Zero Dependency CLIs

with Node.js

Who am I?

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Zero Dependency CLIs

- What are dependencies and why are we trying to avoid them?
- What is a CLI app and why are we talking about them?
- What new Node.js features can help us write CLI apps?
- What new Node.js features might be coming next?

Dependencies

What are they and why do we need them?

- Some other piece of code, like a library, that your program needs to run
- In Node.js dependencies commonly come from, and are installed with, npm
- Other users and contributors will also need to install the same dependencies
- Dependencies need to be installed at build time and deployed with your code
- Node.js does not include a big "standard library" and relies on npm packages instead

Dependencies

Are dependencies bad?

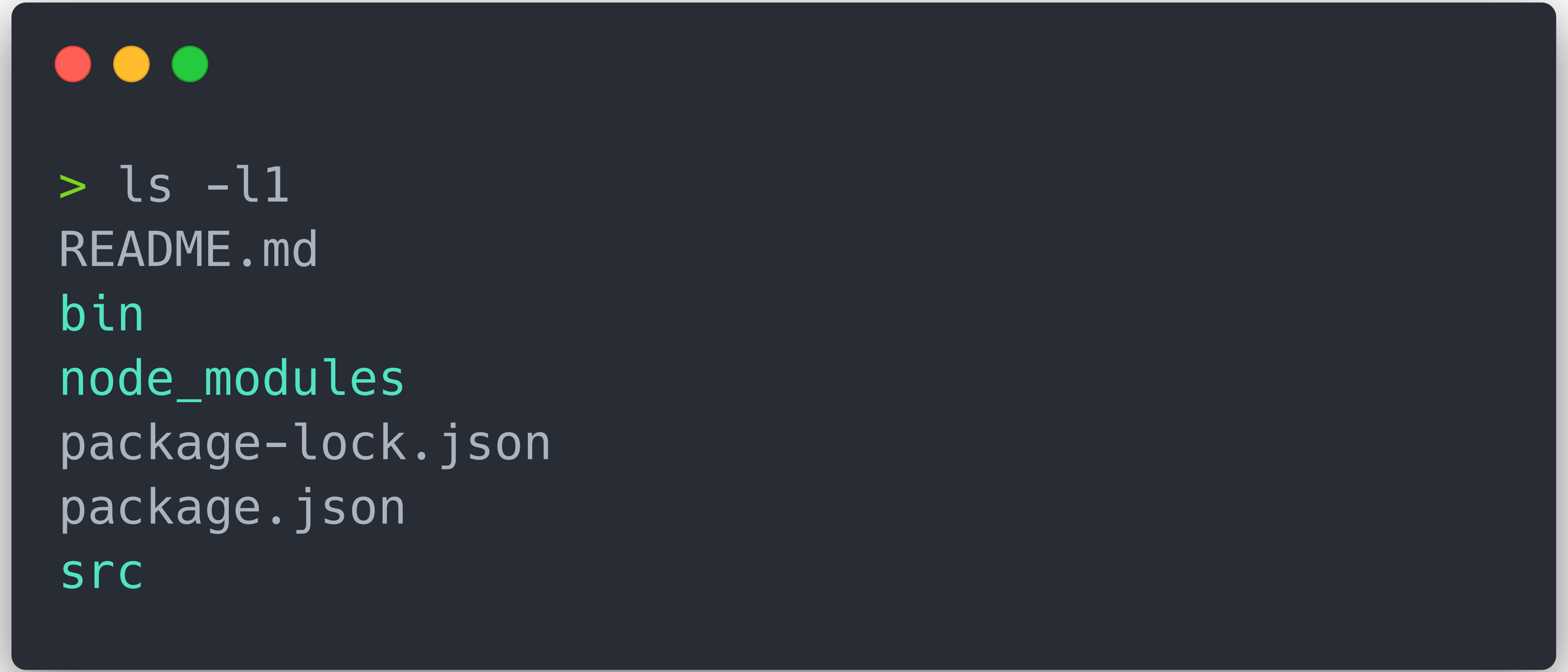
- Not necessarily
- Dependencies do introduce some overhead in the development and deploy process
  - Users need to install the dependencies to run and develop on a project
  - Dependencies need to be installed or bundled at build time
- If you’re building a complex app it probably already has a build and deploy pipeline and many dependencies so adding more dependencies probably doesn’t make much of a difference
- For smaller apps and libraries, like CLIs, not having an install or build step makes setup, contributing and distribution easier

CLI Apps

What are they and why do I keep talking about them?

