Managing Packages with npm

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Helping developers get started with JavaScript

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Referencing Third-party Scripts

For browser-based applications, you can reference third-party scripts

```
<script type="text/javascript" src="lib/jquery.min.js"></script>
<script type="text/javascript">
(function () {

  const container = $('.container');

})();
</script>
```

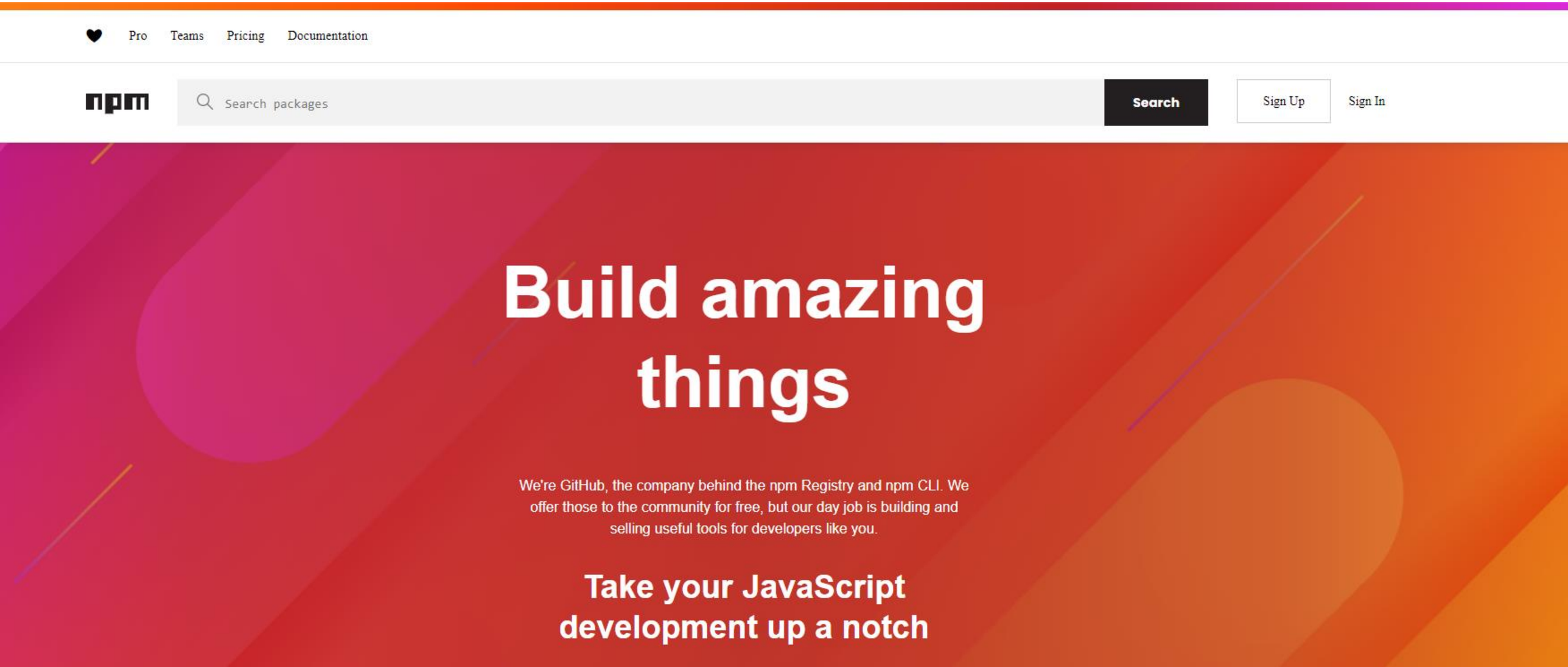
Referencing Third-party Packages

For module-based applications, you reference npm packages

```
const $ = require('jquery');

const container = $('.container');
```

