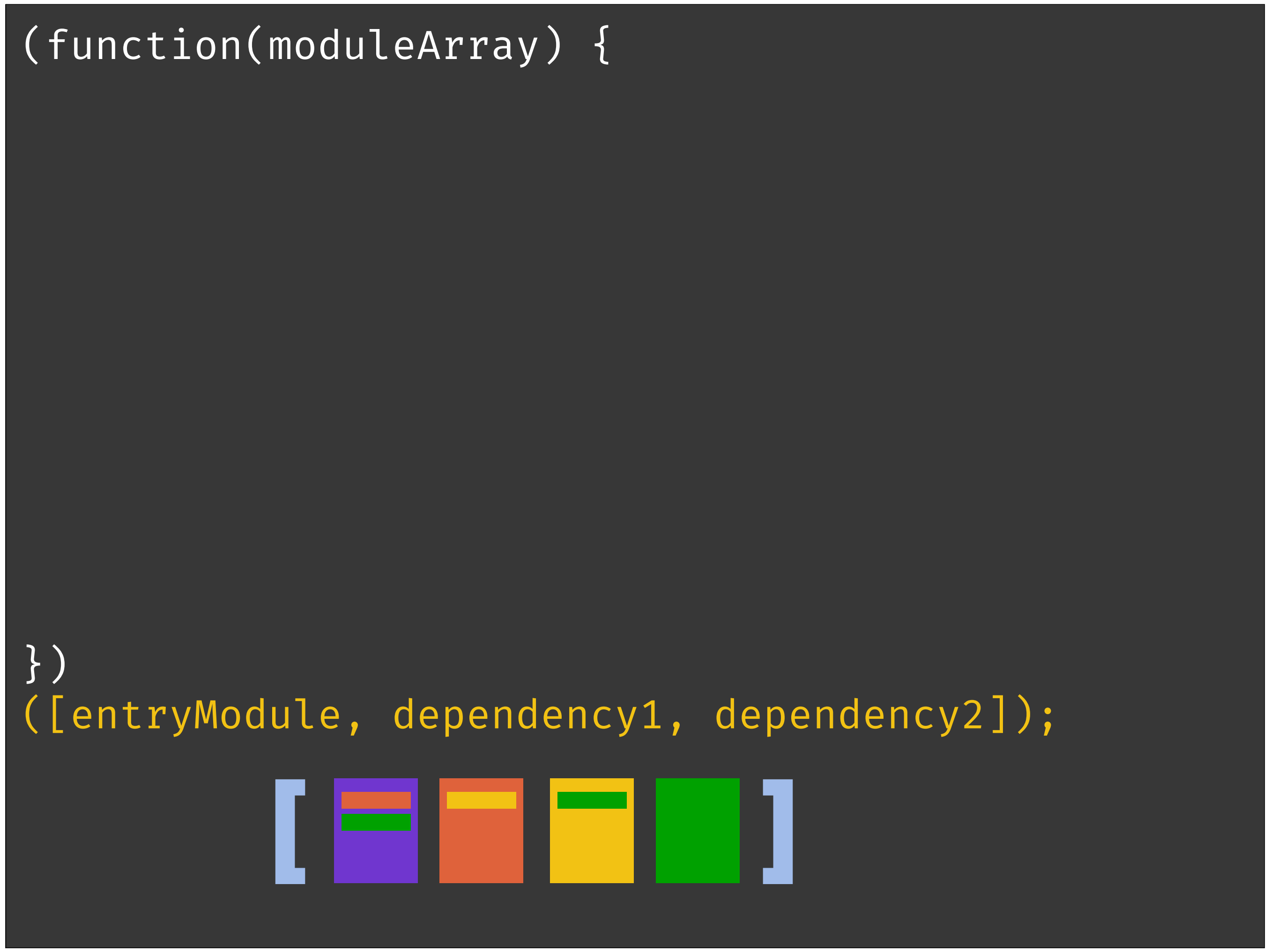

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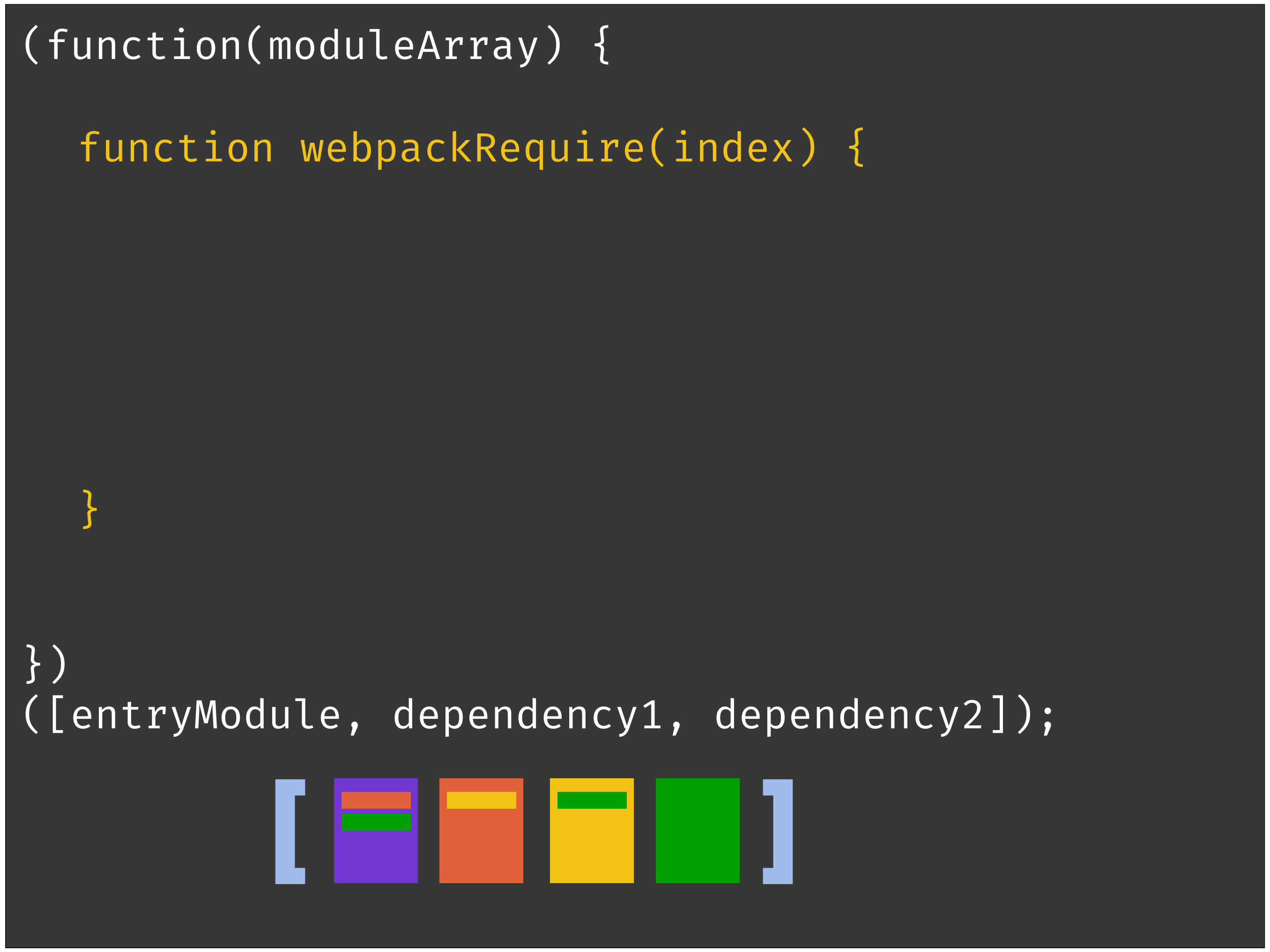

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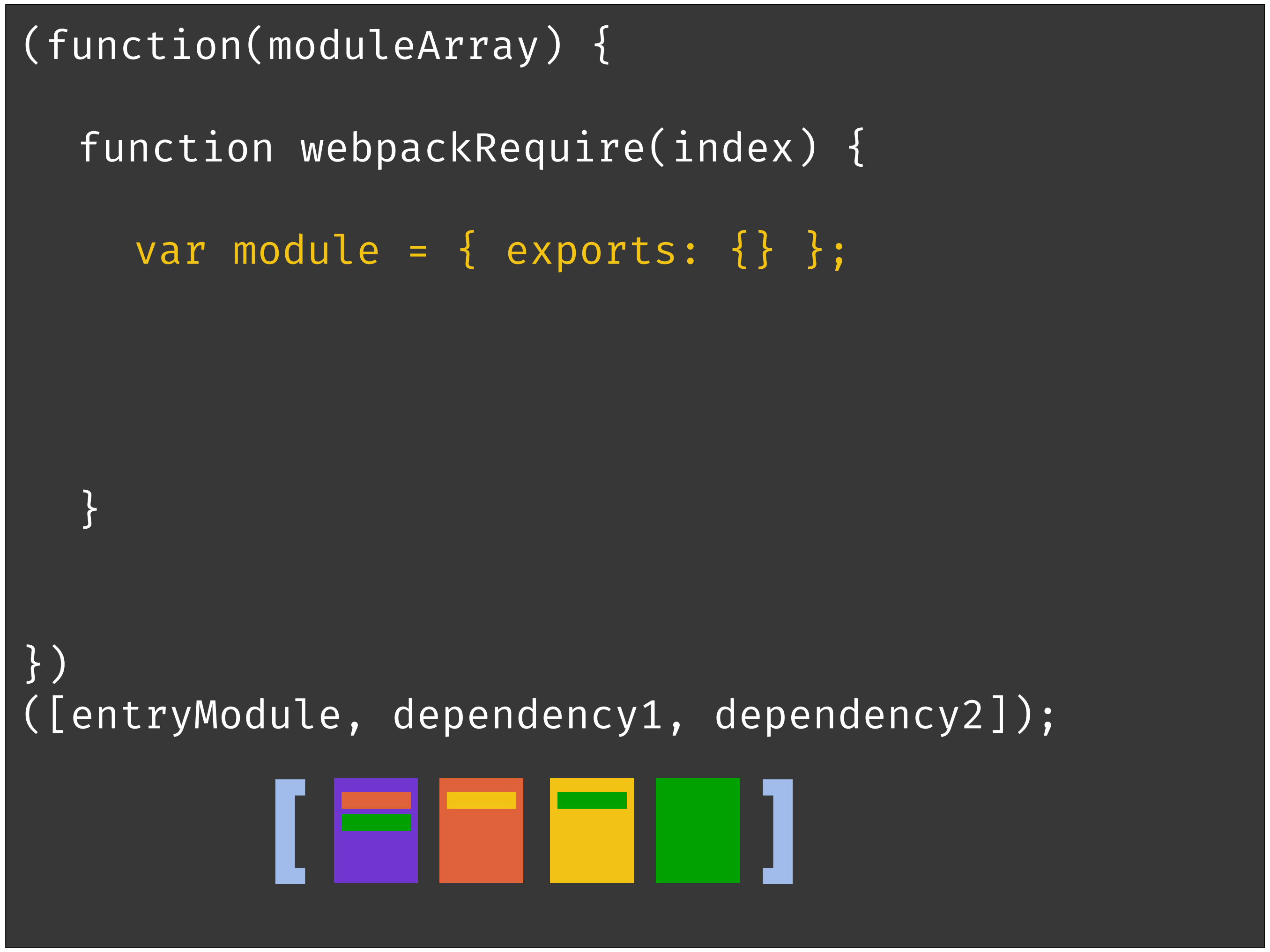

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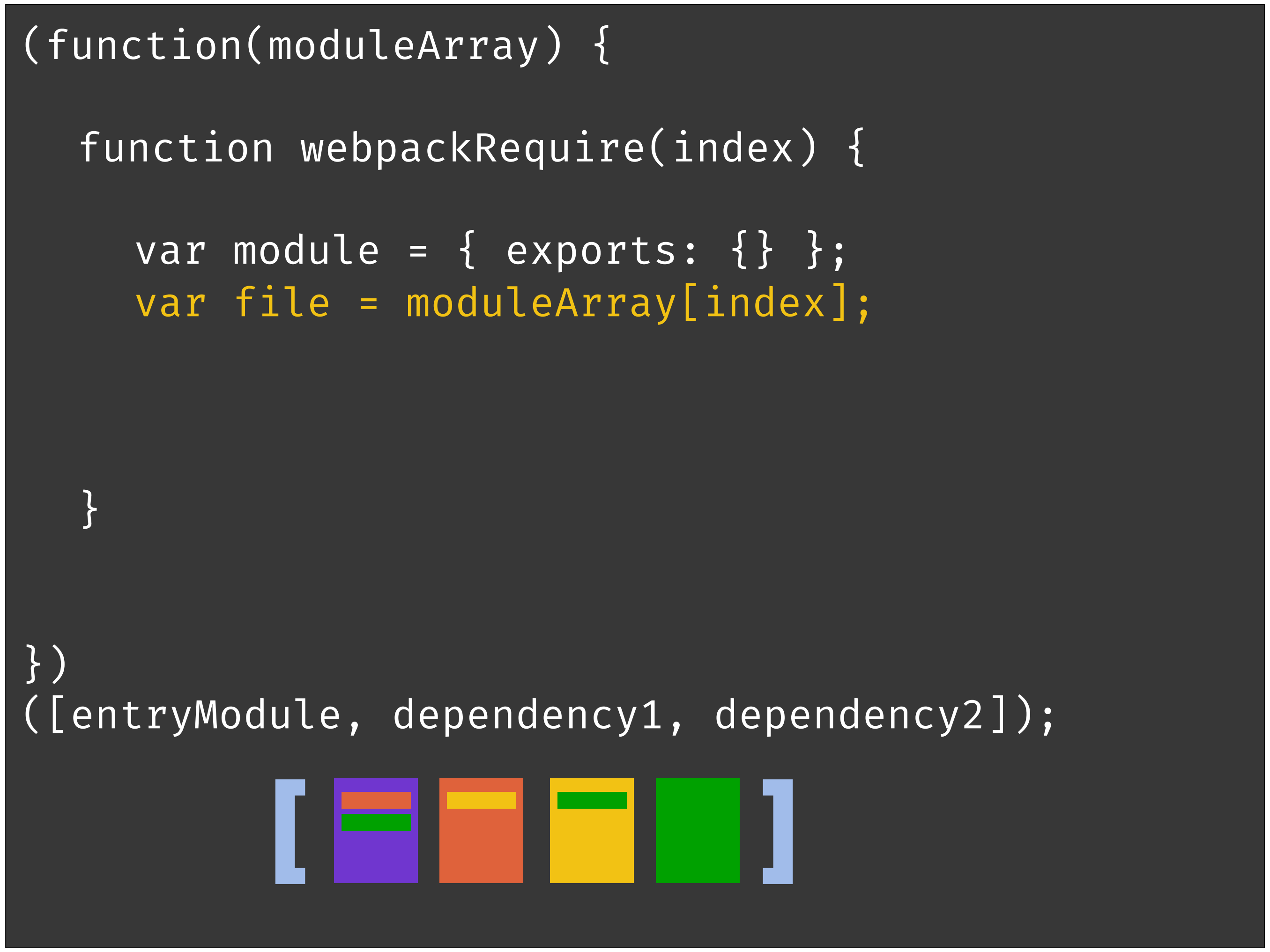