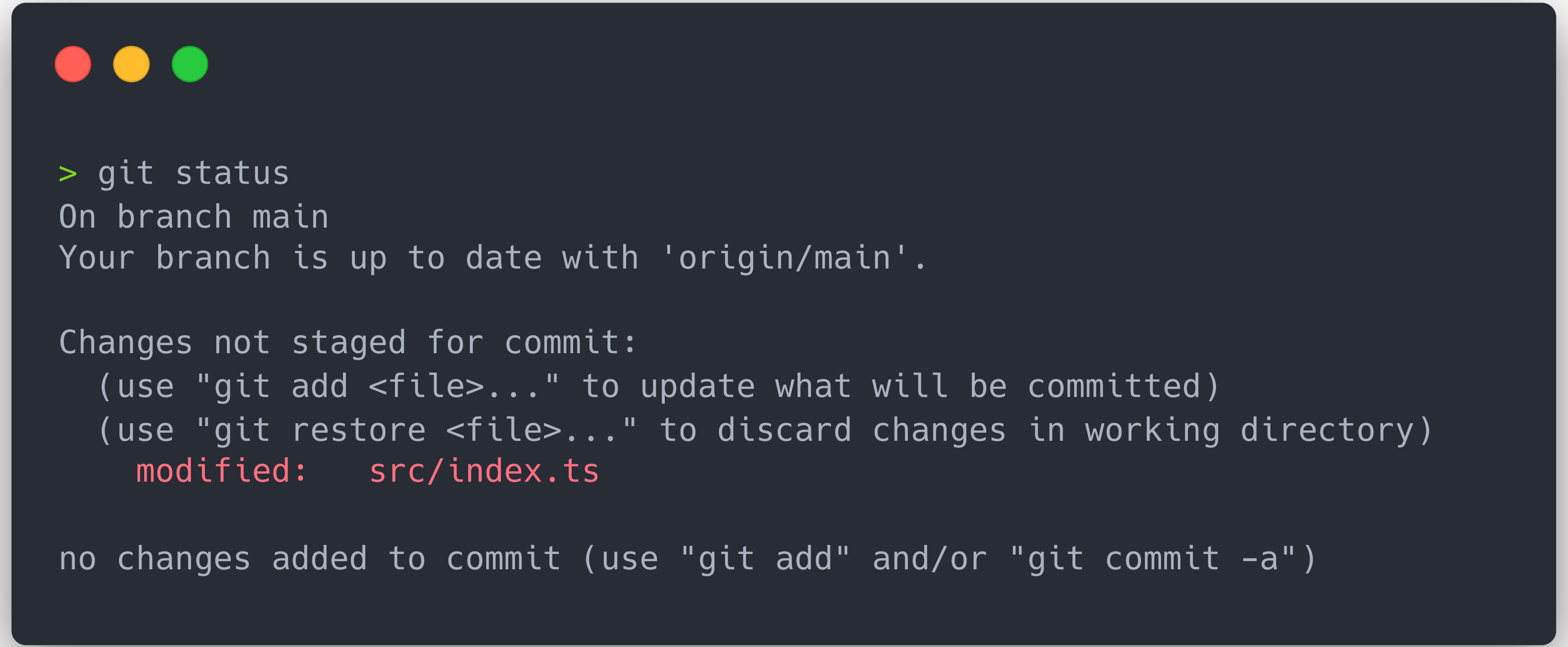
- CLI stands for Command Line Interface
  - Basically a fancy way to describe a script that takes some input and generates output
- These kinds of apps run in a terminal
- Commonly used for dev tools, build scripts and process automation
- Range from simple `` `cat` `` to complex `` `git` ``

CLI Apps



```
> ls -l1
README.md
bin
node_modules
package-lock.json
package.json
src
```

CLI Apps



```
> git status
On branch main
Your branch is up to date with 'origin/main'.

Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
    modified:   src/index.ts

no changes added to commit (use "git add" and/or "git commit -a")
```

CLI Apps

Why am I talking about them?

- I work on a number of CLI apps as a part of my job and use them daily
- I just really like CLI apps
    - They’re fun to build and the terminal is a challenging, somewhat constrained, environment
- The things I’m talking about here don’t just apply to CLI apps
- There are other types of apps that also benefit from having no dependencies or build and deploy steps
    - Serverless functions
    - Build scripts
    - GitHub Actions

What’s New in Node.js?