B-Roll: npmjs.com



```
npm install
```

◀ Installs project dependencies

```
npm install <package>
```

◀ Installs specific package

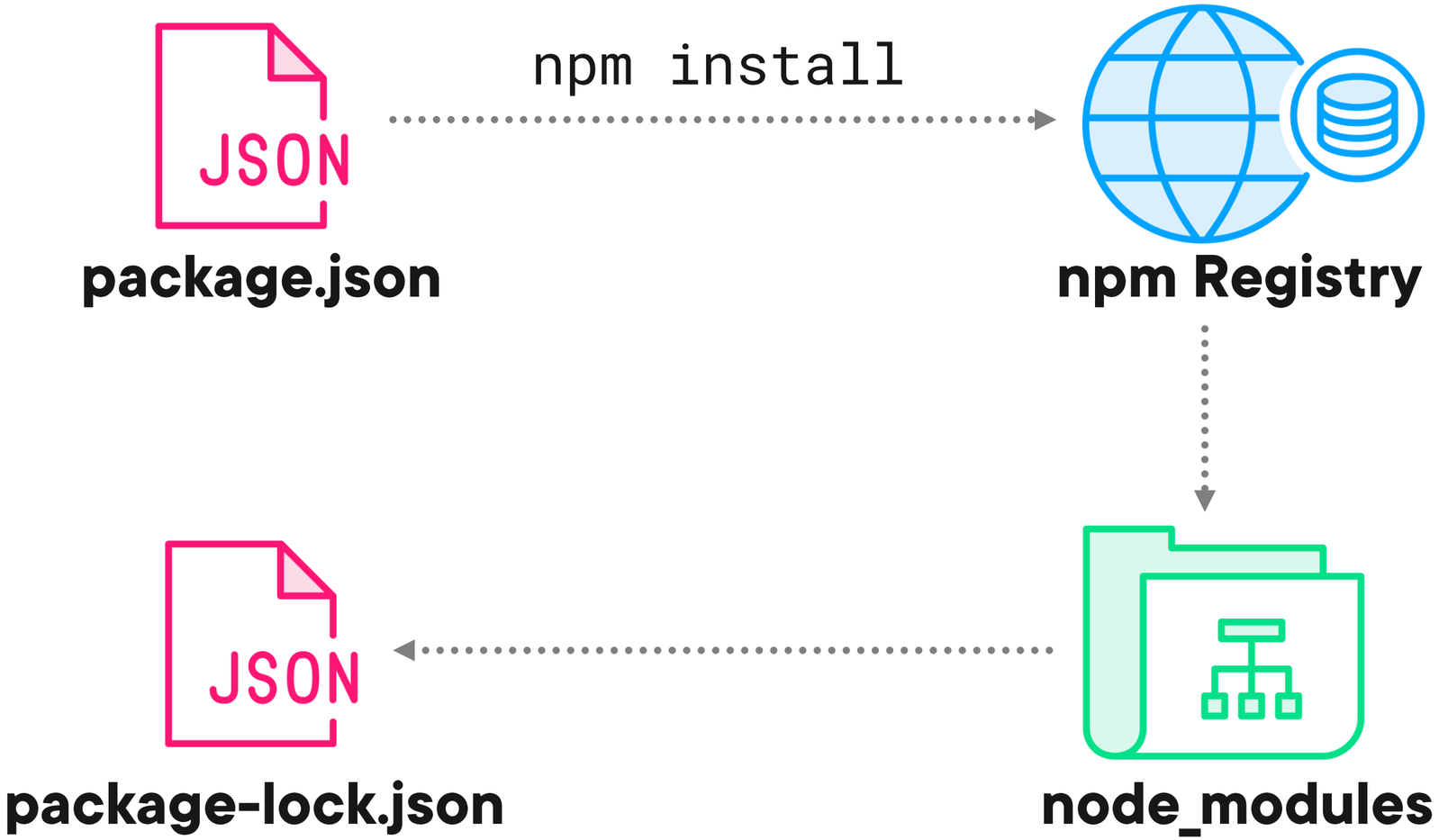
```
npm update <package>
```

◀ Update a package

```
npm uninstall <package>
```

◀ Removes a package

How npm Works



The Heart of a JavaScript Project

The package.json file contains metadata about the project, including dependencies

```
{
  "name": "package-name",
  "version": "1.0.0",
  "dependencies": {
    "express": "5.x"
  },
  "devDependencies": {
    "eslint": "^8.0.0"
  }
}
```

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Package metadata

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}
```

Runtime dependencies

Development-time only dependencies

The Heart of a JavaScript Project

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Package ID

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  },
  "devDependencies": {
    "eslint": "^8.0.0"
  }
}
```

Package ID

Version Constraint

Package Version Matching

A version string provides an expression to match against

package.json

```
{
  "name": "package-name",
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Package Version Matching

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  }
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```

```
$ npm view express versions
[
  '0.14.0',
  '1.0.0',
  '4.5.1',
  '5.1.1',
  '5.2.6',
  '5.6.0',
]
```

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```
{
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  }
}
```

Latest matching version

```
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[
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Package Version Matching

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```
{
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  "dependencies": {
    "express": "5.x"
  }
}
```

Newly published

```
$ npm view express versions
[
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  '1.0.0',
  '4.5.1',
  '5.1.1',
  '5.2.6',
  '5.6.0',
  '5.7.0',
]
```

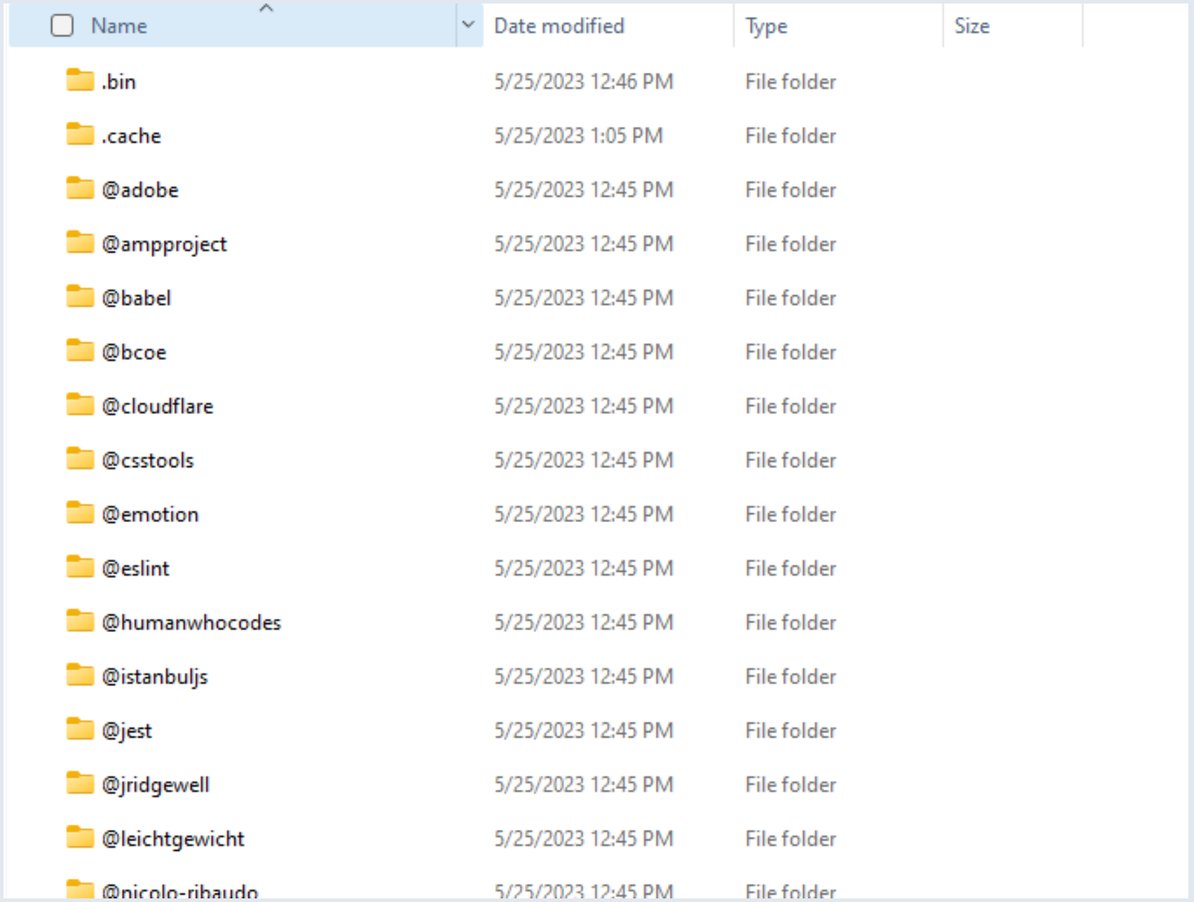
The Nervous System of a JavaScript Project