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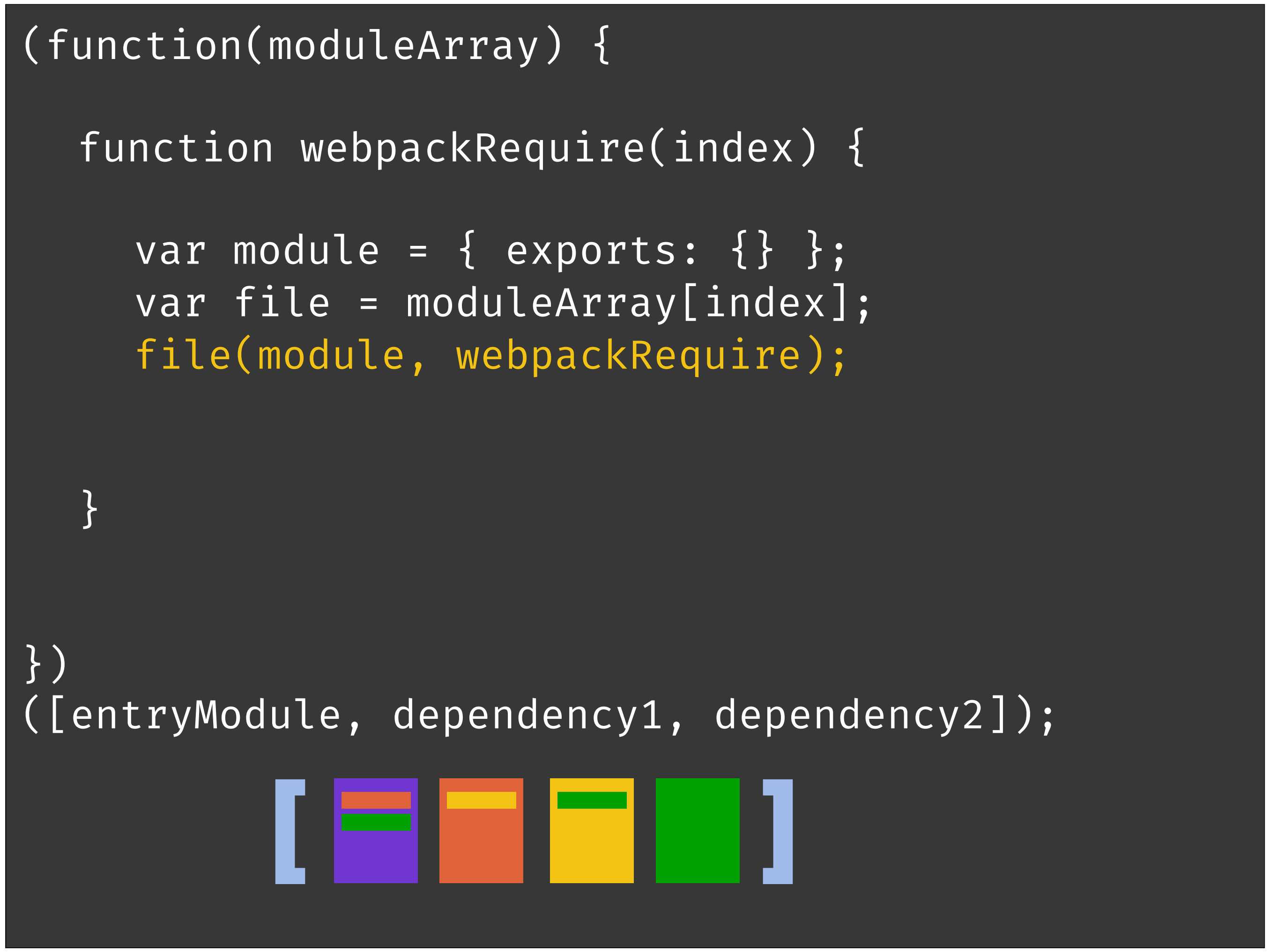

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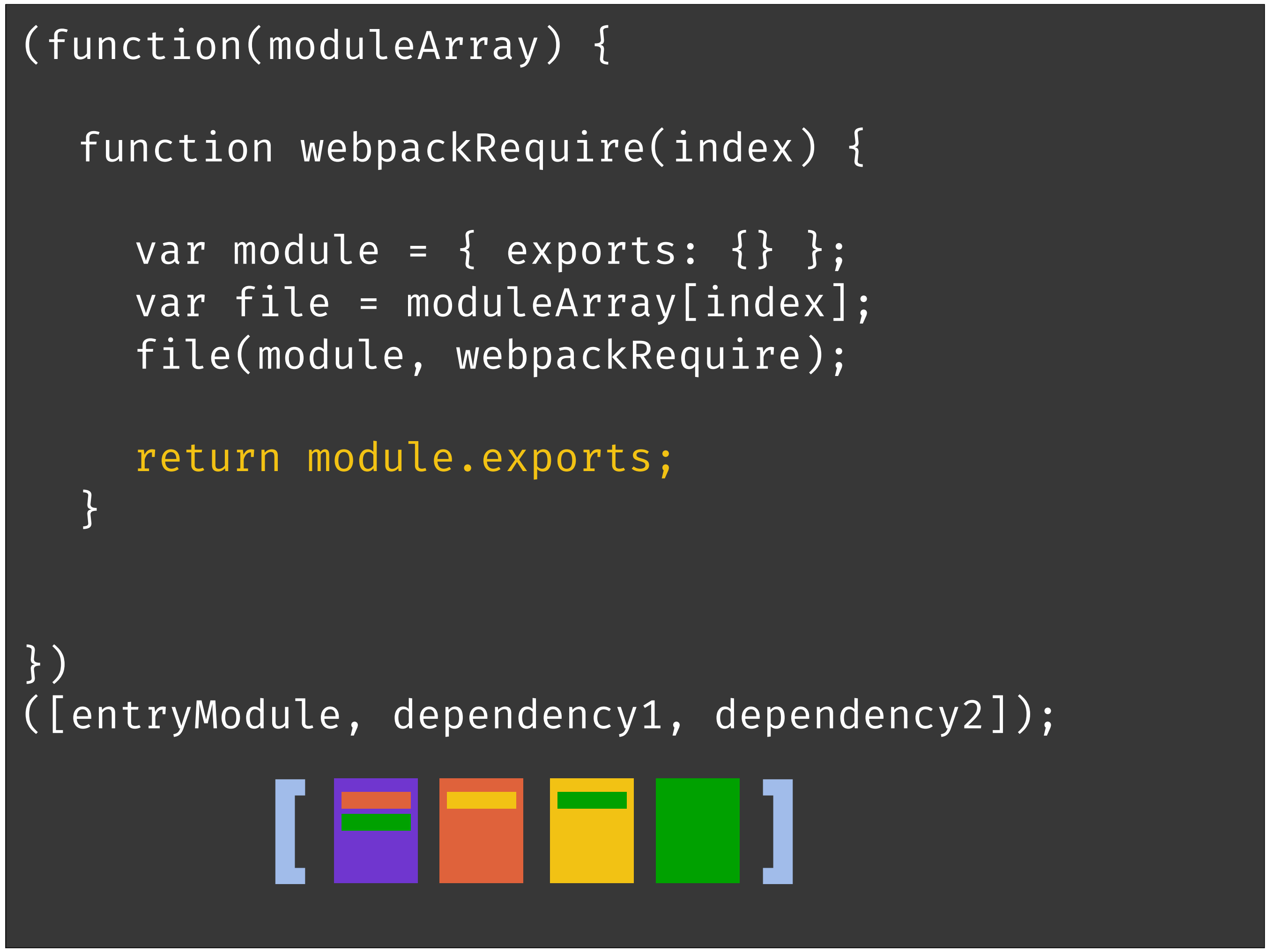

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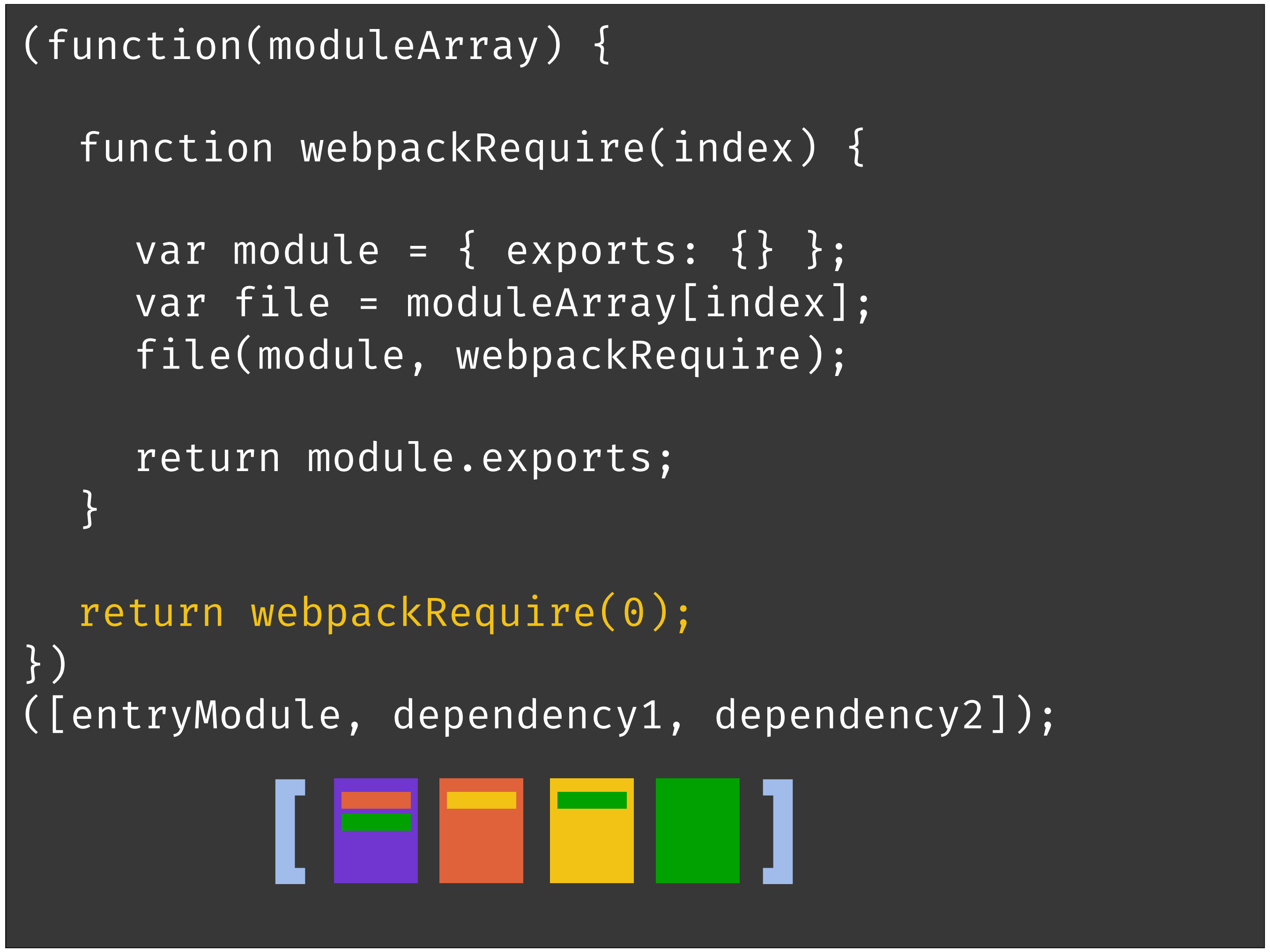

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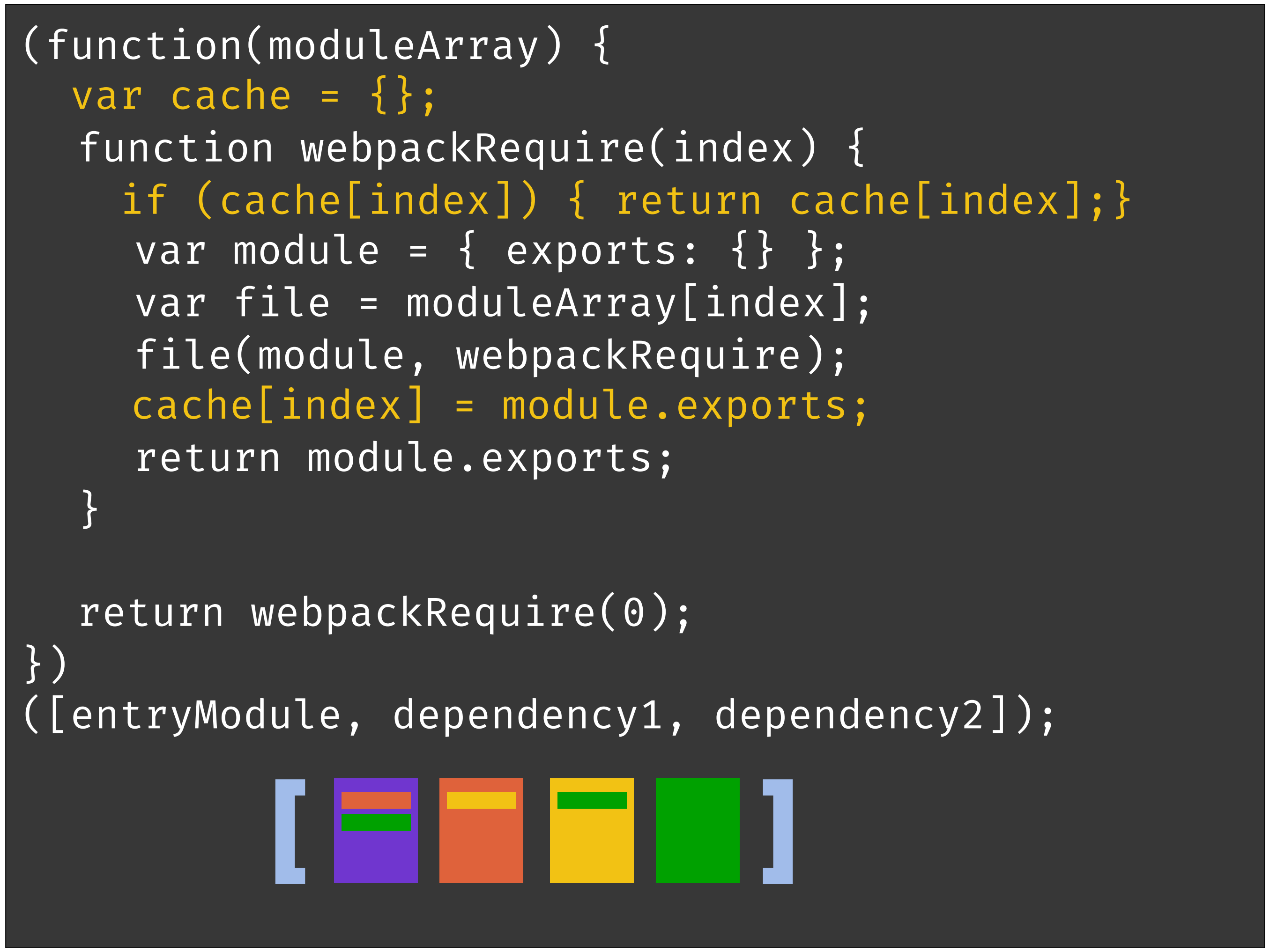