As of v18.3.0

Argument Parsing

- Simple scripts often don’t take any inputs
- As they get more complex it becomes helpful to accept some user input
- This also helps make scripts more general and useful in more cases
- Most languages provide at least a basic argument parser

Argument Parsing

Parsing arguments is surprisingly complicated and can be tedious and error prone

```
mycli --silent
mycli -s
mycli --silent=true
mycli --slient false
mycli --no-silent
```

These all do the same thing, set the `` `silent` `` argument, but in several different ways

Argument Parsing

How did we used to handle this?

```
const args = process.argv;

// ['node', 'mycli', '--silent']
// ['node', 'mycli', '-s']
// ['node', 'mycli', '--silent=true']
// ['node', 'mycli', '--slient', 'false']
// ['node', 'mycli', '--no-silent']
```

More likely you would use a third-party library like `` `yargs` `` or `` `commander` ``

Argument Parsing

Now there’s a new way to do this in Node.js! Introducing `` `util.parseArgs` `` 🎉

```
import { parseArgs } from 'node:util';

const input = process.argv.slice(2);
const options = {
  silent: {
    type: 'boolean',
    short: 's',
  },
};

const { values } = parseArgs({ input, options });
```

Argument Parsing

Using our previous examples this is what `parseArgs` will give us

```
const { values } = parseArgs({ input, options });

// { silent: true }
// { silent: true }
// Option '-s, --silent' does not take an argument
// Option '-s, --silent' does not take an argument
// Unknown option '--no-silent'
```

Fetch

- Web API for making HTTP requests
- People have been attempting to "make fetch happen" in Node.js for several years

Fetch

Fetch

- Web API for making HTTP requests
- People have been attempting to "make fetch happen" in Node.js for several years
- Fortunately we didn’t listen to that advice and Fetch is now available in Node.js 18! 🎉
- Built on top of Undici (an HTTP/1.1 client, written from scratch for Node.js)
- Built with the Web Streams API which is also now available in Node.js 18

Fetch

An example of using `` `fetch` `` to query the GitHub API for my profile

```
const response = await fetch('https://api.github.com/users/iansu');
const body = await response.json();

// {
//   "login": "iansu",
//   "name": "Ian Sutherland",
//   "company": "@neofinancial",
//   "blog": "https://iansutherland.ca/",
//   "location": "Calgary, AB"
// }
```

Test Runner

- Basic API to create tests, both synchronous and asynchronous
- Supports subtests, `` `skip` `` tests, `` `todo` `` tests and `` `only` `` tests
- Can be used with Node's existing built in `` `assert` `` library
- Simple runner to run tests
  - You can provide a list of files
  - It will automatically run files in a `` `test` `` directory
  - It will automatically run files that end in `` `.test.js` ``, `` `.test.cjs` `` and `` `.test.mjs` ``

Test Runner

Let’s write some basic tests

```
import test from 'node:test';
import assert from 'node:assert';

test('synchronous test', (t) => {
  assert.strictEqual(1, 1);
});

test('asynchronous test', async (t) => {
  assert.strictEqual(1, 1);
});
```

Test Runner

Now let’s run those tests

```
node --test

TAP version 13
ok 1 - index.test.js
  ---
  duration_ms: 0.038415792
  ...
1..1
# tests 1
# pass 1
# fail 0
# skipped 0
# todo 0
# duration_ms 0.095865209
```

Recursive Filesystem Operations

- Built in methods like `` `fs.readFile` ``, `` `fs.unlink` ``, etc. are great for working with a small number of files
- If you want to work with a large number of files and/or directories recursive operations are helpful
- In the past doing any recursive filesystem operations required adding one or more dependencies to your project
- Not anymore!