The package-lock.json is a lockfile containing exact dependencies being used

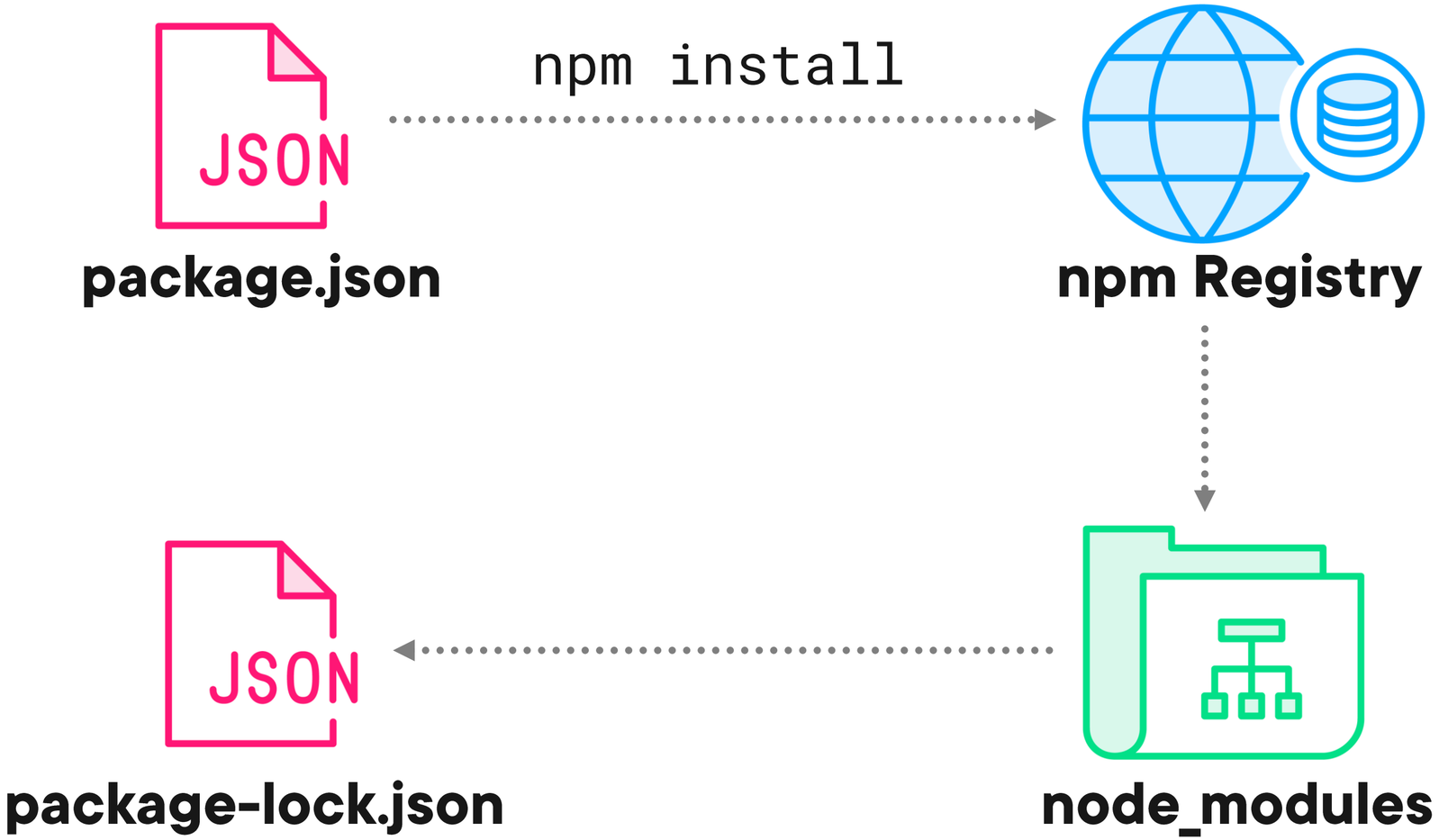

```
{
  "name": "demo",
  "version": "0.1.0",
  "lockfileVersion": 2,
  "requires": true,
  "packages": {
    "": {
      "name": "demo",
      "version": "0.1.0",
      "dependencies": {
        "react": "^18.2.0",
        "react-dom": "^18.2.0",
        "react-scripts": "5.0.1",
      },
      "devDependencies": {
        "chai": "^4.3.7",
        "chai-dom": "^1.11.0",
        "mocha": "^10.2.0"
      }
    },
    "node_modules/@adobe/css-tools": {
      "version": "4.0.1",
      "resolved": "https://registry.npmjs.org/@adobe/css-tools/-/css-tools-4.0.1.tgz",
      "integrity": "sha512-+u76oB43nOHrF4DDWRLWDCtci7f3QJoEBigemIdIeTi1ODqjx6Tad9NCVnPRwewWlKkVab5PlK8DCtPTyX7S8g=="
    },
  }
}
```


The Veins of a JavaScript Project

The node_modules folder contains the physical package files being used



How npm Works



Initializing a JavaScript Project

Demo

Initializing a project using npm install

Creating a project using npm init

```
npm install
```

Installing Project Dependencies

Execute the npm install command to pull down and extract the dependencies for a project

There are other JavaScript package managers besides npm.

```
npm init
```

Creating a New package.json File

Use npm init to create a new JavaScript package definition in the current directory

npm init

```
package name: (<folder name>)
version: (1.0.0)
description:
entry point: (index.js)
test command:
git repository:
keywords:
author:
```