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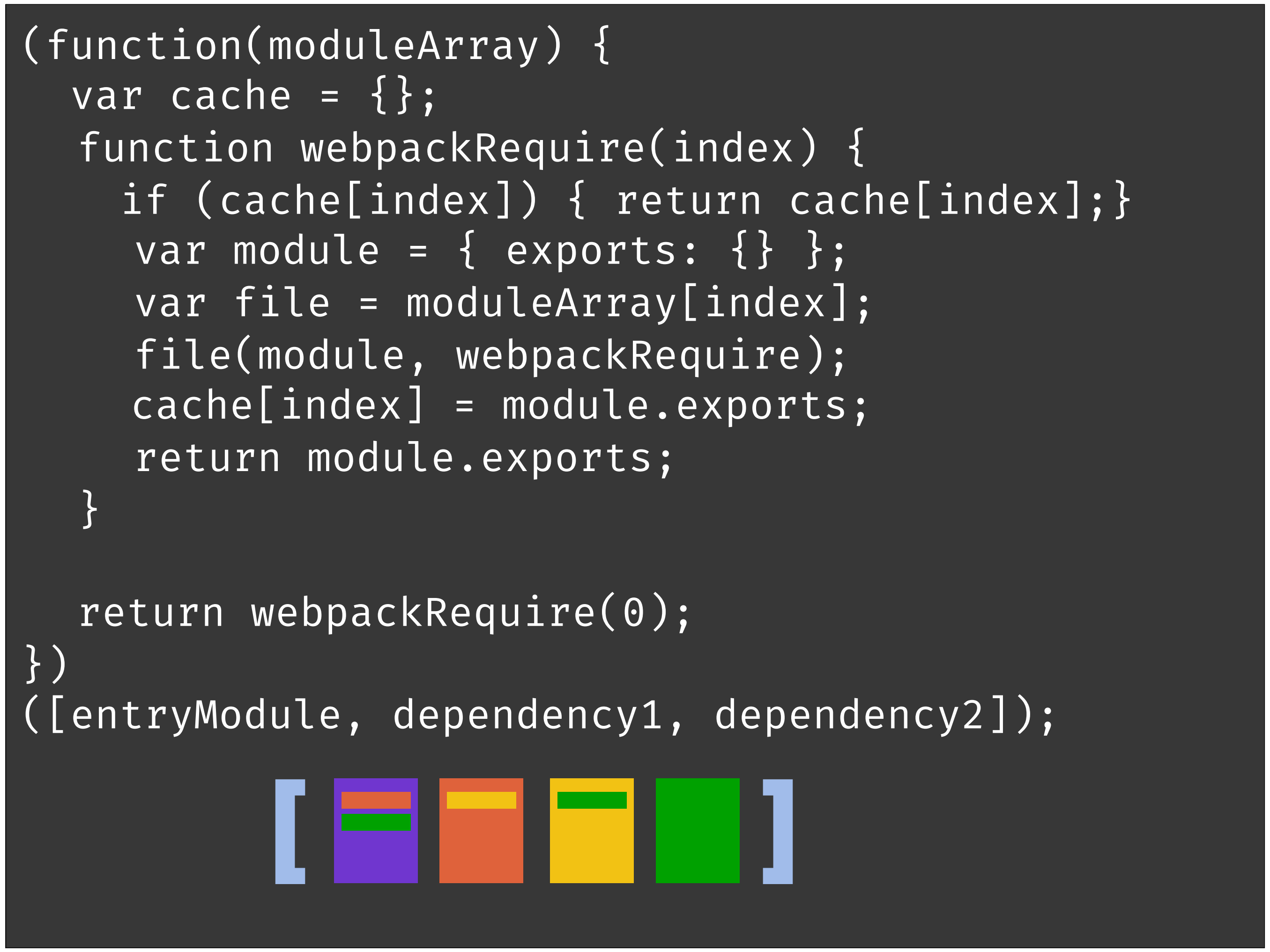

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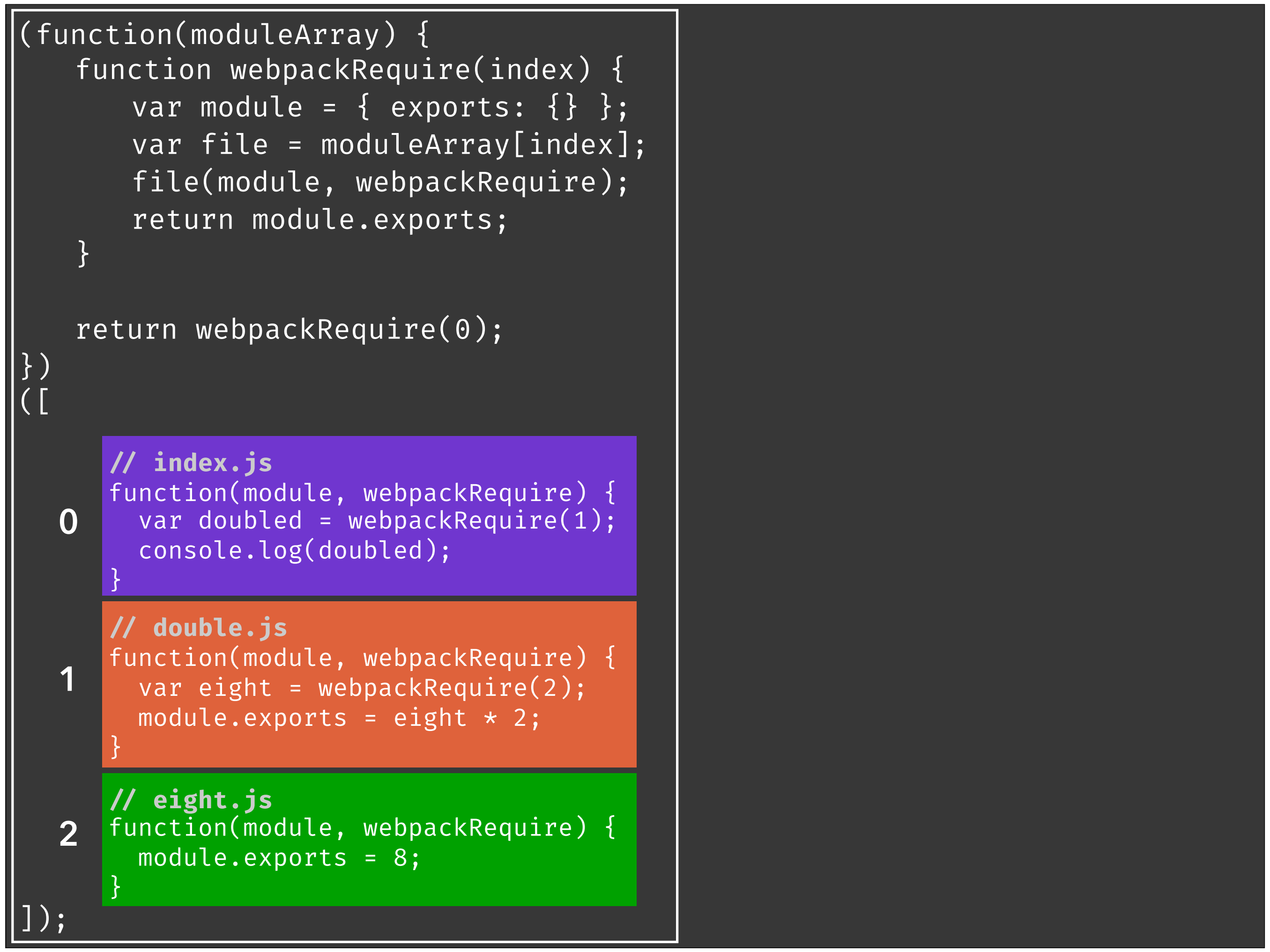

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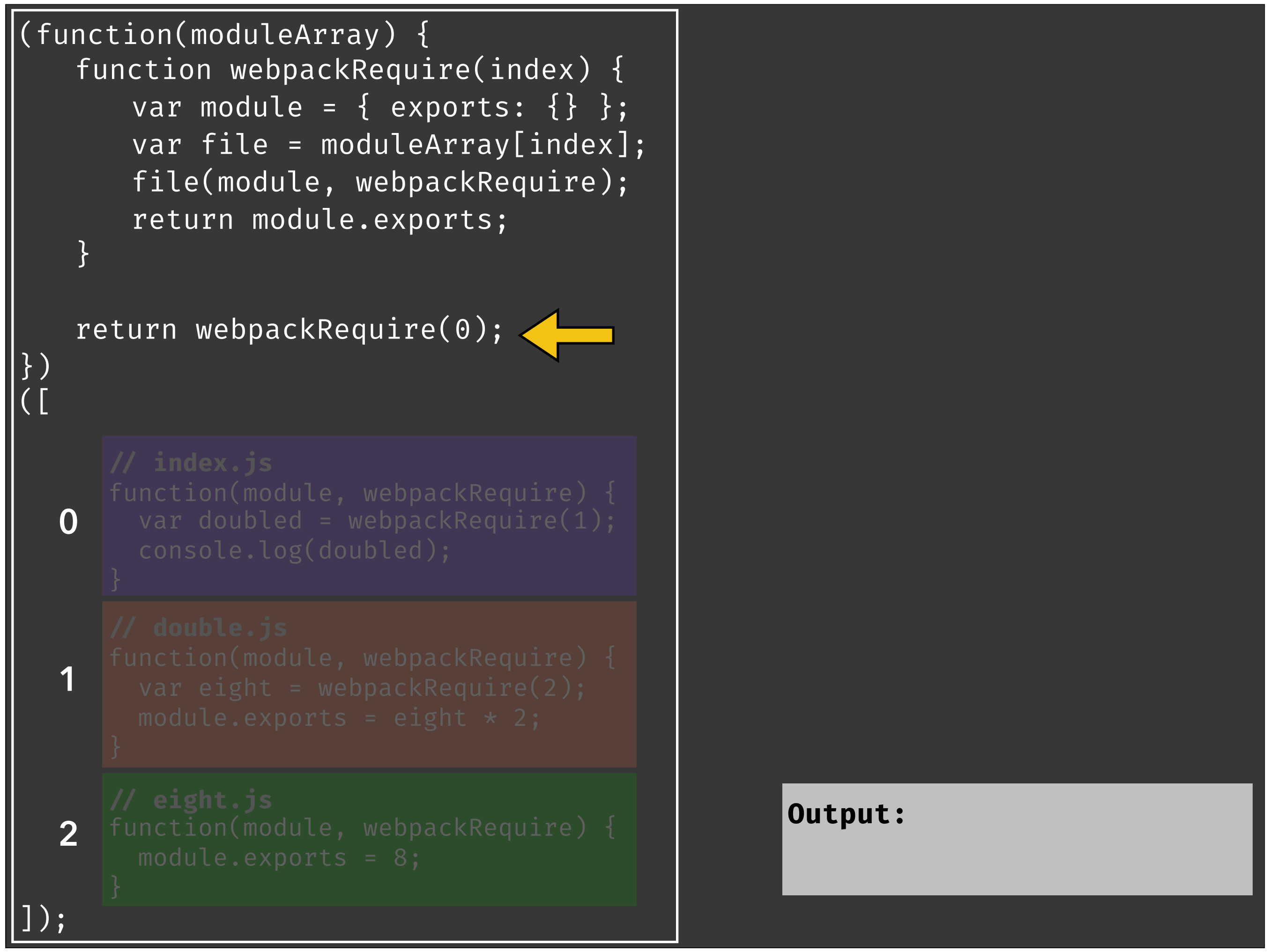
        console.log(doubled);
      }

      // double.js
      function(module, webpackRequire) {
        var eight = webpackRequire(2);
        module.exports = eight * 2;
      }

      // eight.js
      function(module, webpackRequire) {
        module.exports = 8;
      }
]);
```



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     }
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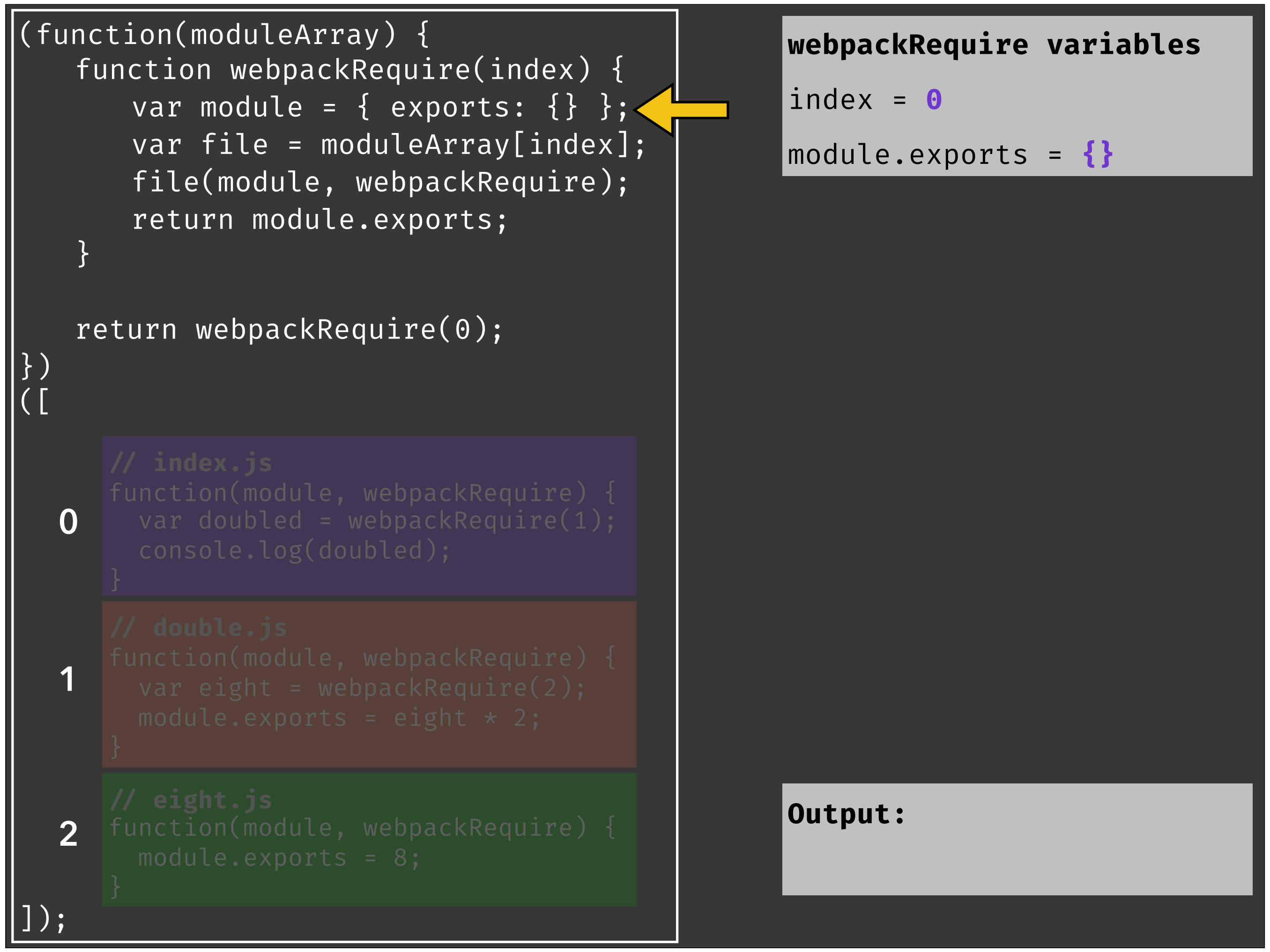
```

Output:



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webpackRequire variables

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index = 0

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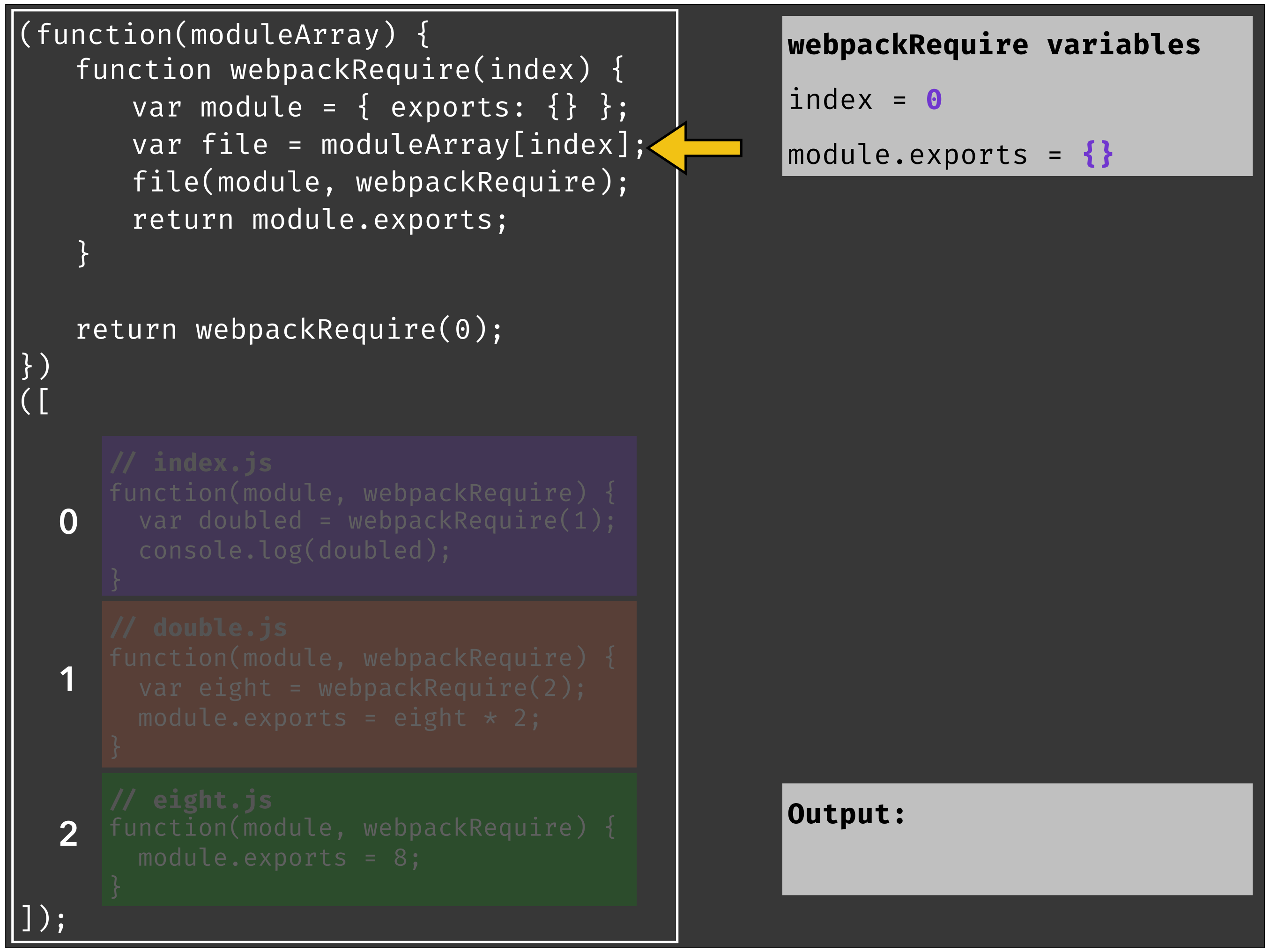

