Jest: Frontend Testing done right

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codecentric

Who am I?

Developer/Consultant/Whatever

Taming the Web since the 2000

Compiled Mozilla for bonus features

Backend vs. Frontend dev

Podcaster http://autoweird.fm

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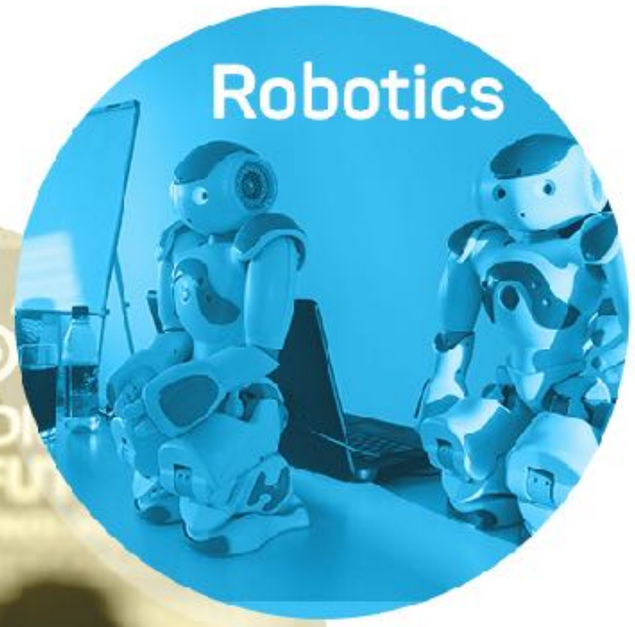
Holger Grosse-Plankermann

Consulting and so much more



International Events

Meetups

+1 Time

Trainings

Webinars

Social Media

Writing

Knowledge Leadership

Blog

Knowledge Sharing

Show of hands

Do you test your frontend code?

- Unit Testing
- Selenium
- Macros

Show of hands

What Test framework are you using?

- Jest
- Mocha
- Karma
- Jasmine
- Something else?

AGENDA

Where are we heading?

Unit Tests in JavaScript

Where do I come from?

