

The future of modules

The future of javascript
modules & node



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you use a **lot** of modular javascript
billions & billions of packages

**if you use code from npm
the future of modules
matters to you**

a module is a scope plus
an API that lets you reuse it

files are modules
groups of files can be

give that group of files a
package.json and it's a **package**

module syntax:
this is what I'm sharing
this is what I'm re-using

CommonJS is one module syntax
ECMAScript Modules is another

**you've seen the syntax a million times
but here's a fast refresher**

```
const chalk = require('chalk'); // cjs
import chalk from 'chalk'; // esm

console.log(chalk.bold('hello world!'));
```

```
const { yellow, bold } = require('chalk'); // cjs
import { yellow, bold } from 'chalk'; // esm

console.log(`${bold('hello')} ${yellow('world!')}`);
```

```
function red(word) = { ... }; // etc
```

```
module.exports = { red, green, blue, bold, ...}; // cjs  
export { red, green, blue, bold, ...}; // esm
```

**why is this worth a talk?
it isn't because of syntax**

it's because the transition
has not been smooth

TopGearGifs.tumblr



**node needs both
and it still doesn't do ESM natively**

ESM is the future
of modular JavaScript

**in order to understand the future
we must first understand the past**

in 2009 JS had no module spec
but CommonJS had one

**there was a lot of server-side js going on
and people needed a way to share code**

**node adopted the CommonJS syntax
and wrote a loader**

node's resolution algorithm
turns a **human-friendly module name**
into a **path to code that can be loaded**

```
const chalk = require('chalk');
// loads './node_modules/chalk/index.js'
const other = require('./chalk');
// loads './chalk.js' if it finds it
```

**node's take on modules is useful
you're using the heck out of it today**

browser-side js was still concatenating files



TC39 started working on the problem in 2009

import & export arrived in **ES2015**

**esm design choices differ from cjs!
its intended uses are different!**

inherently asynchronous not synchronous

(mostly) not dynamic:
can't import from a **variable** source

designed to support static analysis
the import() variation is, however, dynamic

see Lin Clark's cartoon deep-dive
for an exploration of the details

**static analysis is important
when your target is the browser**

**node's nested deps are a great solution
server-side, where disk space is cheap**

**static analysis & tree shaking help
minimize download burden in FE**

A black and white photograph of a man with dark hair and a mustache, wearing a dark flight suit and goggles. He is looking out of a cockpit window, which shows the interior of a plane and some structural elements. The word "SPEED!!" is overlaid at the bottom in large, bold, white letters.

SPEED!!

so front-end focused developers want ESM

in between 2009 and now
something very **interesting** happened

node's user base changed

**throwbacks like me still write server-side js
most of you use node for frontend tooling**

you didn't want to wait for new js features
you wanted them now

**transpilation took off
babel was the new hotness**

**babel transpiled the ESM syntax into CJS
and the future looked like it was here**

**but babel was CJS behind the scenes
which meant node's loader was doing the work**

problem: there is no esm loader

**no loader? no loader.
well, html's loader.**

```
<script type="module" src="entry.js"></script>

import {chalk} from 'https://example.com/js/chalk/index.js';
import {foo} from '../js/foo.js';
```

**file paths are super-predictable
and super-annoying to write by hand**

node's loader is part of its **magic**
there's no magic in spec-compliant ESM loading

**babel set some expectations
for that magical resolution algorithm**

meanwhile, back in Gotham City...

node's been using CJS for 9 years
npm has 725K public packages

**you will recall, front-end dev is now what
people are using node to do**

**node should use JS standards
when those standards exist**

**therefore node should use ESM.
but what does this mean?**

the devil is in the details

**ESM in node looked like
it was not going good places**

**very depressing talk by Myles Borins
about how hard the integration was**

**the systems have to co-exist
but they have little in common**

how do CJS & ESM **interoperate?**

can you `require()` an esm file?

can you `import` a cjs file?

**how do you know which is which
without parsing everything?**

**node has no type="module" marker
for its entry points**

so it proposed .mjs as a **file suffix** for
javascript using the esm api



TopGear on tumblr

I'm the Stig table-flipping.

**"Well," I said. "What happens if
we choose different constraints?"**

SOUNDS LIKE A CHALLENGE,

top

HOW HARD CAN IT BE.

well, not very hard.
Chris Dickinson & I implemented a
usable take on ESM + CJS in node.

**no mjs, parse entry points;
require module consumer know its api in advance**

**our aim was to prove with a bit of parsing
you could get a lot of usability**

reception was mixed



BrendanEich

@BrendanEich

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This is good:



npm's proposal for supporting ES modules in node

npm's proposal for supporting ES modules in node

gist.github.com

4:35 PM - 12 Jan 2018

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HONEYCAM



technical problems are easy

people problems are hard

what is node for?
how do we use node?
where is node going?

**fundamental differences in answers
lead to fundamental differences in designs**

**talking
thinking
typing**

the node modules problem
needed more talking

**I didn't want our solution adopted.
I wanted the conversation restarted.**



great news!

**node has an unchartered modules team
doing the hard work of talking**

**it started with use cases
and it's continuing with some deep questions**

**see github.com/nodejs/modules
to understand how complicated the **tradeoffs** are**

**this brings us to the present state
ESM is not quite there yet, but soon!**

**if you are using babel in your build
you have no reason not to use ESM now**

**those of us not using Babel had
few options until recently**

github.com/standard-things/esm

npm init esm -y

record scratch noise
npm install -g npm@latest

npm@6 has some goodies

like templated init
even better than npm init -y

npm audit & npm audit fix
report and automatically fix
known vulnerabilities in your dep tree

**npm, Inc, is a company that
sells goods and services**

**you can pay us to run a very nice
single-tenant registry for you**

now back to modules...

ESM in node without a build step:
npm init esm -y



transpilation on the **fly** by
monkey-patching the module object

```
require = require('esm')(module);
const Widget = require('./main.js').default;

// over in main.js
import fs from 'fs';
import cjs from './cjs.js';
const esm = require('./esm.js');
export default class Widget { ... }
```

**Q: Was that transparent interop?
A: I believe it was, Bob.**



**the tradeoff is a lot of parsing
for a lot of features**

is std/esm the future? not exactly.

so what is the future of modules?

the future of node is front-end
the future of node is using common standards

**learn the `syntax` now if you haven't yet
future-you will `assume ESM` not `CJS`**

**CommonJS modules won't go away
you'll just use **fewer** of them**

**migrate when you have a reason
don't migrate now if you don't need to**

**the future of js modules is ESM
and it will be just fine**

AND ON THAT

BOMBSHELL...



you

[github/ceejbot/future-of-modules](https://github.com/ceejbot/future-of-modules)