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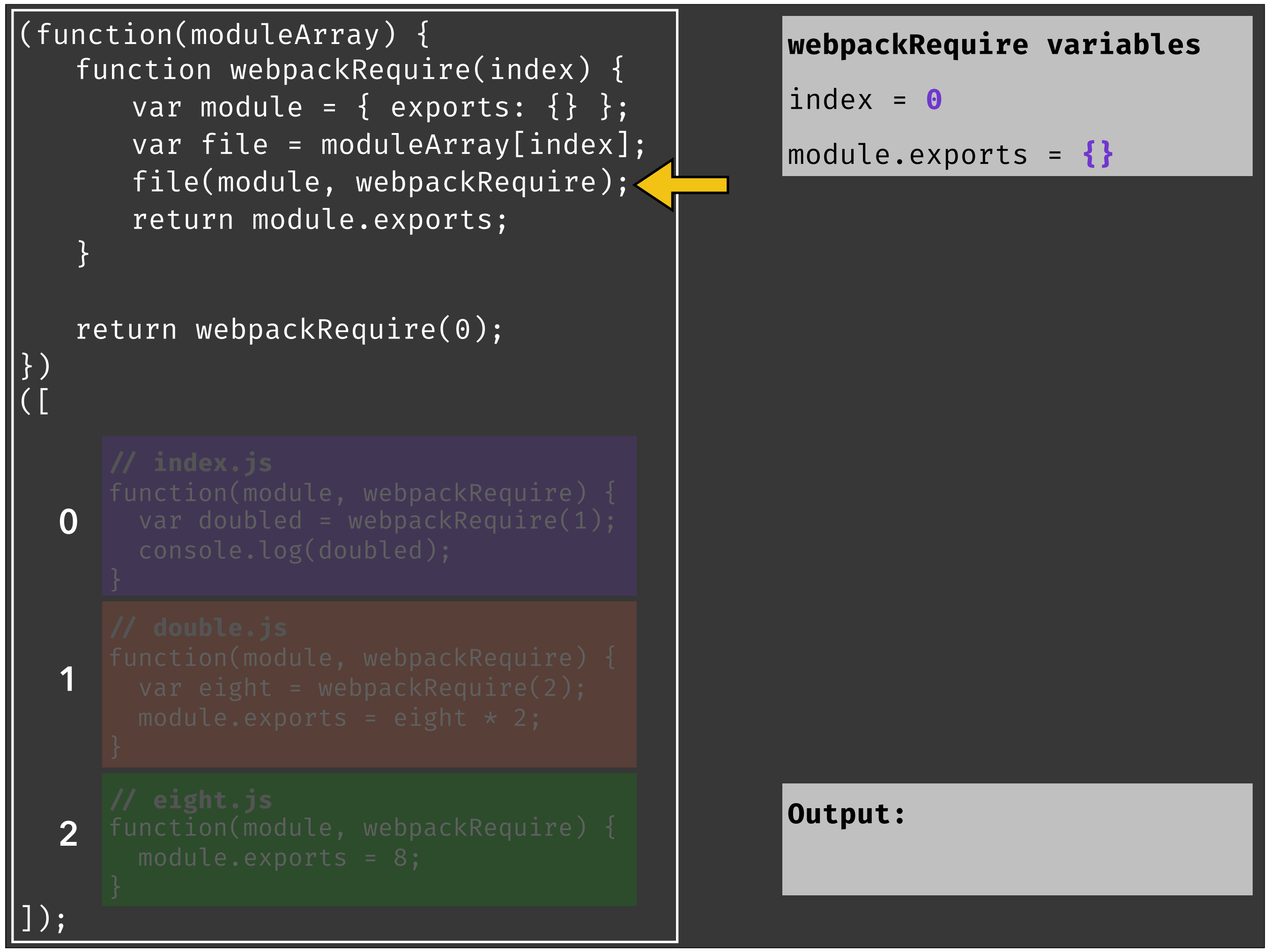

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  module.exports = 8;
}
```

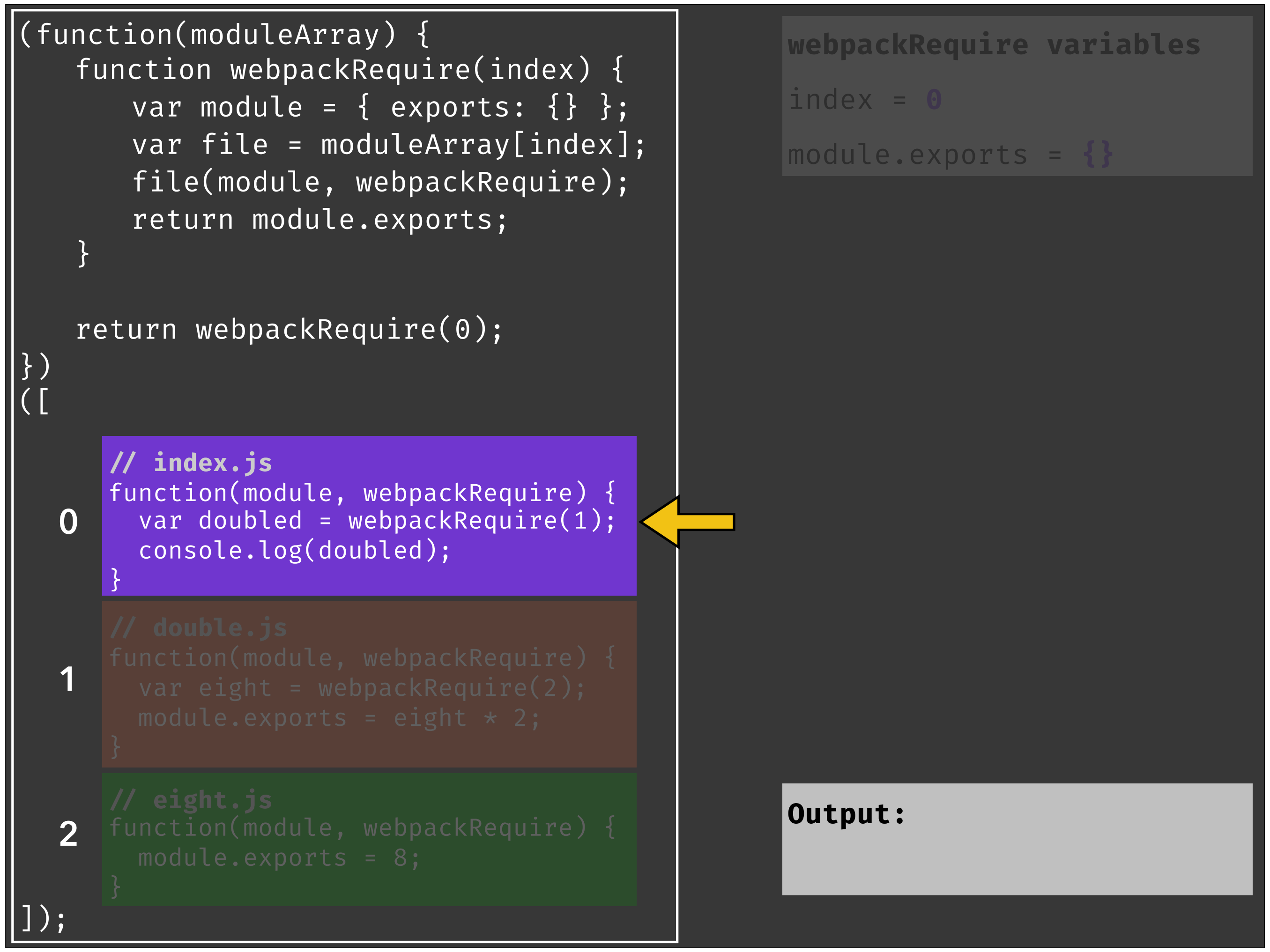
```
]);
```

webpackRequire variables