Recursive Filesystem Operations

`fs.mkdir` - recursively create a directory and any non-existent parent directories

```
import { mkdir } from 'node:fs/promises';

await mkdir('/tmp/a/b/c', { recursive: true });
```

Recursive Filesystem Operations

`fs.rm` - recursively delete a directory and all child directories and files

```
import { rm } from 'node:fs/promises';

await rm('/tmp/a', { recursive: true, force: true });
```

Recursive Filesystem Operations

`fs.cp` - recursively copy a directory and all child directories and files

```
import { cp } from 'node:fs/promises';

await cp('/tmp/a', '/tmp/z', { recursive: true });
```

ⓘ This API is currently marked as experimental

Recursive Filesystem Operations

`` `fs.readdir` `` - recursively read the contents of a directory and all child directories

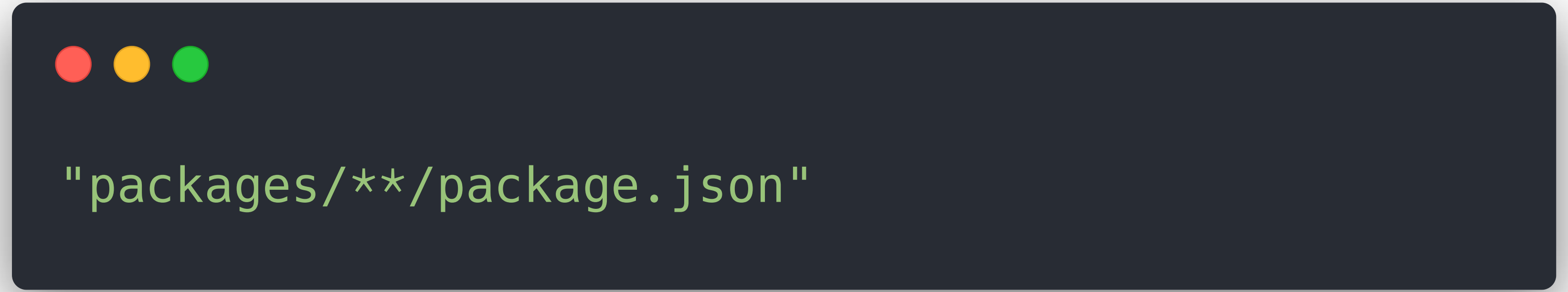
```
import { readdir } from 'node:fs/promises';

await readdir('/tmp/a', { recursive: true });
```

ⓘ There is currently an open PR for this feature: nodejs/node#41439

What’s Next?

What’s Next?

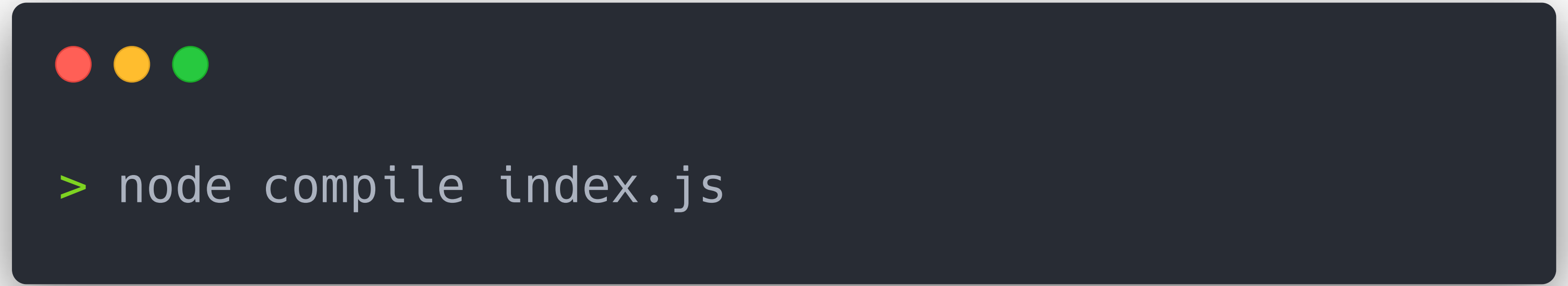
Glob?



```
"packages/**/package.json"
```

What’s Next?