What is Jest

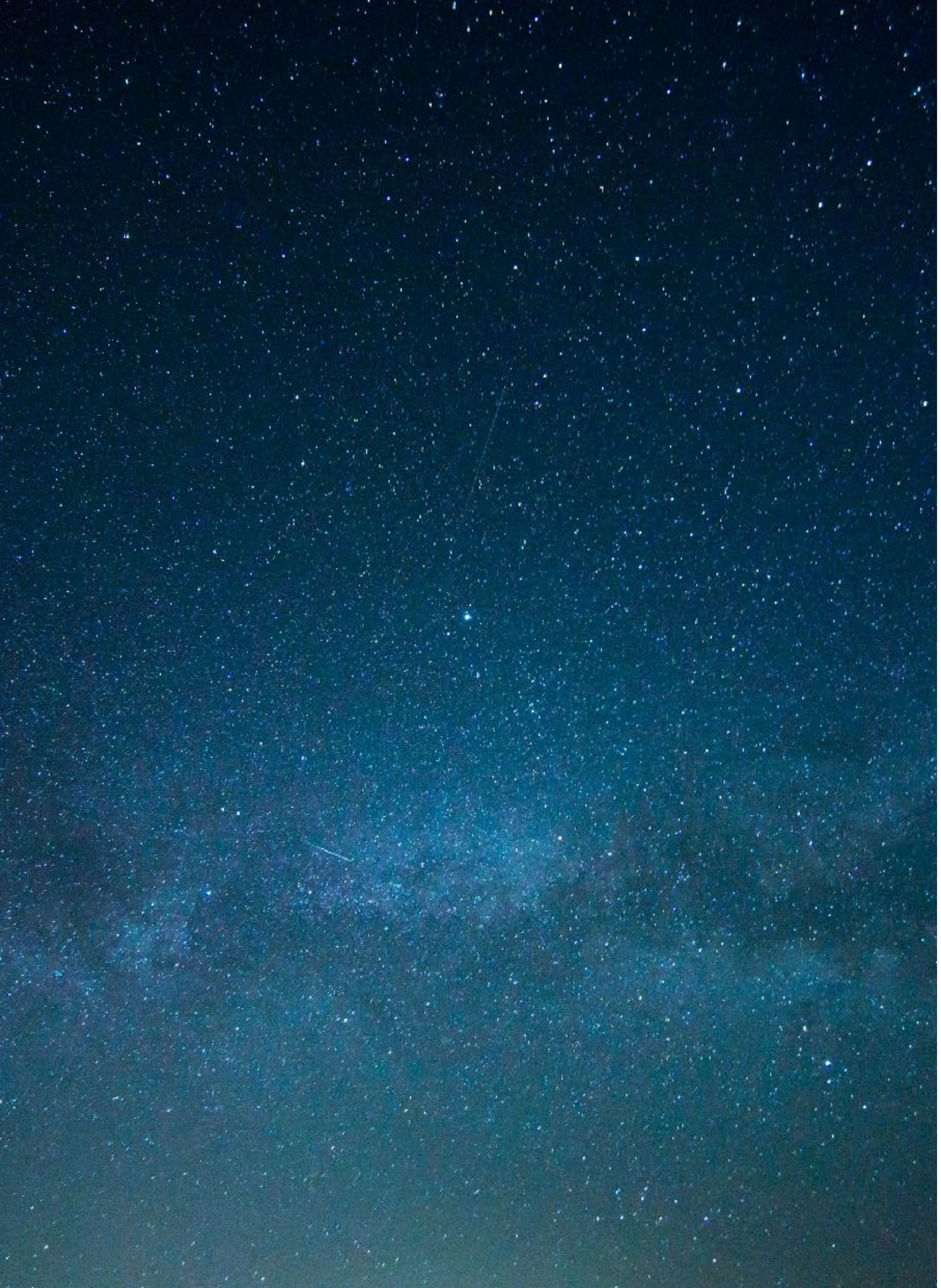
Why another library?

Top 3 reasons for Jest

Number 3 will amaze you :)

(Unit-) Testing JS

Where do I come from



Early Days

- JavaScript === alert(“Foo“)
- Simple Formish Web Apps
- Seemingly no need for thorough testing like in the backend
- „Selenium is enough“

JQuery explosion

- Everybody wanted to build the new Myspace
    - … with jQuery
- But frontend skills were still lacking
- *Let's do complicated backend stuff and finish the frontend with some sprinkles of jQuery …*
    - … And some more
    - jQuery Jenga
- Too „complicated" to properly test our frontend code

Rise of SPAs

- In the age of SPAs the need for proper testing on the client arose
  - Alongside the explosion of the ecosystem
- Many different approaches (Hey it's Javascript!l
  - Jasmine
  - Mocha
  - QUnit
  - .....
- But: Terribly to set up!

Where are we now?

- SPAs/JS somehow mainstream
  - Often more code in the frontend than in the backend
- JS testing however is not
  - Console.log is still a thing

Why is that?

- Backend Java testing is well established
  - And Tooling is quite nice tbh
  - mvn clean install ftw
- JavaScript Testing used to be a mess
  - Tons of config and dependencies needed to be orchestrated
  - And that rumor is still in our heads

Testing in the frontend is important

- More and more complex code than in the backend
- Rapid feedback
- Safety net
- Design!
- Documentation

- Testing is a task many devs don't like
  - Don't let the tools stand in the way!
  - Help is on the way!

Enter Jest

A library that puts the fun in testing

What is Jest?