```
index = 0

module.exports = {}
```

Output:



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(function(moduleArray) {
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        var module = { exports: {} };
        var file = moduleArray[index];
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        return module.exports;
    }

    return webpackRequire(0);
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```

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// index.js
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  var doubled = webpackRequire(1);
  console.log(doubled);
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// double.js
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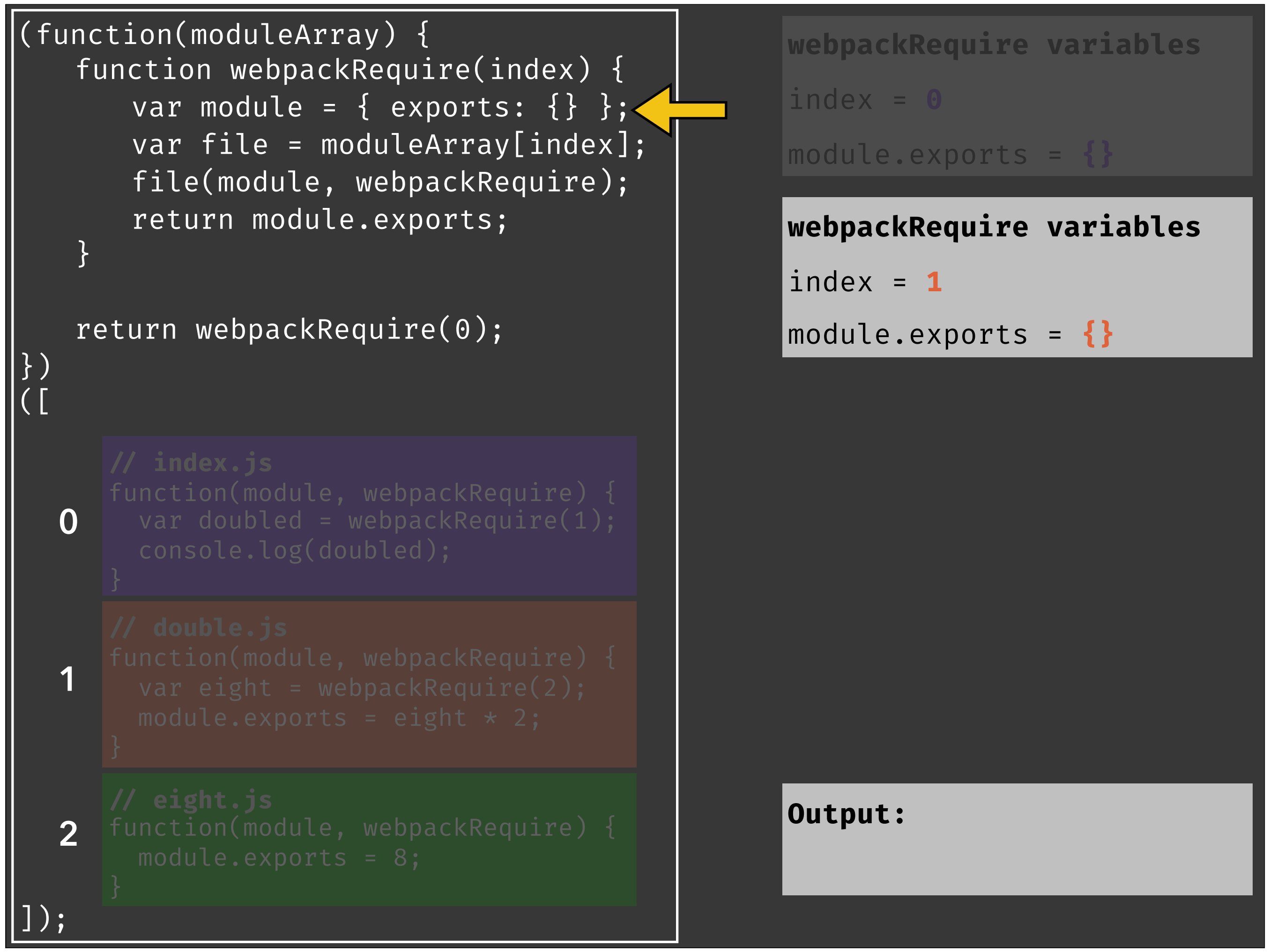

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webpackRequire variables

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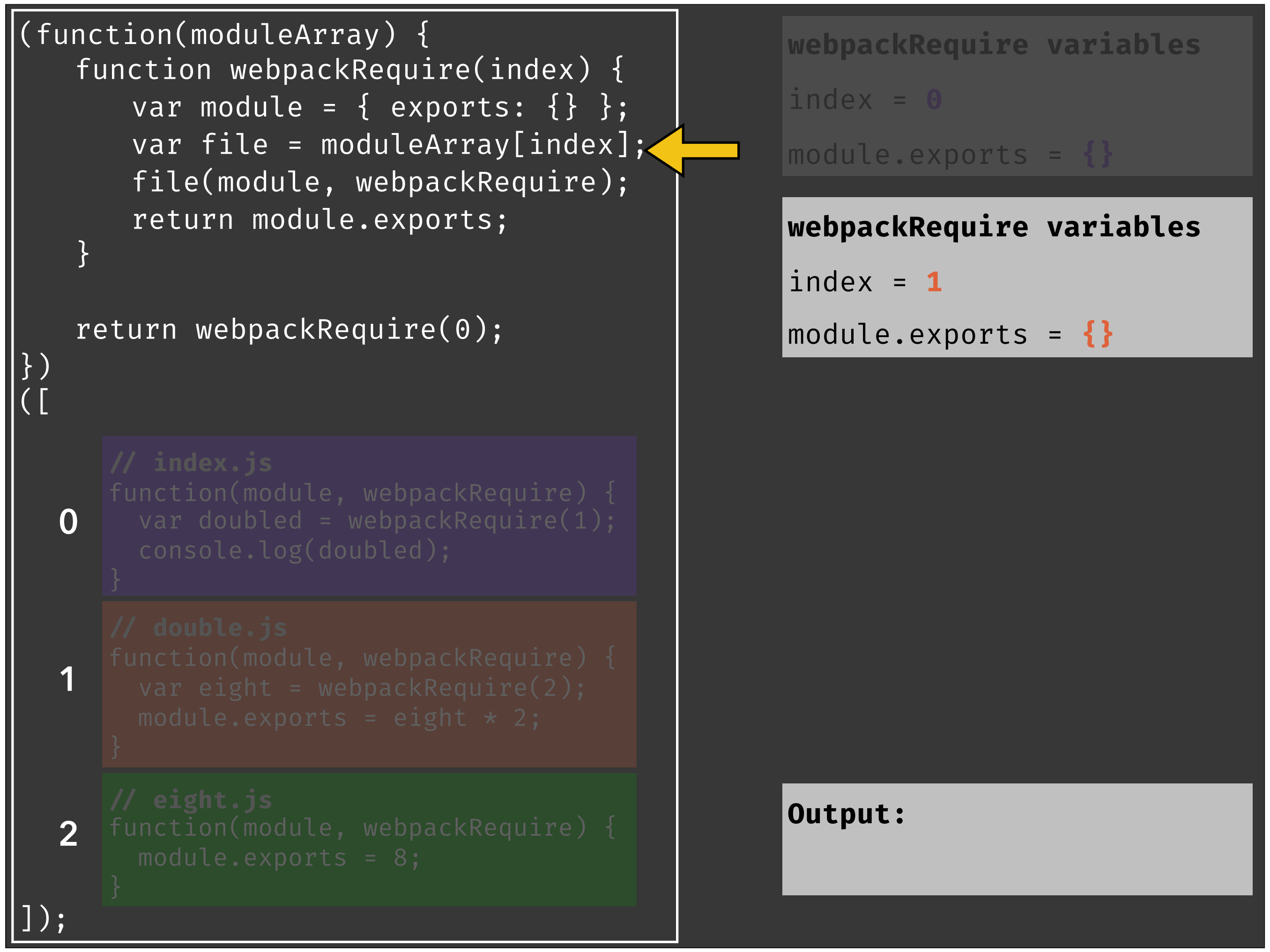