Demo: package.json

Adding a Package Dependency

Demo

Install the latest version

Install a specific version

Install as a development dependency

Demo: VS Code Project

Demo: yargs

yargs DT

17.7.2 • Public • Published a year ago

Readme | Code Beta | 7 Dependencies | 0 Dependents | 250 Versions

Yargs

Yargs be a node.js library fer hearties tryin' ter parse optstrings

ci passing | npm v17.7.2 | code style standard | min coverage 96% | Conventional Commits 1.0.0 | Slack

Install

```
> npm i yargs
```

Repository

github.com/yargs/yargs

Homepage

yargs.js.org/

Weekly Downloads

80,632,244

Version

17.7.2

License

MIT

```
npm install yargs

npm install yargs --save
```

Install the Latest Version

Use npm install to install a runtime dependency. Adding the `--save` flag will forcefully add it to the package.json dependencies list.

```
npm install <package>@<version>

# Example: Latest matching version
npm install express@5

# Example: Specific version
npm install express@5.1.0
```

Install a Specific Version

Use the `@` separator to specify a version of a package you want to install. The version string will be saved to the package.json.

```
npm install <package> --save-dev

npm install <package> -D
```

Install a Development Dependency

Use the `--save-dev` flag to specify the dependency is used only for development-time. It will be saved to the `devDependencies` in the package.json.

Why Separate Development Dependencies?

They won't be installed in a production Node.js environment

They help teammates know what packages are not used at runtime

Resources

Specifying dependencies and devDependencies
https://docs.npmjs.com/specifying-dependencies-and-devdependencies-in-a-package-json-file

Updating a Package Dependency

Demo

List outdated dependencies

Perform a package upgrade

Discuss version constraints

When to use automation

Demo: VS Code Project

```
npm outdated
```

Listing Outdated Packages

Use the outdated command to list package current, wanted, and latest versions.

```
^17.7.0 – Any version with a major version of 17, minor of 7, and patch > 0

17 – Any version with a major version of 17
```

Matching Versions

Use the update command to automatically perform a bulk update

Semantic Versioning

```
npm update --dry-run
```

Doing an Update Dry Run

Use the update command with a dry run flag to see what npm will do

npm update will only update to the highest-supported wanted version, not the latest version.

```
npm update
```

Doing an Update

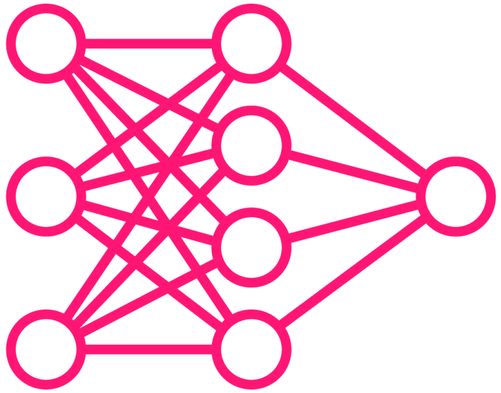
Use the update command to bulk update packages to the highest wanted version

```
npm install@latest
```

Update to the Latest Version

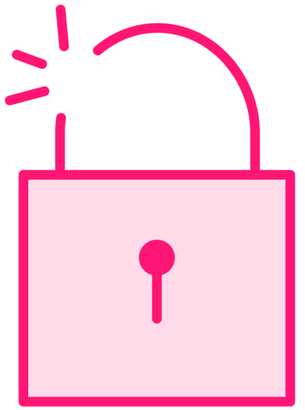
Use the "latest" version tag which always points to the latest published version.

Challenges of Updating Packages



Complex to manage many dependencies

Newer versions aren't always backwards-compatible



Security vulnerabilities can be found downstream

B-Roll: Renovate Bot

renovate

37.351.2 • Public • Published 4 hours ago

Readme | Code Beta | 105 Dependencies | 11 Dependents | 8,365 Versions

Renovate

Automated dependency updates. Multi-platform and multi-language.

license AGPL-3.0-only | codecov 100% | renovate enabled | Build passing | docker pulls 1.4G | openssf scorecard 8.2

Install

```
> npm i renovate
```

Repository

github.com/renovatebot/renovate

Homepage

renovatebot.com

Weekly Downloads

119,443

Version

37.351.2

License

AGPL-3.0-only

Resources

About semantic versioning
https://docs.npmjs.com/about-semantic-versioning

npm SemVer Calculator
https://semver.npmjs.com/

Removing a Package Dependency

Demo

Using npm to uninstall a package

Manually removing a package

Demo: VS Code Project

```
npm uninstall chalk
```

Uninstall a Package

Completely removes a package, updating the package.json and package-lock.json files accordingly.

Demo: Manually Removing a Package

How IDEs Integrate with npm

How IDEs Integrate with npm

How IDEs Integrate with npm

Package dependency management

Demo: Package Dependency Metadata

{} package.json > ...

```
{
  "name":
  "pluralsight-course-building-js-dev-environment
  -demo",
  "version": "1.0.0",
  "description": "",
  "main": "index.js",
  ▷ Debug
  "scripts": {
    "test": "echo \"Error: no test
    specified\" && exit 1"
  },
  "a
  "l
  "d
    "express": "^4.19.2"
  }
}
```

Fast, unopinionated, minimalist web framework

Latest version: 4.19.2 published 1 month ago

http://expressjs.com/

Demo: npm VS Code Extension

{} package.json > ...

```
{
  "name":
  "pluralsight-course-building-js-dev-environment
  -demo",
  "version": "1.0.0",
  "description": "",
  "main": "index.js",
  ▷ Debug
  "scripts": {
    "test": "echo \"Error: no test
    specified\" && exit 1"
  },
  "a
  "l
  "d
    "express": "^4.19.2"
  }
}
```