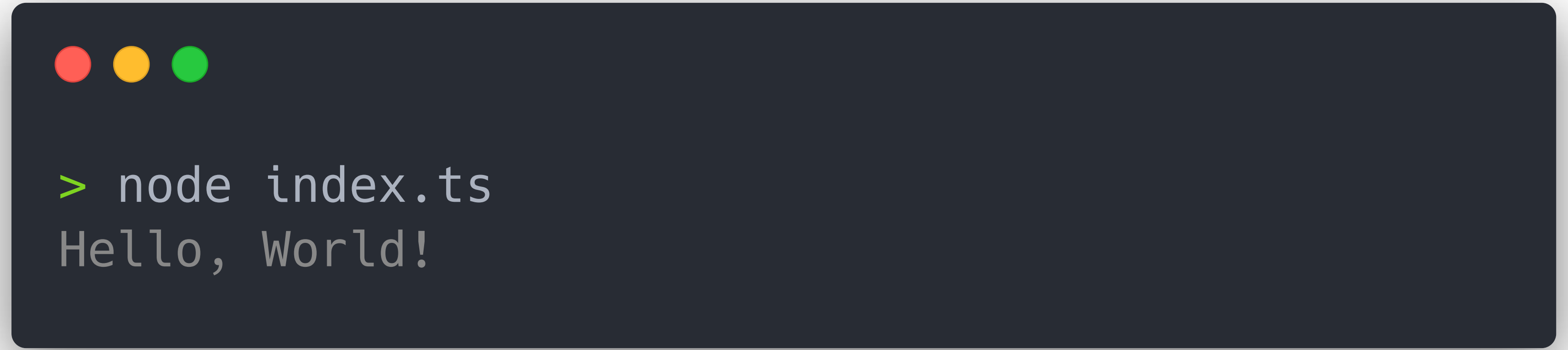
Self-contained Executables?



```
> node compile index.js
```

What's Next?

TypeScript?!



```
> node index.ts
Hello, World!
```

What’s Next?

Want to help figure out, and build, what’s next?

Join the Node Tooling Group!

github.com/nodejs/tooling

Putting It All Together

- I wanted a way to try out all these new features
- What's a CLI app that makes API requests, downloads files and manipulates the filesystem? 🤔
- A package manager! 📦
- Let's build a package manager...?! 🥴

Bad Package Manager

Introducing Bad Package Manager (or `` `bad` ``). It’s a package manager that is… bad. For science!

- Might one day be a good CLI app
- Will probably never be a good package manager
- Ongoing project to test new features in a Node.js CLI app
- Currently uses `` `parseArgs` ``, `` `fetch` ``, `` `test` ``, `` `rm` ``, `` `cp` ``, `` `mkdir` ``
- Contributions welcome!
    - iansu/bad-package-manager

Bad Package Manager

Currently supported features

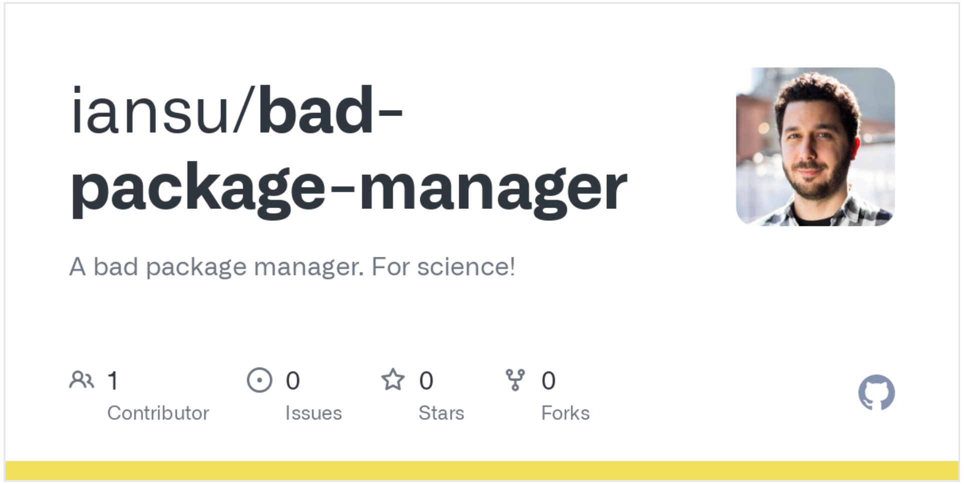
- `` `bad install` `` - install all `` `dependencies` `` and `` `devDependencies` `` from `` `package.json` ``
- `` `bad install <package>` `` - install the named package and add it to `` `dependencies` `` in `` `package.json` ``
- `` `bad install --dev <package>` `` - install the named package and add it to `` `devDependencies` `` in `` `package.json` ``
- `` `bad clean` `` - delete `` `node_modules` ``

Bad Package Manager

Future ideas

- ``bad uninstall <package>`` - uninstall previously installed ``dependencies`` and ``devDependencies``
- ``bad run <script>`` - run scripts specified in ``package.json``
- ``bad ls <package>`` - list part of the package tree (hopefully with ``fs.readdir``)
- ?

Bad Package Manager



iansu/**bad-package-manager**

A bad package manager. For science!

1 Contributor
0 Issues
0 Stars
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Thanks for Watching!

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