- Testing Library/Framework
- Comparable to XUnit
  - Command Line Runner
  - More Features

Jest: Facts and figures

- Developed by Facebook
- Current Version 22.4
- MIT Licensed
- > 16.000 Github Stars
- Has been around since 2014

Jest: Facts and figures

- Comes from Facebook but it's not limited to React
- Works like a charm in my projects
  - React based
  - Vue based
  - JQuery backed
  - Did not test it with Angular
    - But should work

TOP 3 Reasons to use Jest now

You won't believe Number 2 :)

Easy Setup

You can start with very little config

Awesome CLI

A really polished product

All in the box

Little to no need for third party Libs

Easy setup

Simple to install and simple to use

Let's get started

I want to write the first test!

Create-React-App

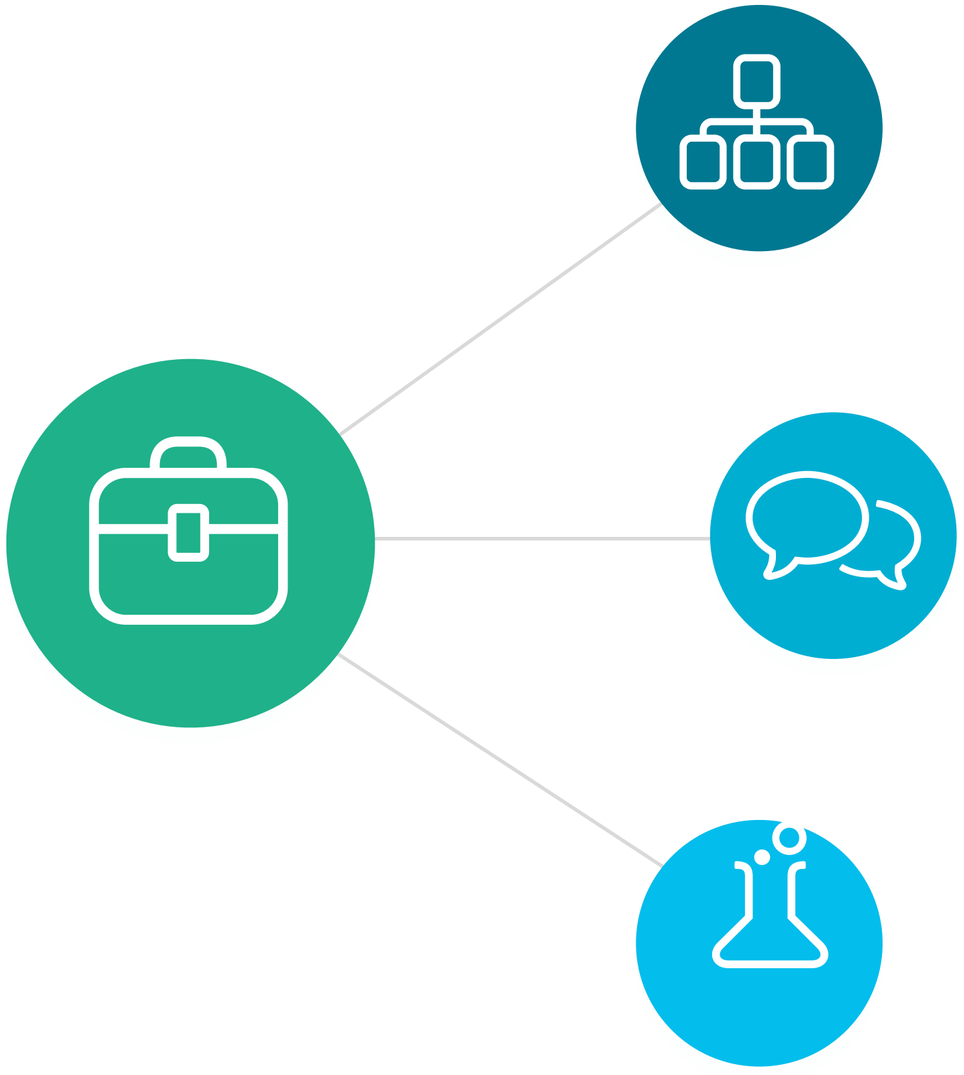
Probably the easiest way to get going is to just use create-react-app

repl.it

Use an online repl might be even easier.