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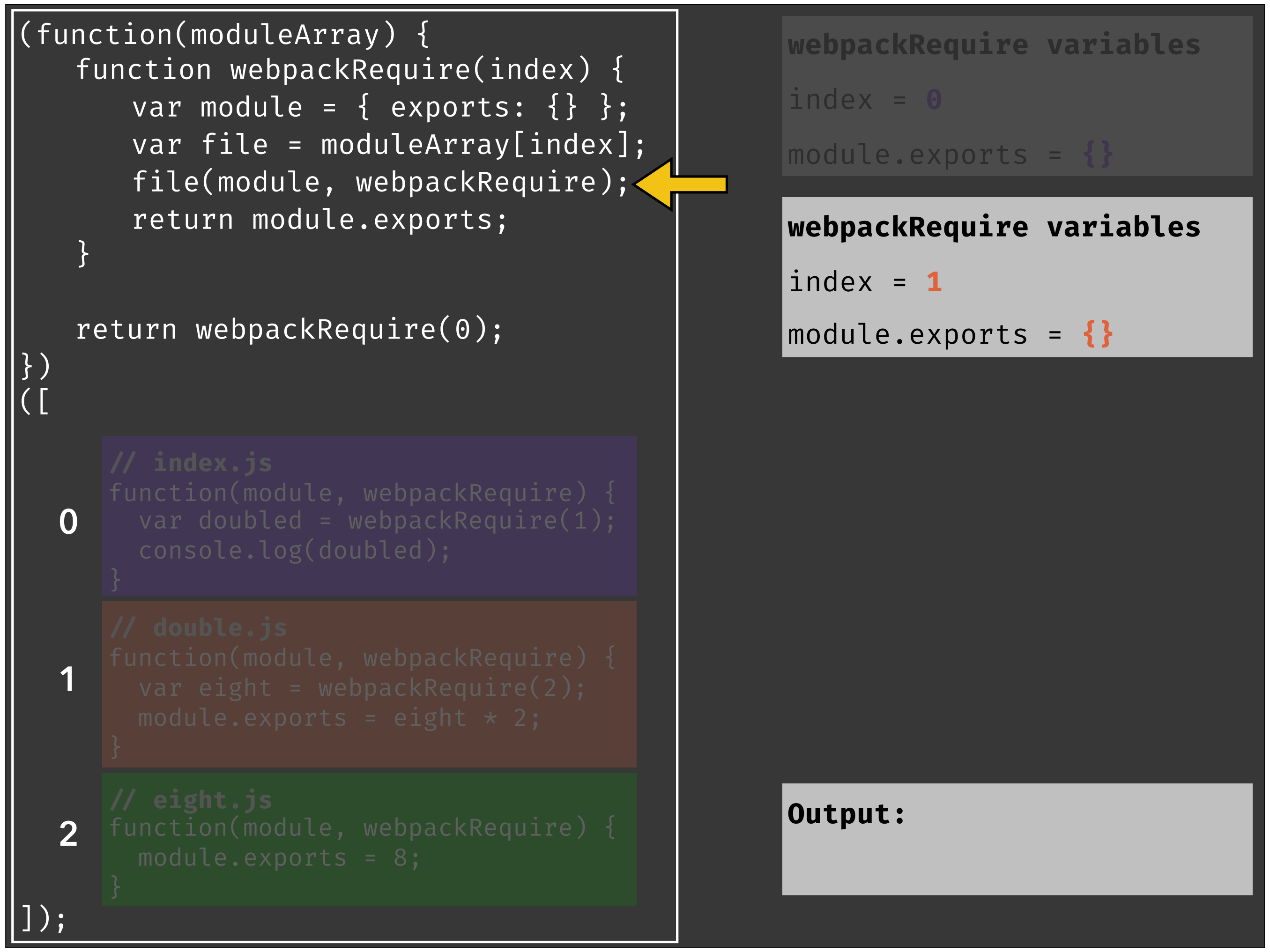

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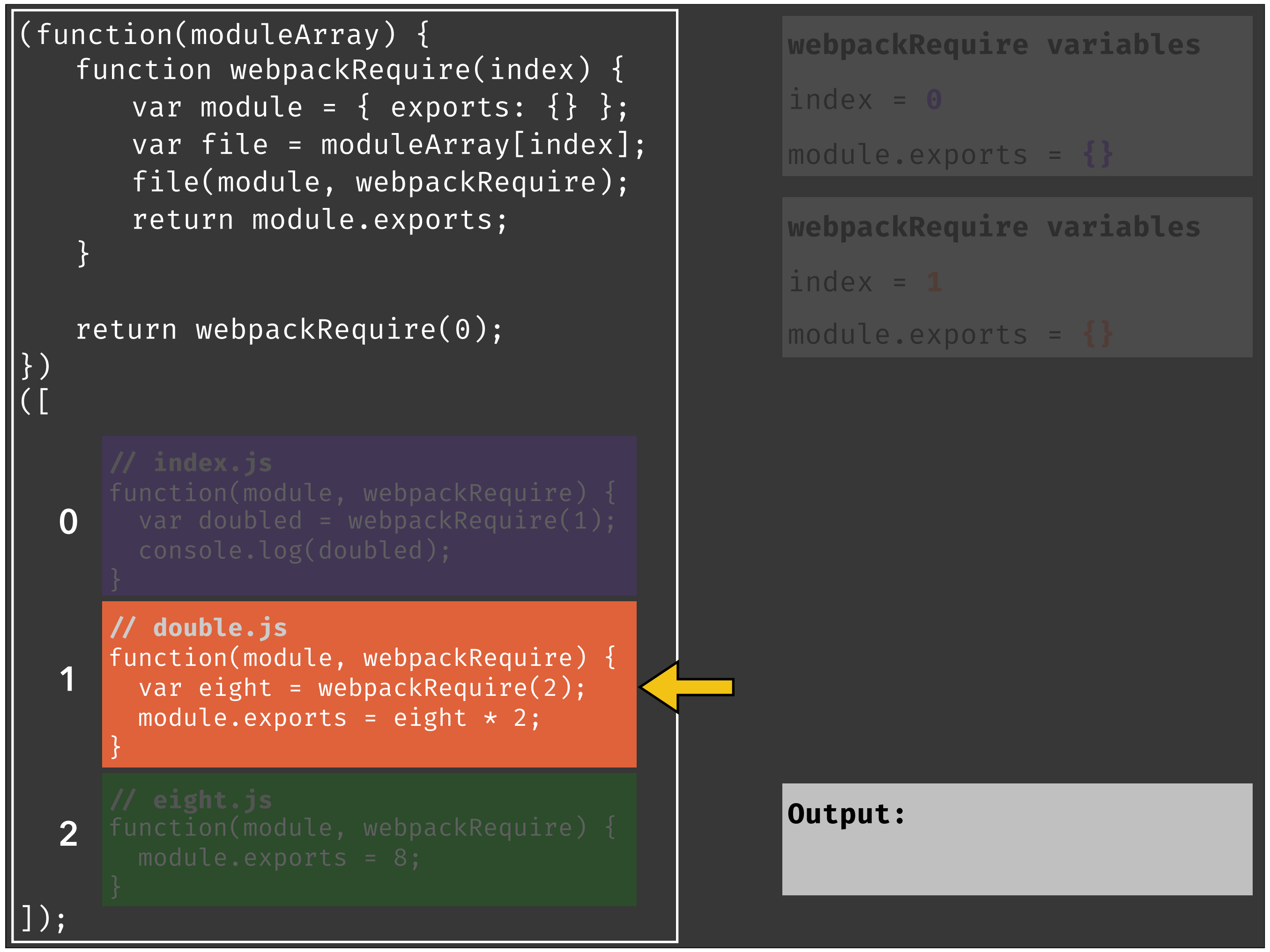

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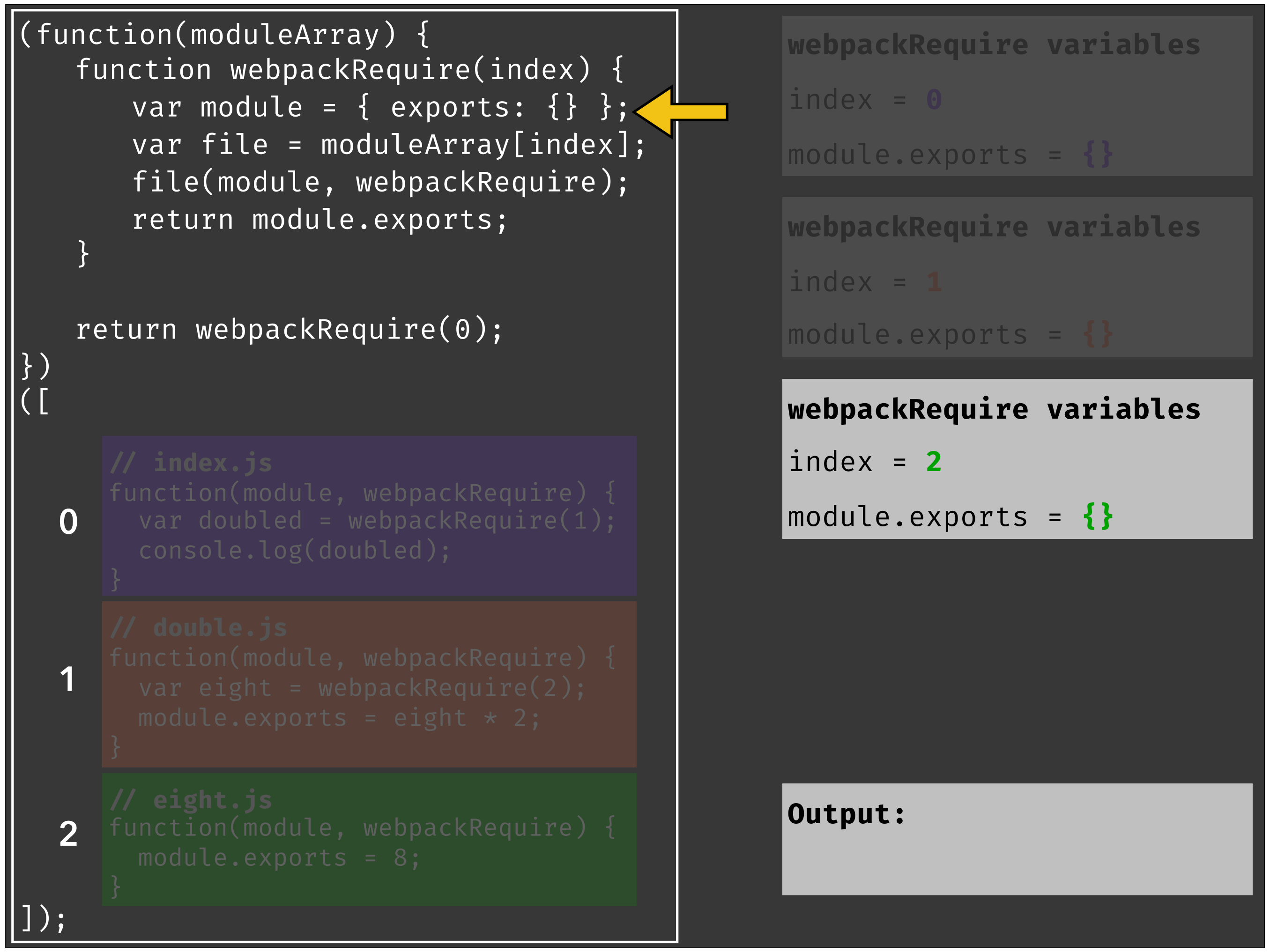

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Output:
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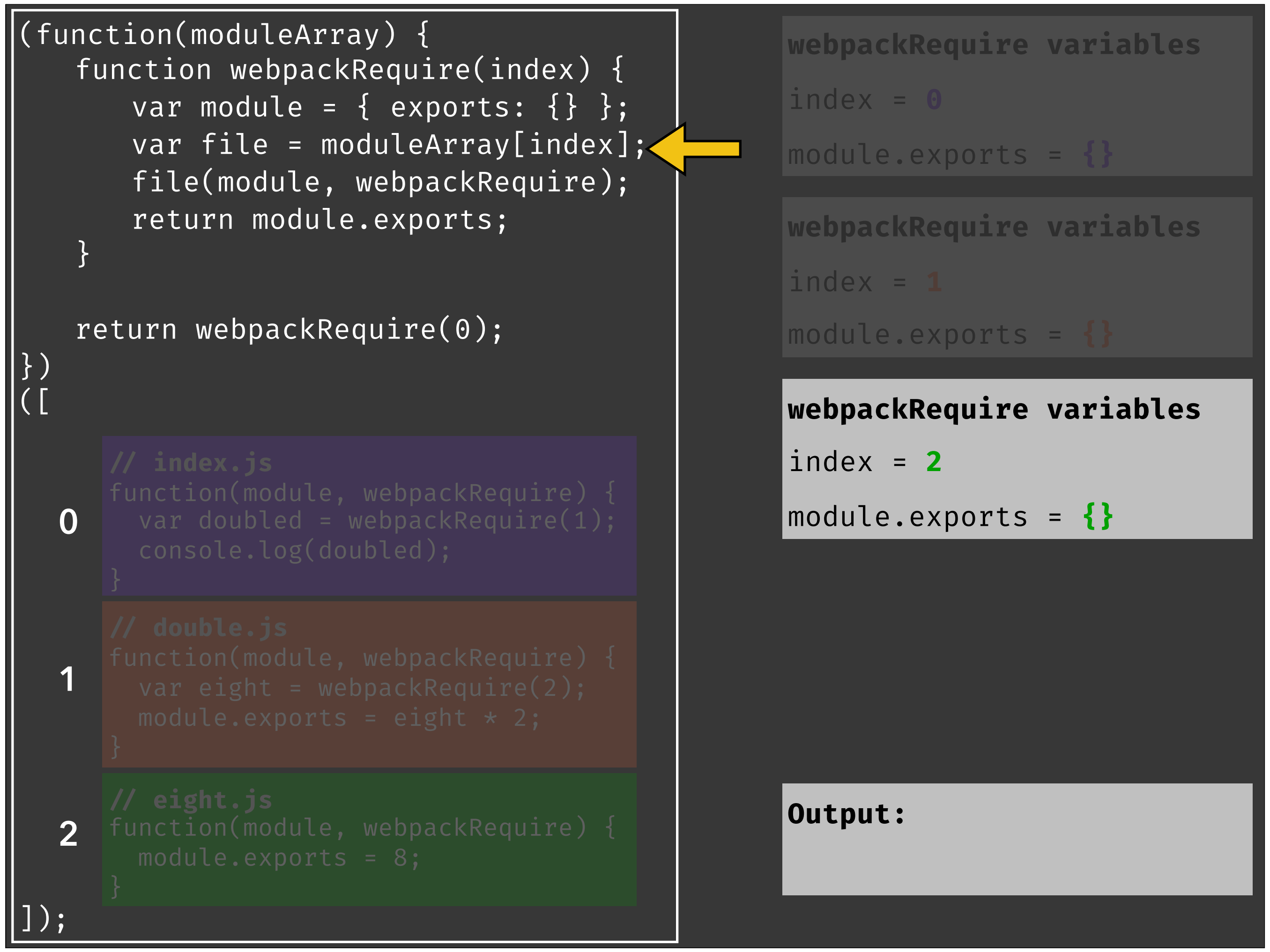

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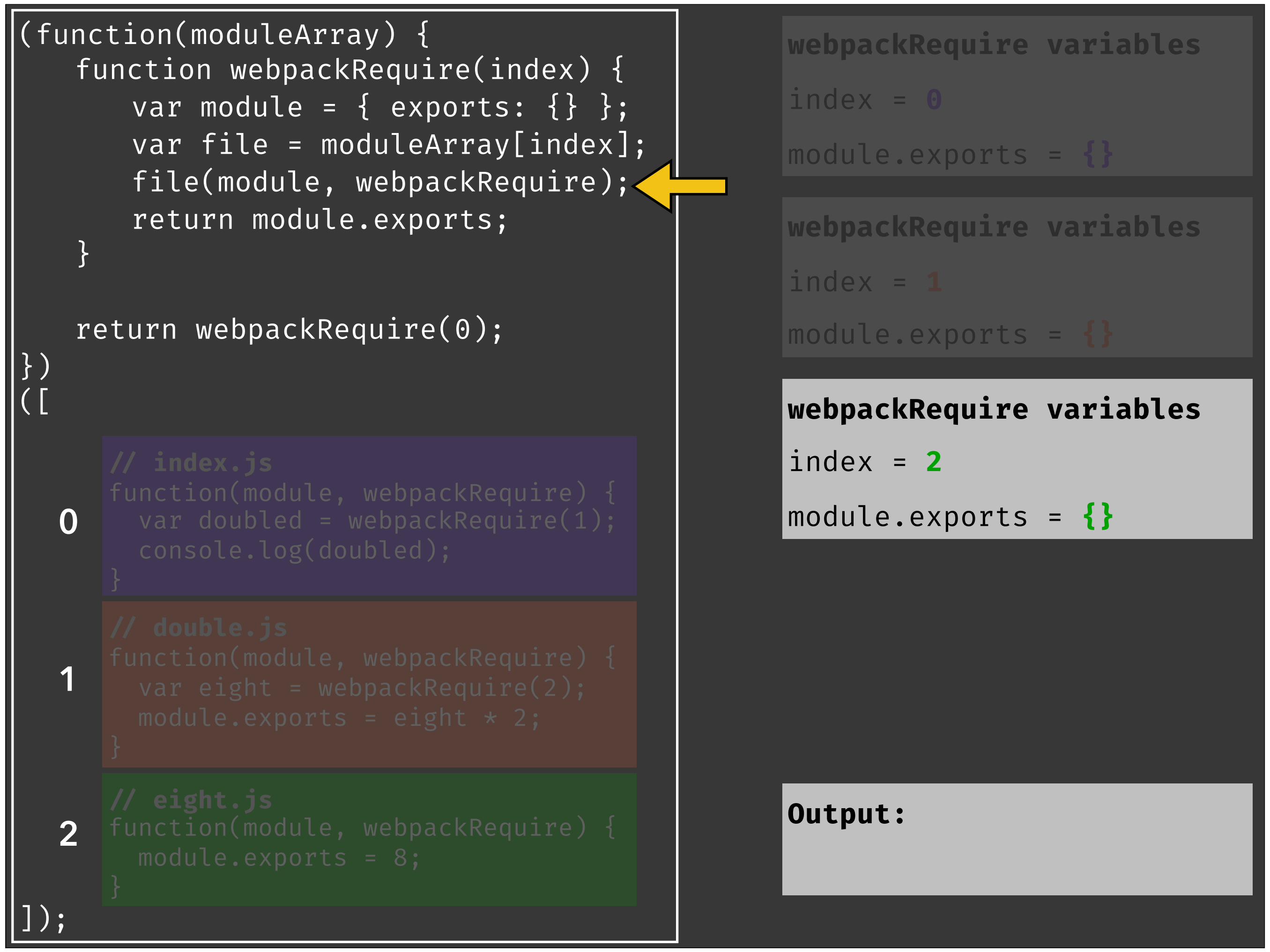

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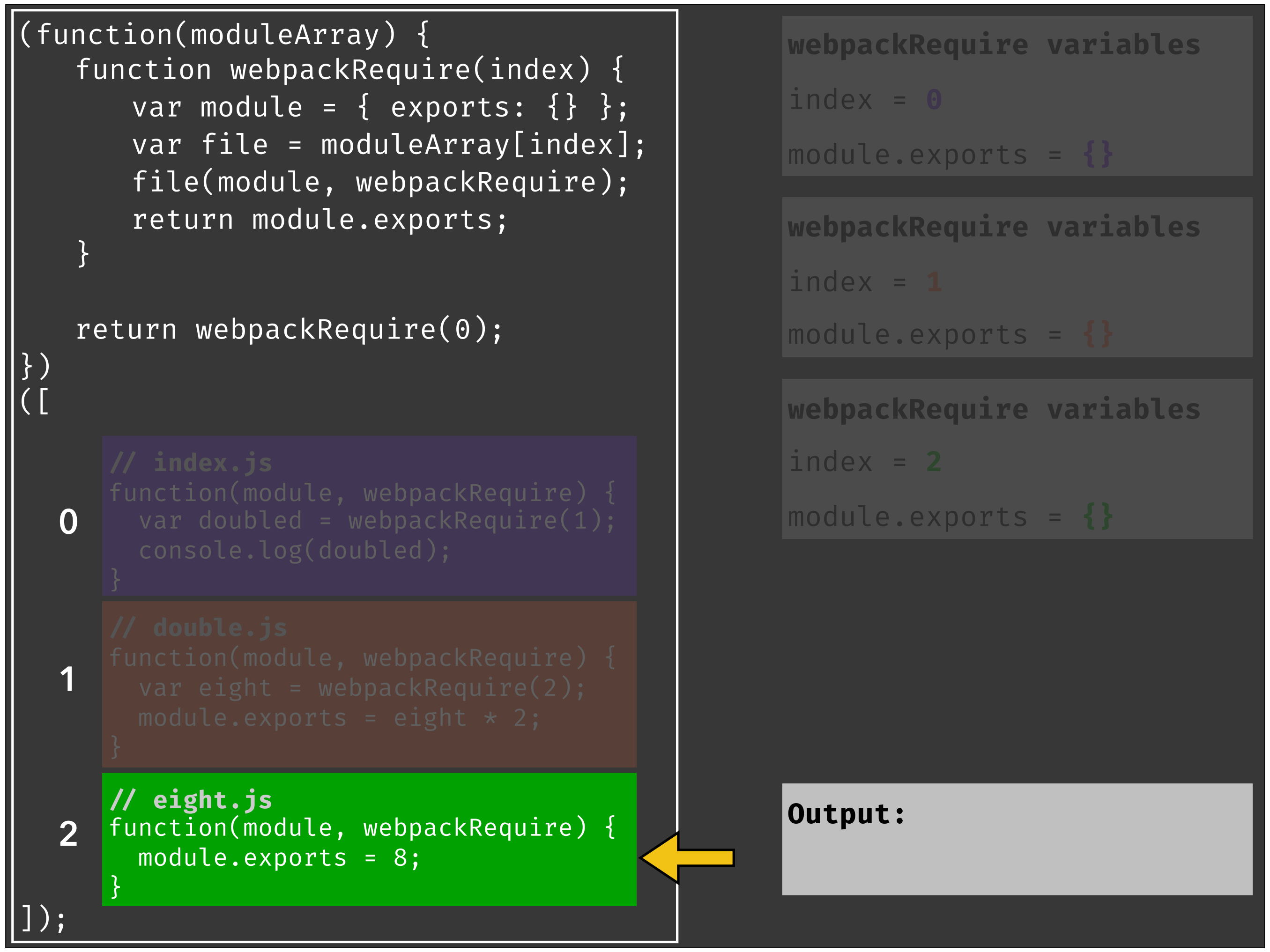

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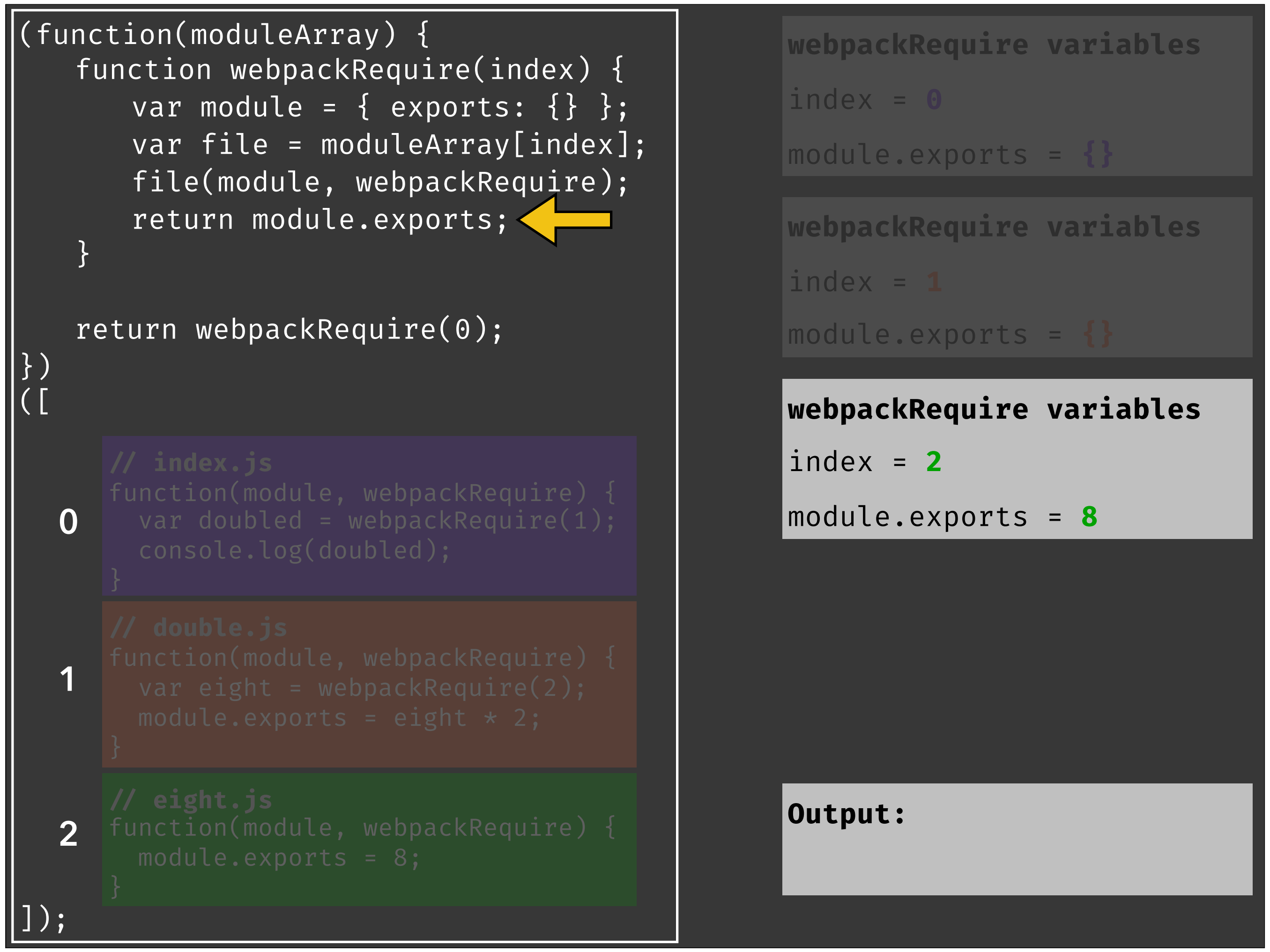

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webpackRequire variables

index = 0

module.exports = {}

webpackRequire variables

index = 1