Fast, unopinionated, minimalist web framework
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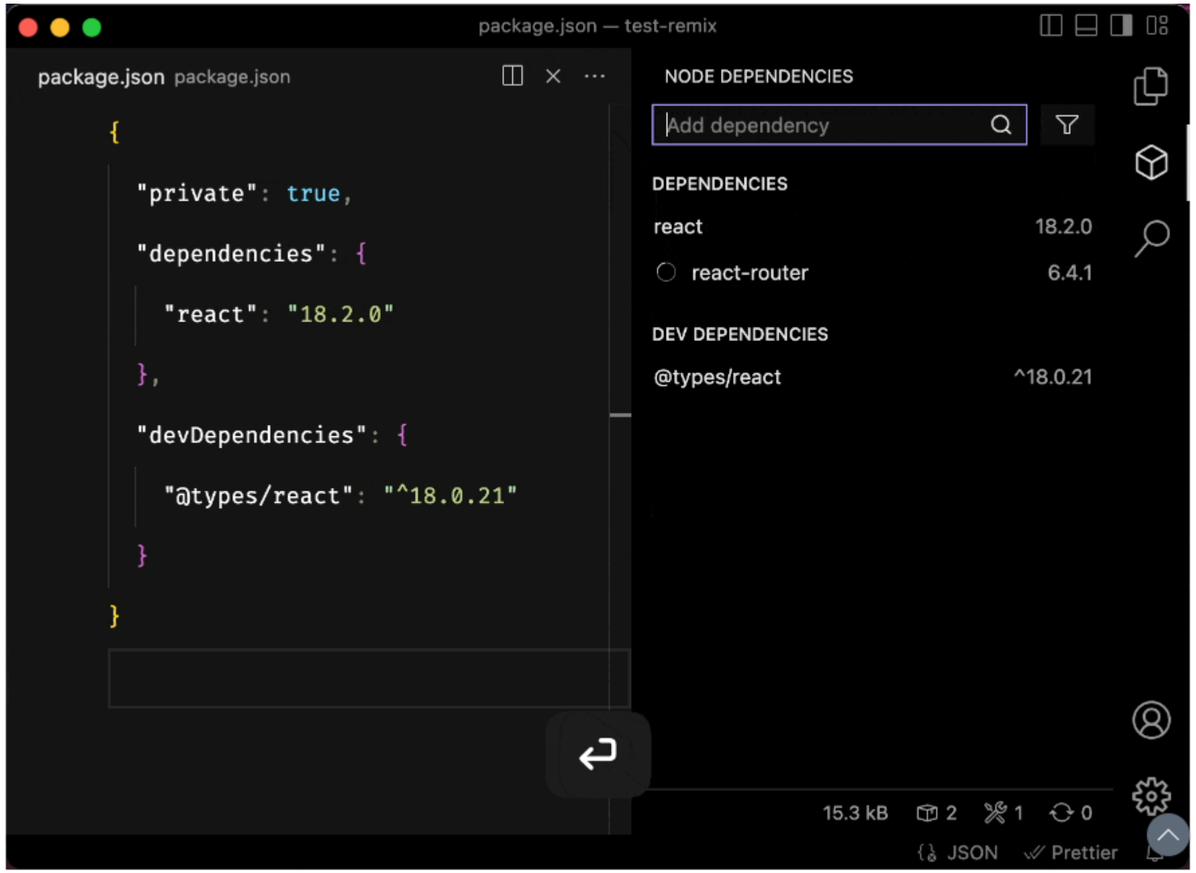
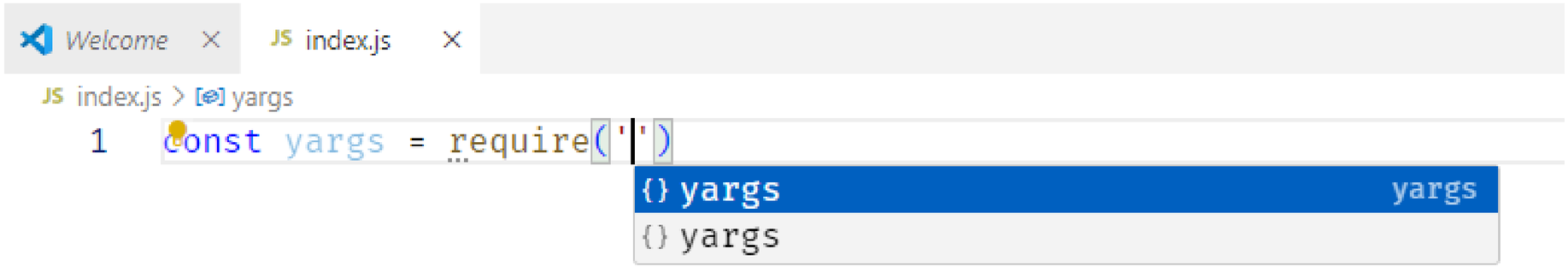


How IDEs Integrate with npm

Package dependency management

Provide code completion for modules

Demo: CommonJS Module Support



How IDEs Integrate with npm

Package dependency management

Provide code completion for modules

Informs language tooling versions and configuration

Demo: jsconfig.json

Configures editor tooling and Intellisense for VS Code

```
{
  "compilerOptions": {
    "module": "CommonJS",
    "moduleResolution": "Node",
    "target": "ES2015",
  },
  "typeAcquisition": {
    "include": ["node"]
  },
  "exclude": [
    "node_modules",
    "**/node_modules/*"
  ]
}
```