npm install jest

Come on let's get our hands dirty



Let's get started

- Install dependencies
- package.json
- Write a simple test
- Run it
- Be amazed

```
$ npm install -D jest
```

```
"scripts": {
  "test": "jest",
  "test:watch": "jest --watch"
},
```

```
describe('Demo should', () => {
    it('be green', () => {
        expect(true).toBe(true);
    });
});
```

```
$> npm test

 PASS  ./demo.spec.js
  Demo should
    ✓ be green (2ms)

Test Suites: 1 passed, 1 total
Tests:       1 passed, 1 total
Snapshots:   0 total
Time:        1.606s
Ran all test suites.
```

Anatomy of a test

```
describe("add", () => {
  beforeEach(() => {})
  afterEach(() => {})
  beforeAll(() => {})
  afterAll(() => {})

  it("should compute the sum", () => {
    expect(add(1, 2)).toBe(3);
  });
});
```

This gives a nice descriptive scoped structure of your test.
As a bonus Jest can print the results nicely,
I can recommend that structure

```
test("should compute the sum", () => {
  expect(add(1, 2)).toBe(3);
})
```

A more traditional way of writing your tests
Possible, but less expressive than the describe style.

Where are my tests?

- Out of the box Jest looks for

```
__tests__/*
foo.test.js
bar.spec.js
```

- Configurable
- Suited my needs well thus far

Works with ES6

- Add babel

```
$ npm install -D babel-jest babel-core babel-preset-env
```

- Add a .babelrc

```
{
    "presets": ["env"]
}
```

- Jest picks it up automatically
- No need to configure

- Compile to JS friendly
    - e.g. works (now) well with TypeScript

Configurable

- in your package.json

```
"jest": {
  "verbose": true
}
```

- via JavaScript

```
// jest.config.js
module.exports = {
  verbose: true,
};
```

- Or using CLI

- https://facebook.github.io/jest/docs/en/configuration.html

Sandboxed and parallel

- Runs errors tests first
- Runs tests in parallel
- Tests run in a sandbox
  - No conflicting