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webpackRequire variables

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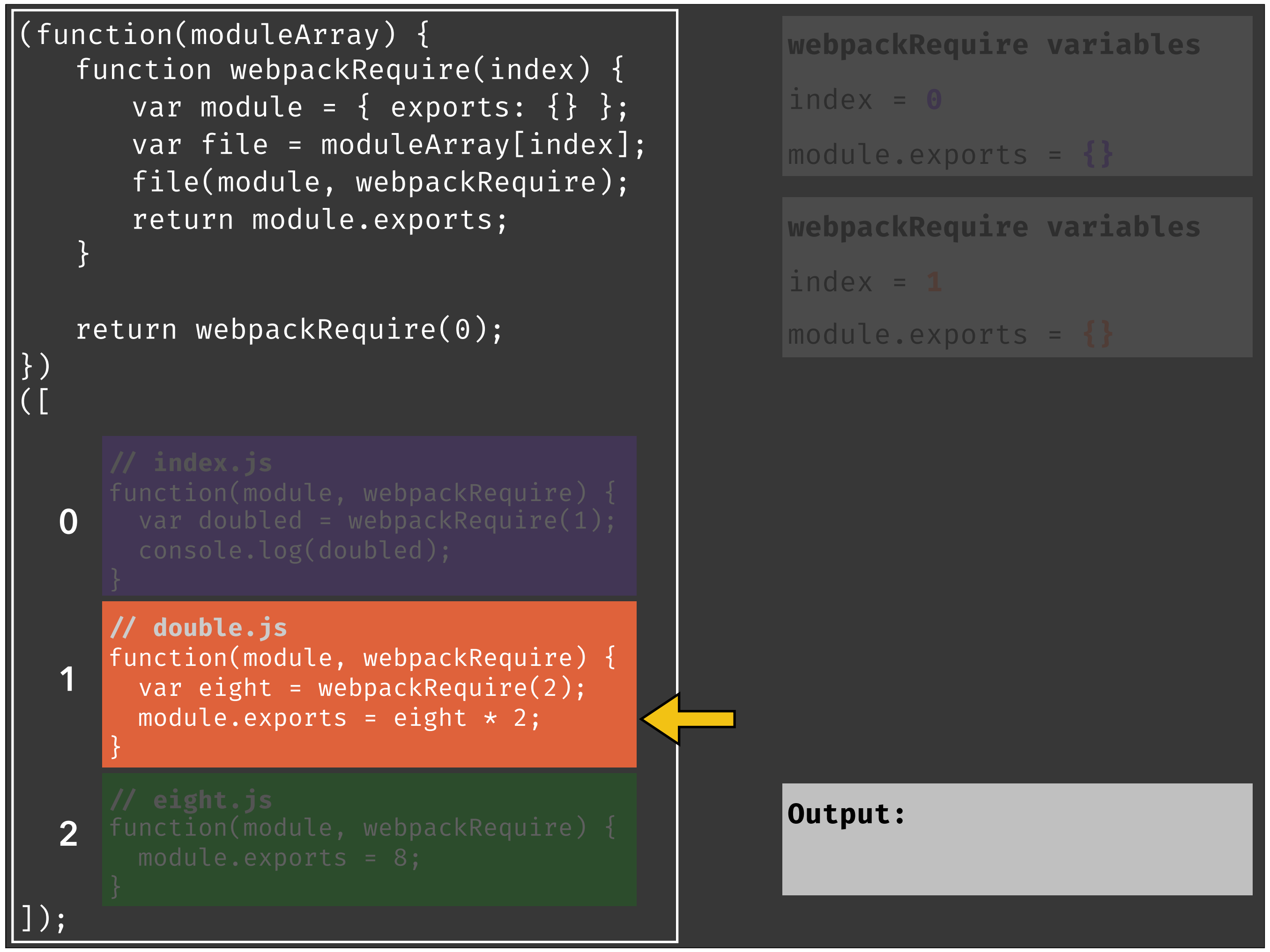
Output:



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webpackRequire variables

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webpackRequire variables

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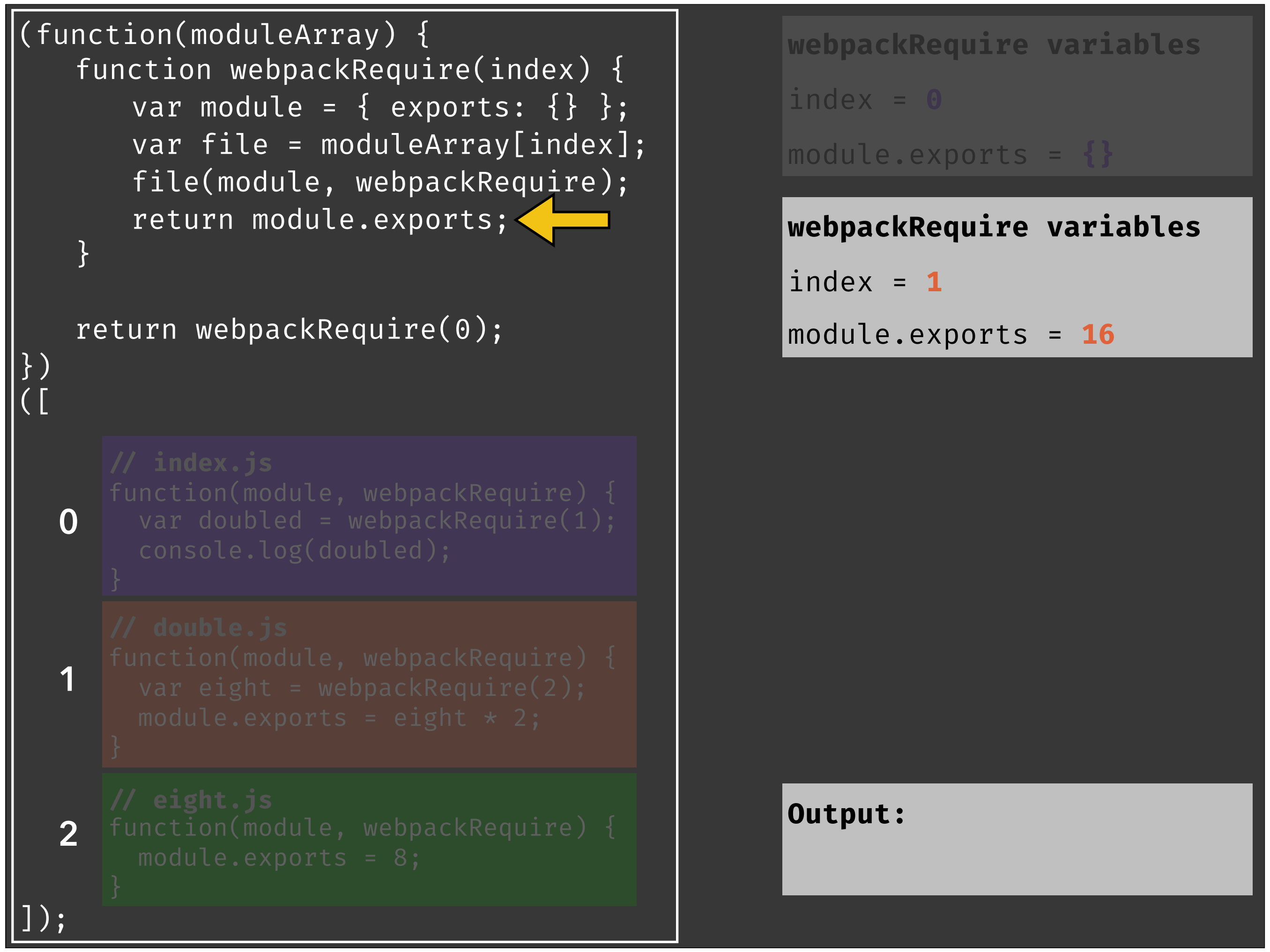

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webpackRequire variables

index = 0

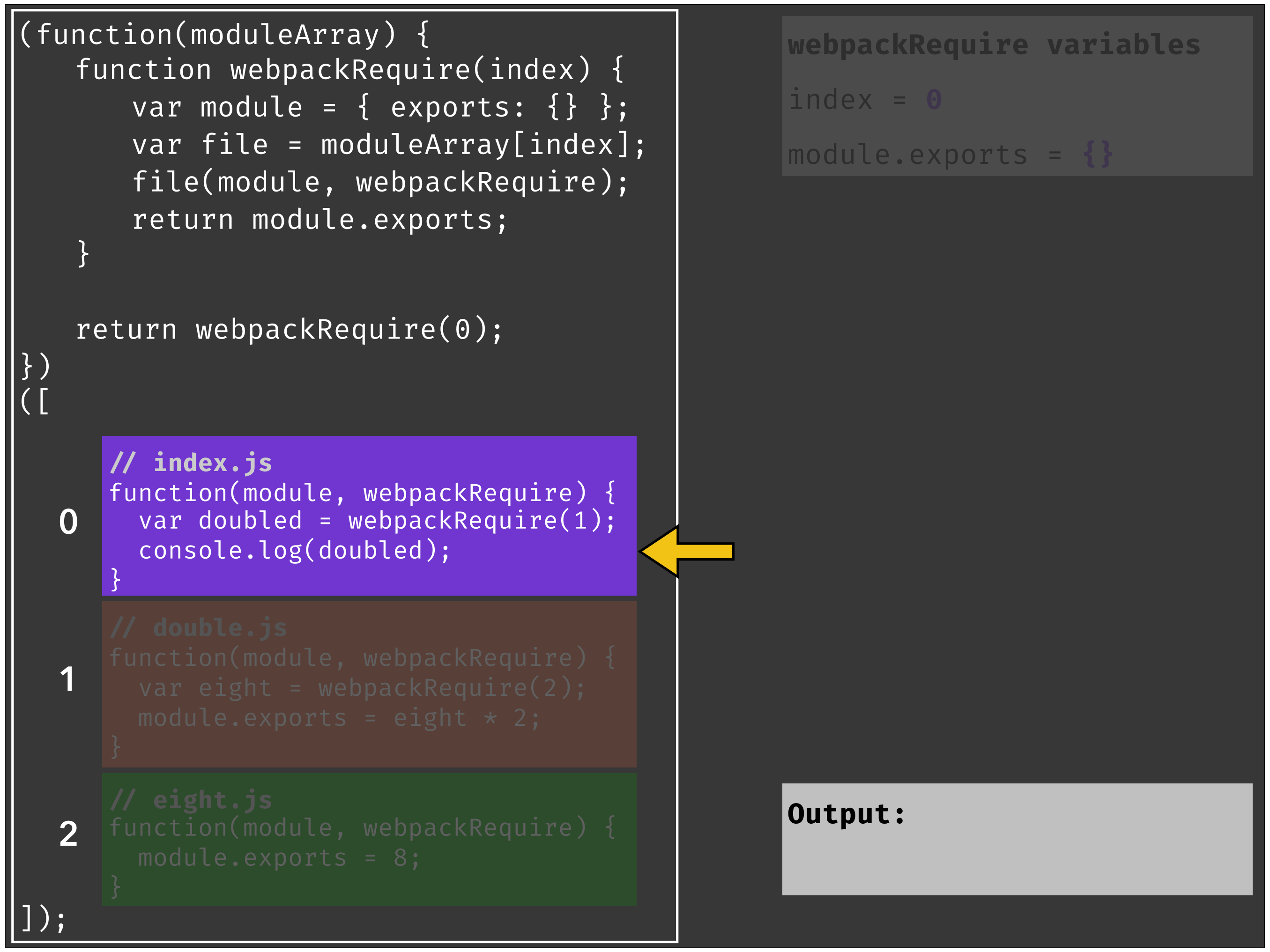
module.exports = {}

webpackRequire variables

index = 1

module.exports = 16

Output:



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webpackRequire variables
index = 0
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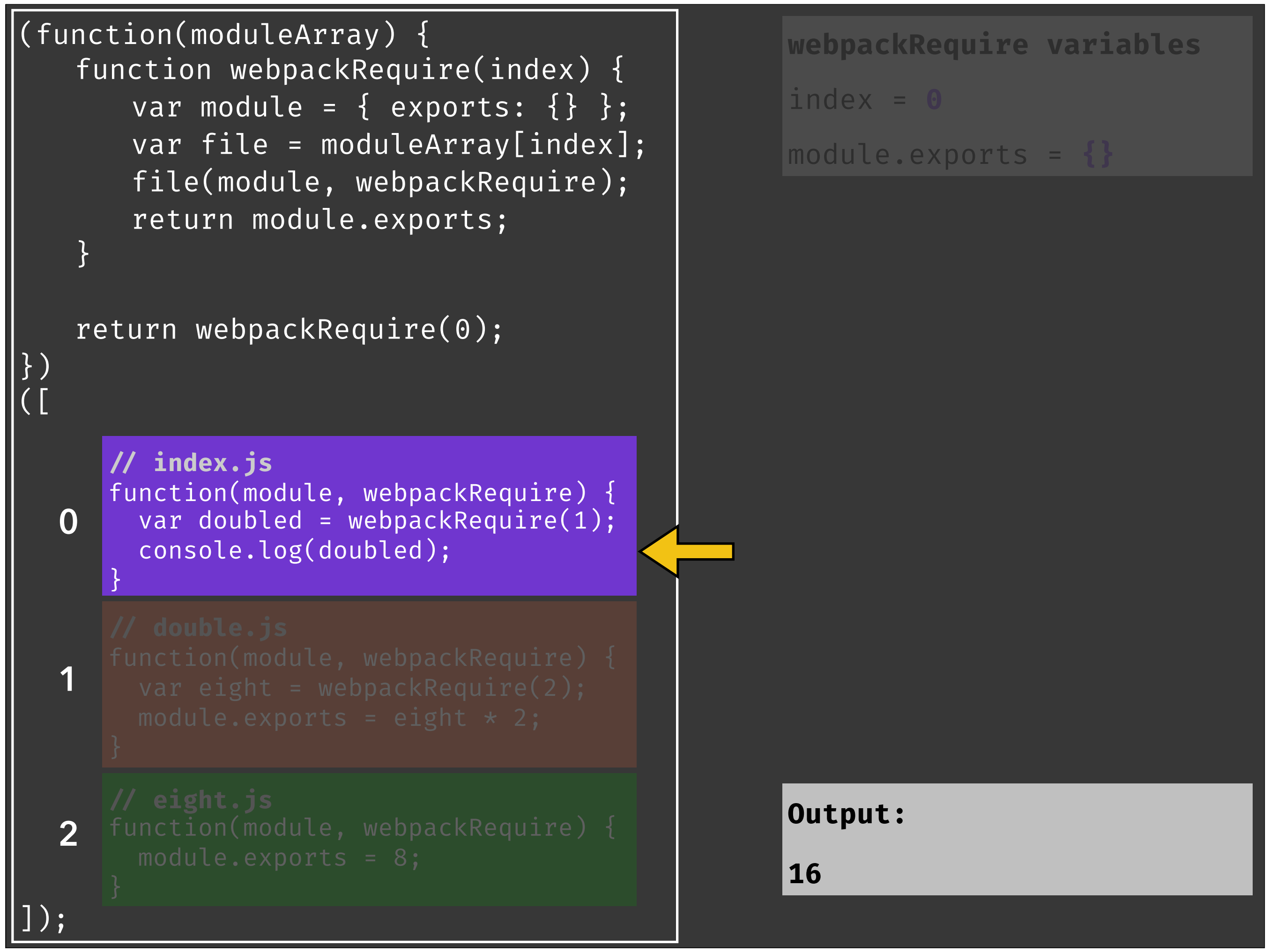

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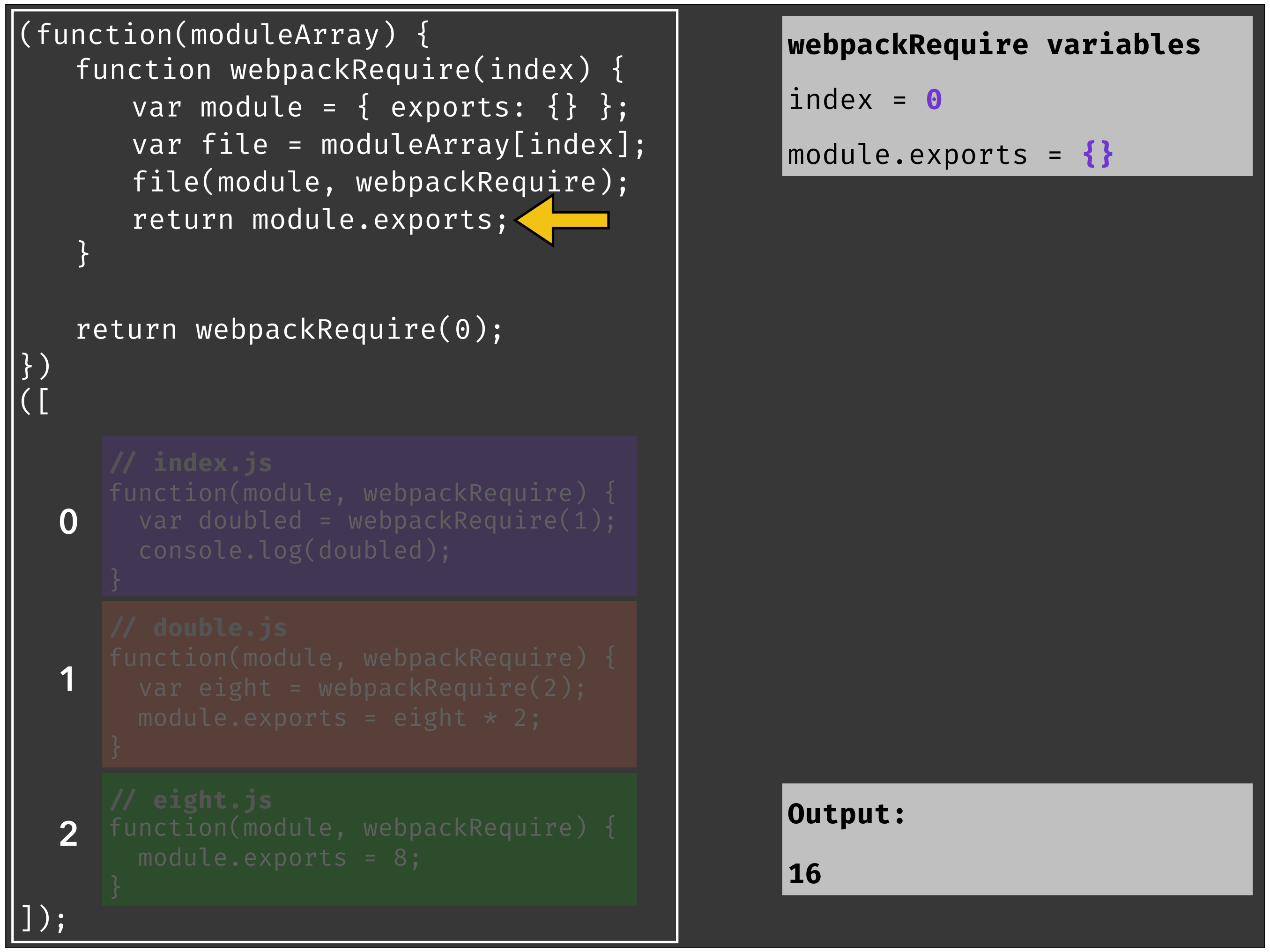
Output:

```
16
```



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Output:

16

HOW DID THIS SOLVE OUR PROBLEMS?

TOADD: NEGATIVES AND DRAWBACKS

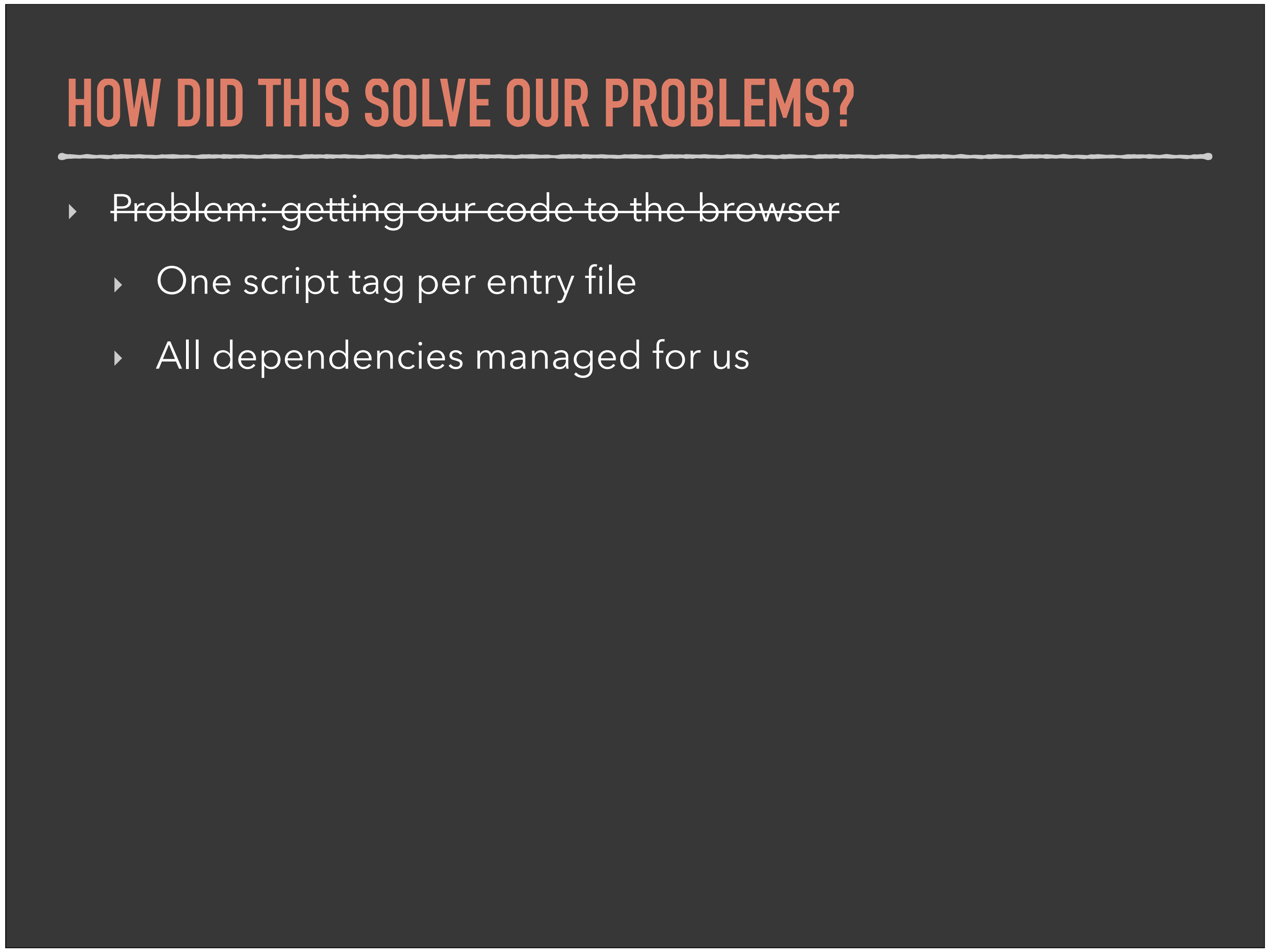
- bundles can get huge
- docs suck
- lots of dev dependencies
- another step in the build chain
- hard to learn
- BUT has tons of other features (not going to cover them today)

How did this solve our problems?

Problem: getting our code to the browser
One script tag per entry file
All dependencies managed for us

Problem: global namespacing
Variables are scoped to their own files and only expose what they put on the exports object
Module privacy is possible by just not exporting

Problem: difficult to manage necessary transforms
We tell Webpack to apply loaders we need to the files we care about



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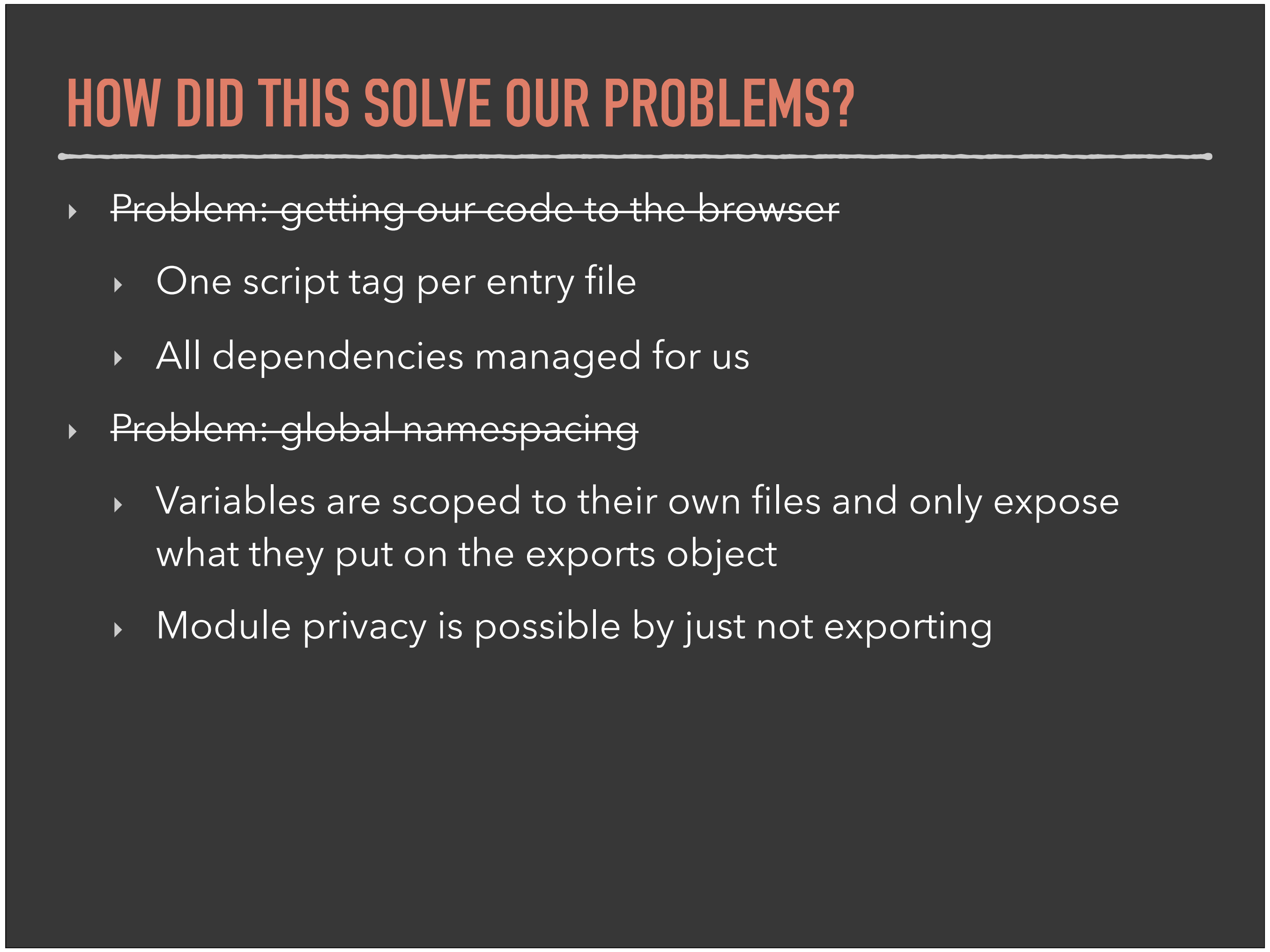

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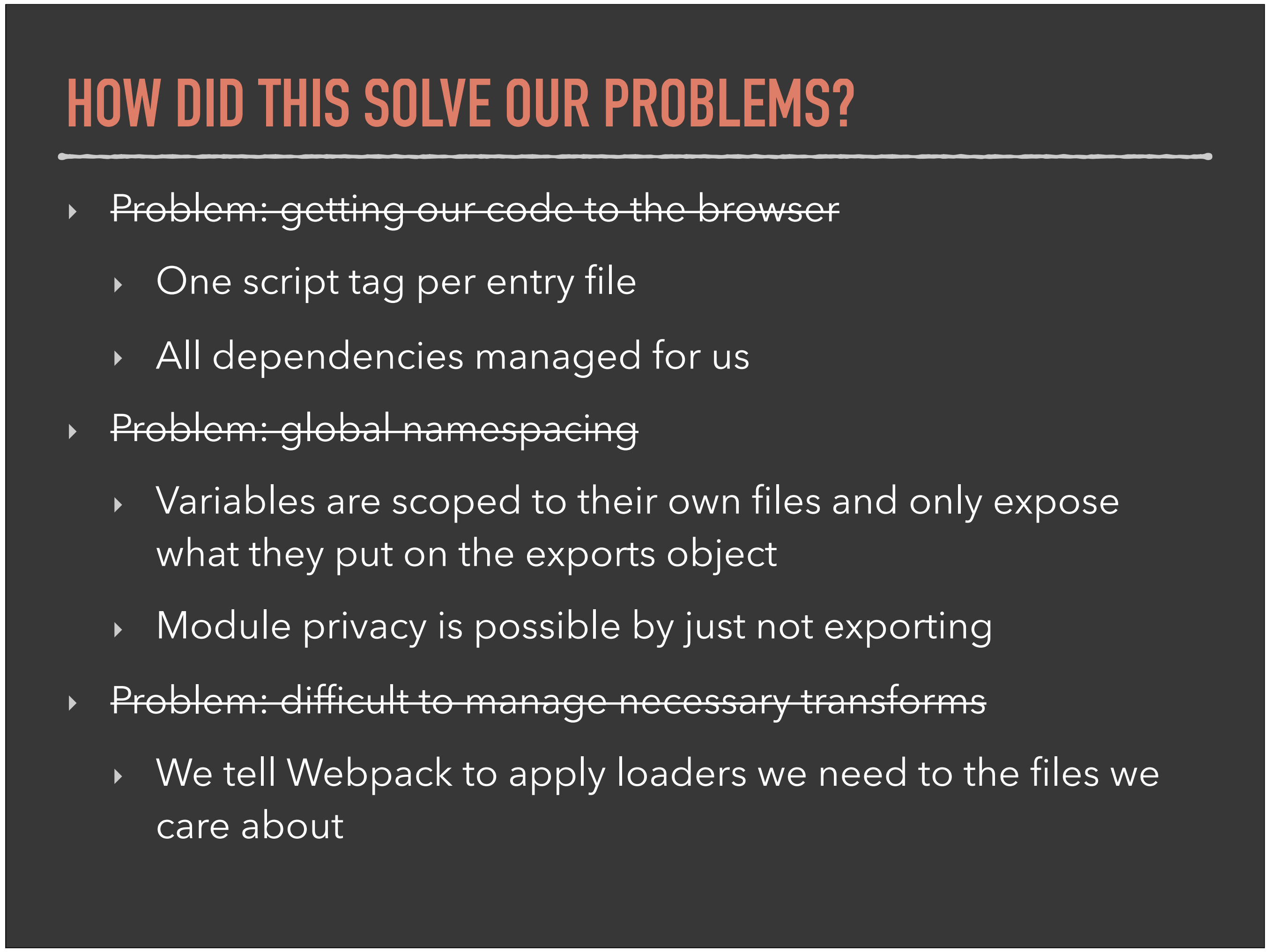

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Thanks for listening!

Naomi Jacobs

Software Engineer at Mavenlink

(yes, we're hiring!)

@naomicodes (Twitter)

@naomiajacobs (Github)

naomiajacobs@gmail.com

https://github.com/naomiajacobs/webpackSandbox

Thanks for listening!
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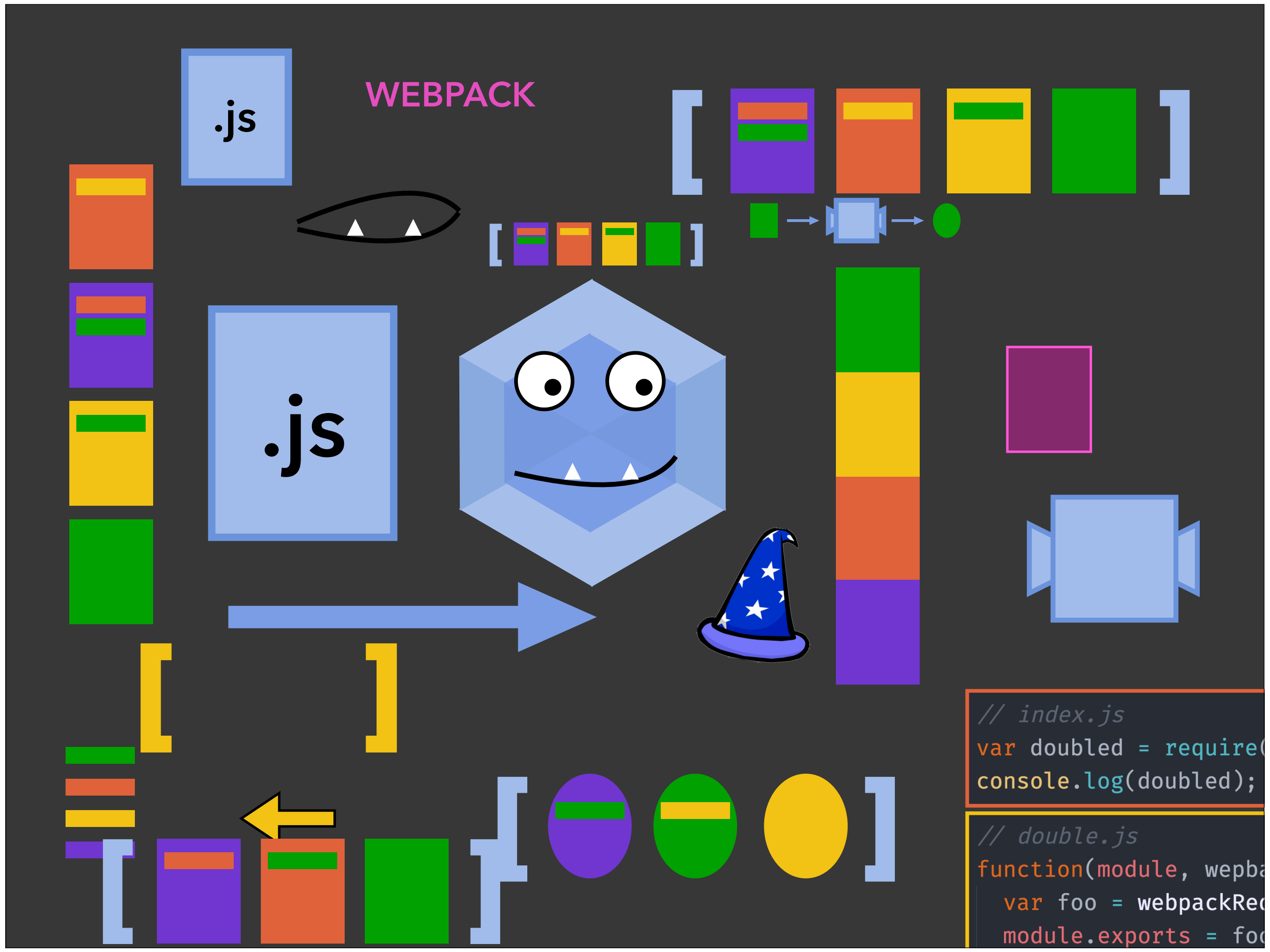

```
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var doubled = require(
console.log(doubled);
```

```
// double.js
function(module, wepba
  var foo = webpackRec
  module.exports = foo
```