Demo: CommonJS Syntax

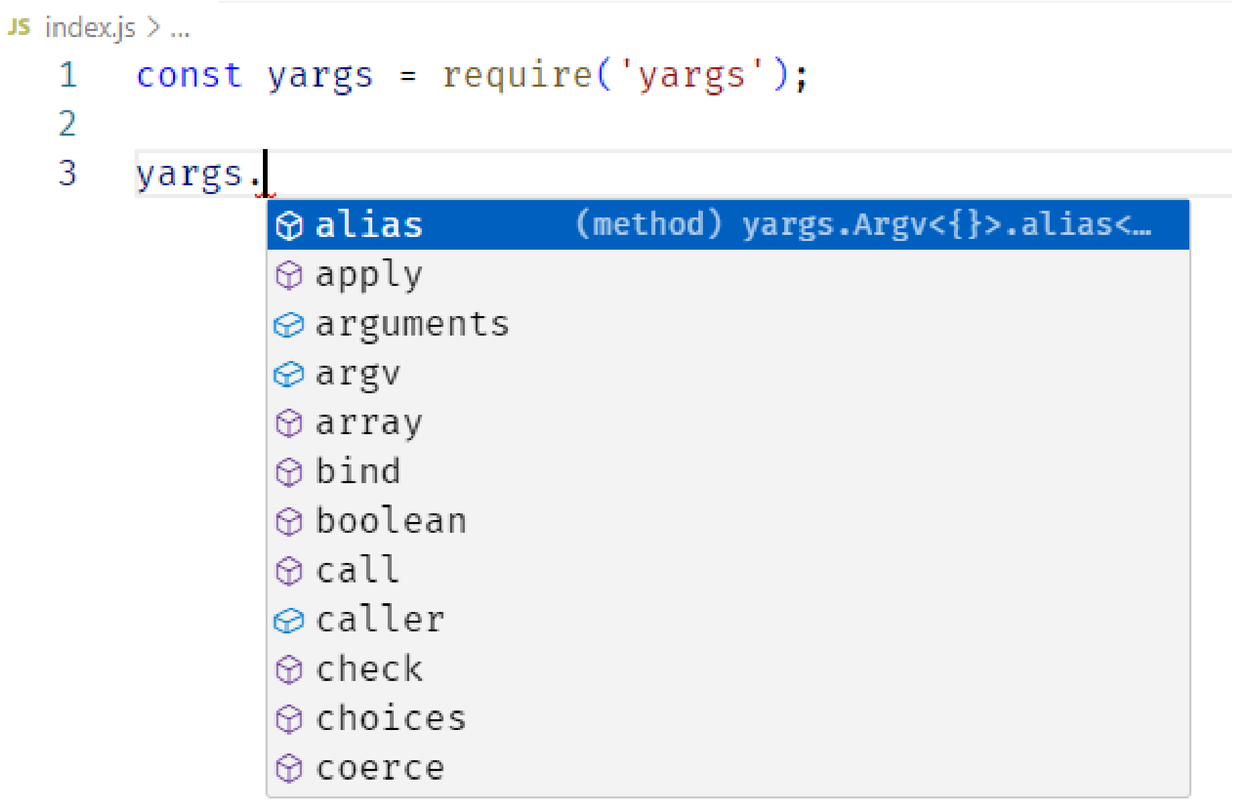
JavaScript IDE Configuration

Visual Studio Code
https://code.visualstudio.com/docs/nodejs/working-with-javascript

Jet Brains WebStorm
https://www.jetbrains.com/help/webstorm/javascript-specific-guidelines.html