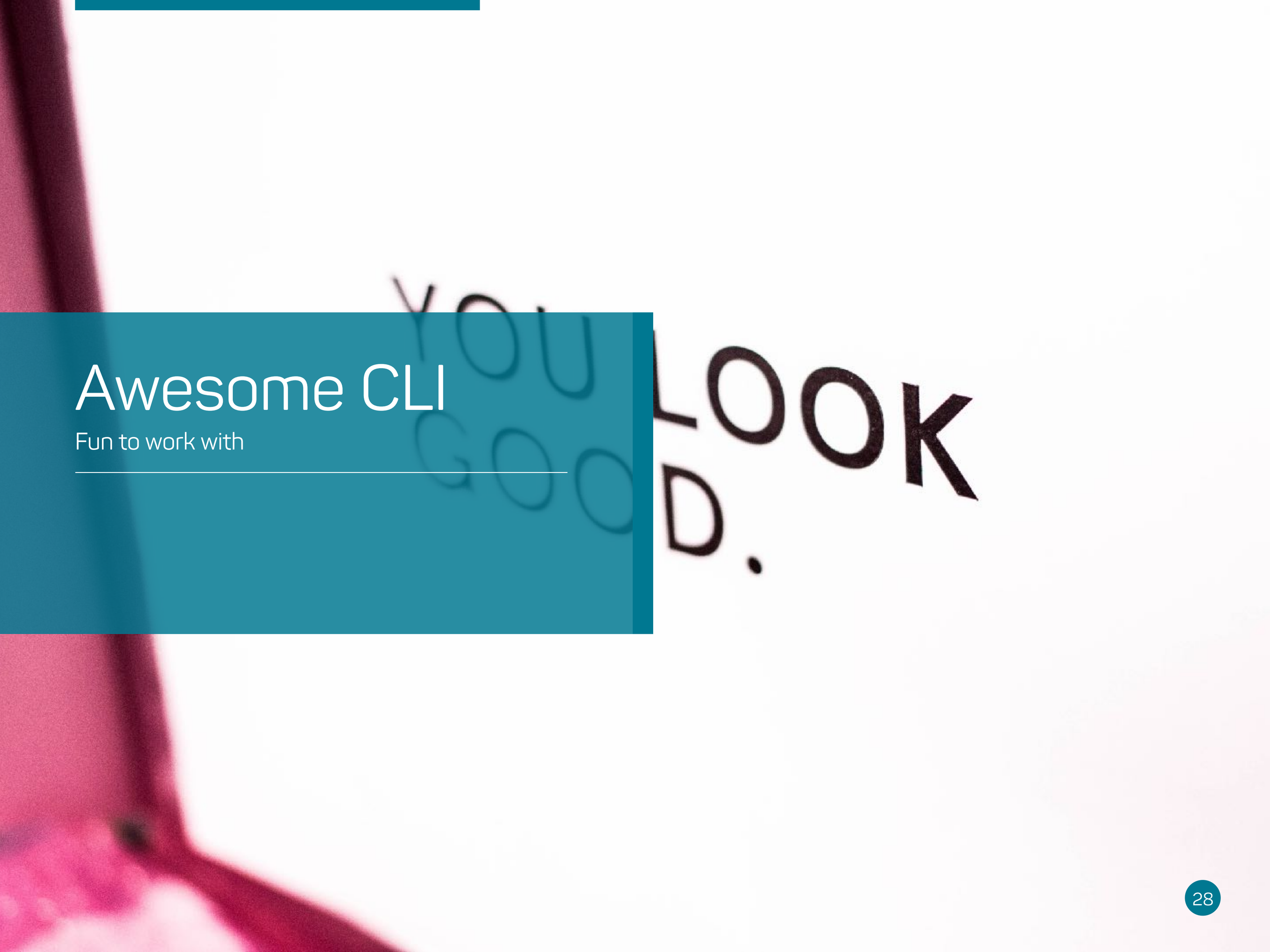
Optional: Install Jest globally

- Use Jest without configuring scripts
- I use it for convenience

```
$ npm install -g jest
```