Eclipse JSDT Environment Setup
https://www.youtube.com/watch?v=SFxfuudlau8

Demo: Type Acquisition



How IDEs Integrate with npm

Package dependency management

Provide code completion for modules

Informs language tooling versions and configuration

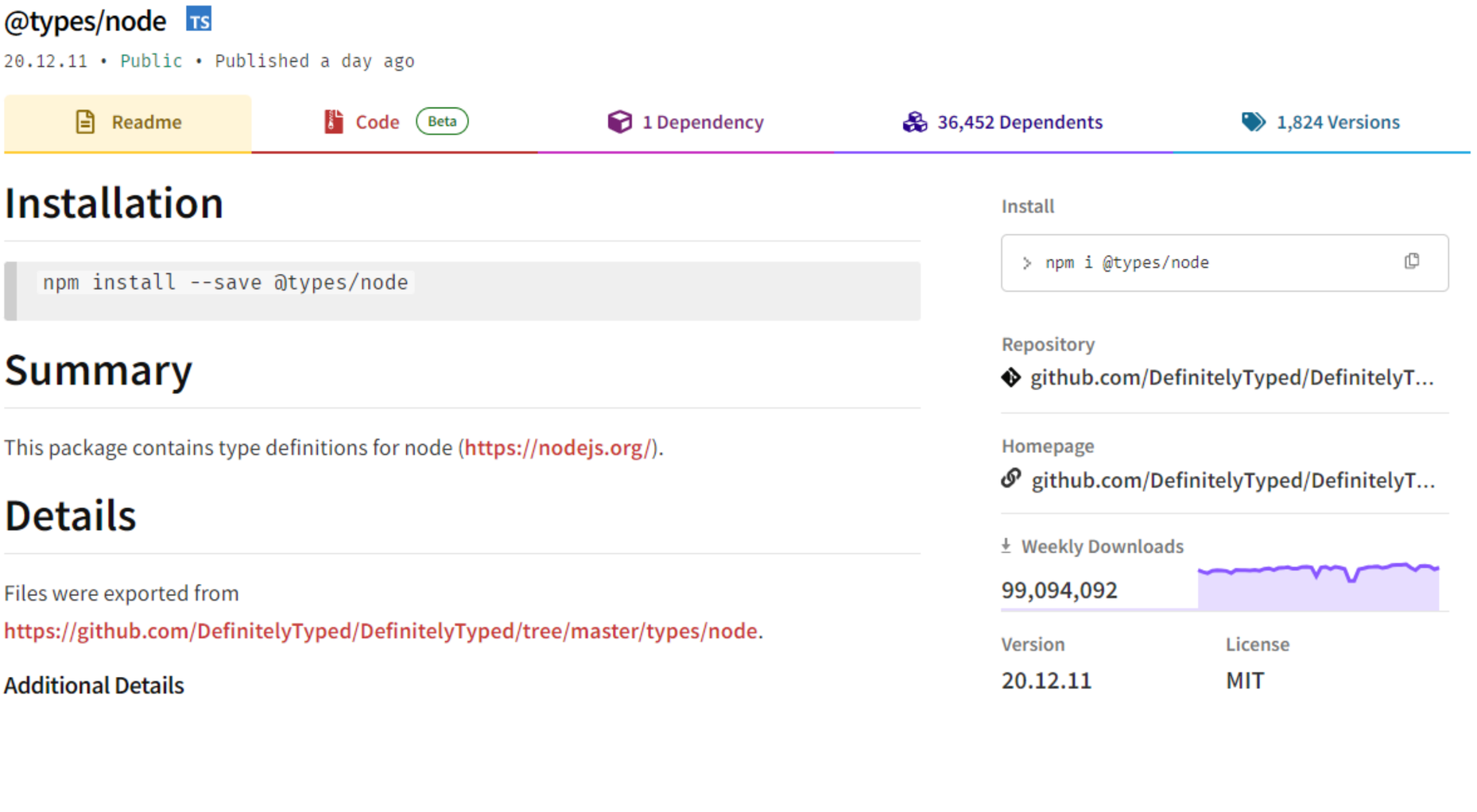
Automatic type acquisition

Demo: Node Typings

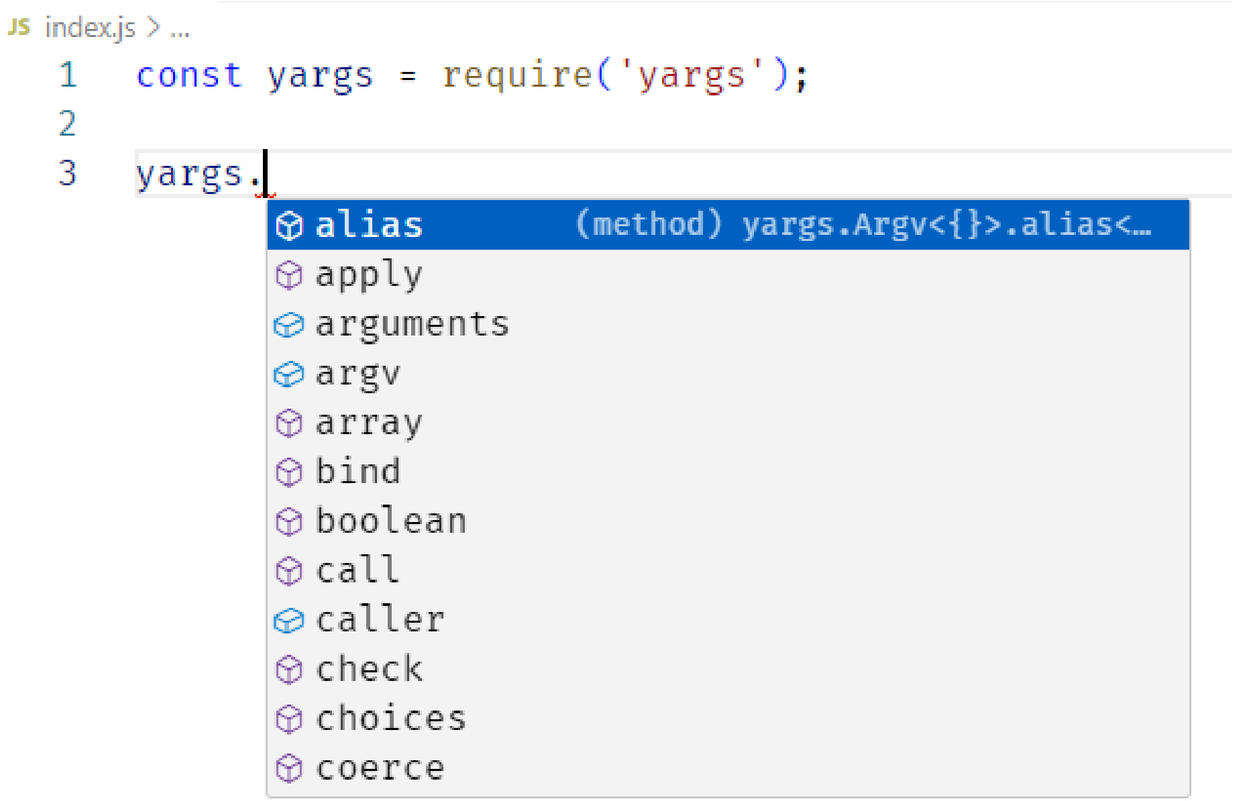
Additional typings can be acquired using jsconfig.json

```
{
  "compilerOptions": {
    "module": "CommonJS",
    "moduleResolution": "Node",
    "target": "ES2015",
  },
  "typeAcquisition": {
    "include": ["node"]
  },
  "exclude": [
    "node_modules",
    "**/node_modules/*"
  ]
}
```

Demo: @types/ Packages



Demo: Node Type Annotations



How IDEs Integrate with npm

Package dependency management

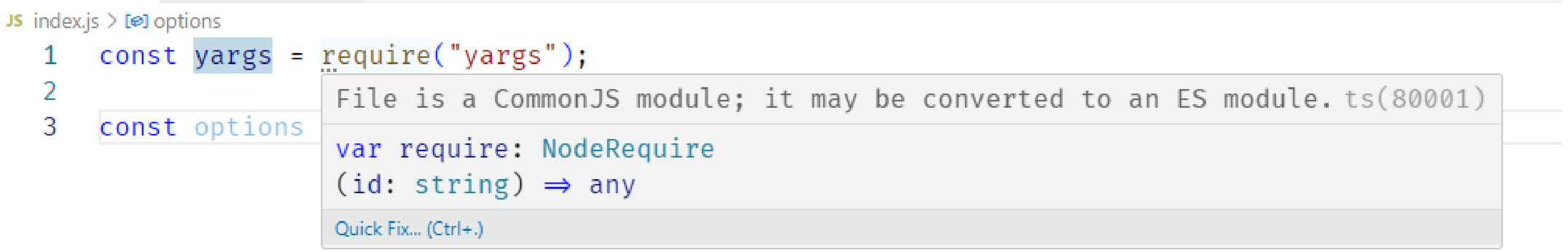
Provide code completion for modules

Informs language tooling versions and configuration

Automatic type acquisition

Detect problems and errors

Demo: Error Annotations



Demo: Problems Panel

You aren't required to fix IDE errors, but they may anticipate runtime errors.

Demo: Run with Invalid Syntax

How IDEs Integrate with npm

Package dependency management

Provide code completion for modules

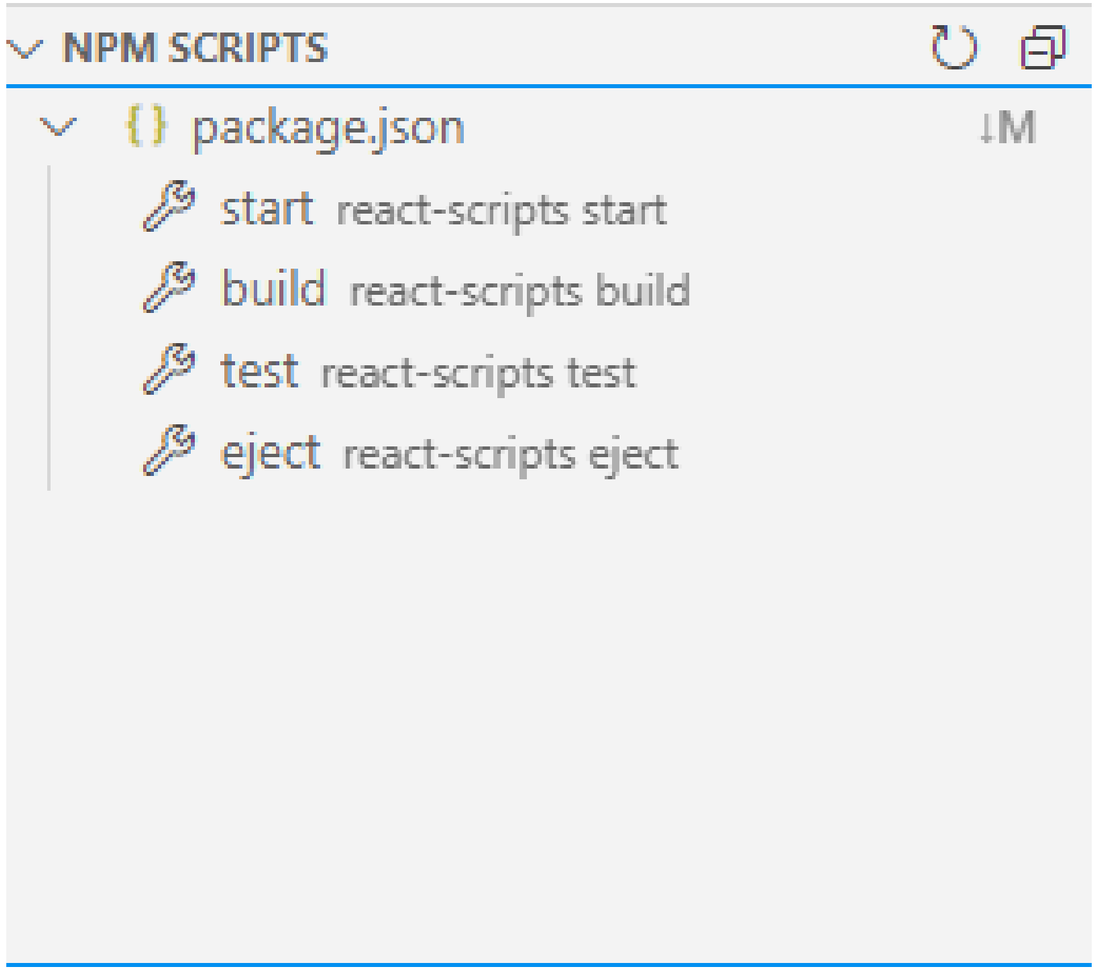
Informs language tooling versions and configuration

Automatic type acquisition

Detect problems and errors

Run npm scripts and tasks

Demo: Run npm Scripts



How IDEs Integrate with npm

Package dependency management

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Automatic type acquisition

Detect problems and errors

Run npm scripts and tasks

Troubleshooting npm Issues

Troubleshooting

Fixing peer dependency errors

Dealing with corporate proxies

Random package installation failures

```
ERESOLVE unable to resolve dependency tree
```

Peer Dependency Error

Some packages require other packages to be at a certain version range, otherwise npm will throw a peer dependency error

```
npm install <package> --force

npm install <package> --legacy-peer-deps
```

Fixing Peer Dependency Errors

Ultimately the package maintainers need to update their version range but there are ways to workaround it if you know the packages are compatible

Demo: Check npm Package Website

Cannot Connect to npm Registry

Create a .npmrc file and configure your registry settings. Configure any proxy or firewall settings.

```
> .npmrc

registry=https://npmjs.com
```

Cannot Connect to npm Registry

Create a .npmrc file and configure your registry settings. Configure any proxy or firewall settings.

Demo: Configuring npm

CLI / Using / Registry

registry

The JavaScript Package Registry

Select CLI Version:

Version 8.19.4 (Legacy)

Description

To resolve packages by name and version, npm talks to a registry website that implements the C
Package Registry specification for reading package info.

npm is configured to use the **npm public registry** at https://registry.npmjs.org by default. Use
registry is subject to terms of use available at https://docs.npmjs.com/policies/terms.

CLI / Configuring / .npmrc

npmrc

The npm config files

Select CLI Version:

Version 8.19.4 (Legacy)

Description

npm gets its config settings from the command line, environment variables, and `npmrc` files.

The `npm config` command can be used to update and edit the contents of the user and global npmrc files.

For a list of available configuration options, see config.

```
rm -rf node_modules
```

Reset Node Modules

Sometimes your node_modules folder will get into an inconsistent state. The nuclear option is to completely remove the directory.

```
code EPROTO
errno EPROTO
request to https://registry.npmjs.org/package failed,
reason: write EPROTO...
```

Error When Pulling down a npm Package

HTTP errors can sometimes happen when packages change in the registry over time

```
npm cache clean --force

npm cache verify
```

Clean npm Cache

For even harder issues, you can try cleaning the npm cache on your system (in addition to removing node_modules).

https://stackoverflow.com/a/48826188

Troubleshooting Resources

Troubleshooting Common npm Errors
https://docs.npmjs.com/common-errors

StackOverflow Questions Tagged "npm"
https://stackoverflow.com/questions/tagged/npm

Summary

npm manages dependencies for both browser- and Node.js-based JavaScript projects

The command you'll use the most day-to-day is npm install, in all its variations

Understanding package versioning constraints will demystify most issues

Your IDE is a powerful tool for making you more productive with coding assistance

You'll run into problems, so it pays to know how to deal with them