Awesome CLI

Fun to work with



Test results

- Nice output out of the box

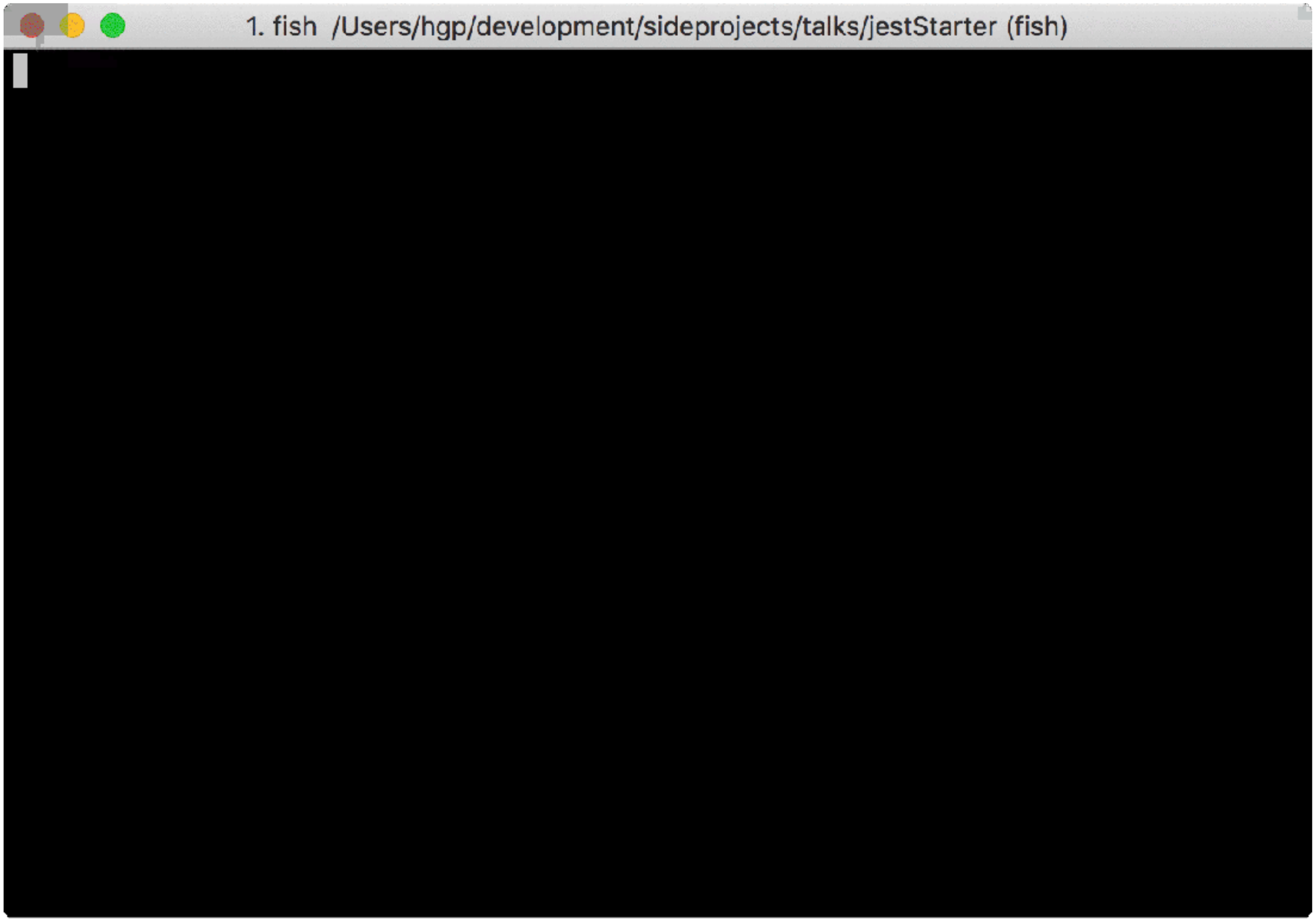
```
PASS  client/service/skippingAndForcing.spec.js
PASS  client/service/customMatchers.spec.js
PASS  client/service/asymetricExpectations.spec.js
PASS  client/service/serviceUser.spec.js
PASS  client/service/newExpectations.spec.js
PASS  client/service/httpServiceWithPromises.spec.js
PASS  client/components/FirstTest.spec.js
PASS  client/components/TextComponent.spec.jsx
PASS  client/components/App.spec.jsx (5.539s)
PASS  client/components/ListComponent.spec.jsx (5.589s)

Test Suites: 10 passed, 10 total
Tests:       5 skipped, 23 passed, 28 total
Snapshots:   5 passed, 5 total
Time:        9.83s
Ran all test suites.
```

Meaningful error reports

```
$> jest
 FAIL  ./add.spec.js
  • add › should compute the sum

    expect(received).toBe(expected) // Object.is equality

    Expected value to be:
      4
    Received:
      3

       8 |
       9 |     it('should compute the sum', () => {
    >  10 |         expect(add(1, 2)).toBe(4);
      11 |     });
      12 | });
      13 |

      at Object.<anonymous> (add.spec.js:10:27)

 PASS  ./stringProducer.spec.js
 PASS  ./asymetricExpectations.spec.js
..
 PASS  ./skippingAndForcing.spec.js

Test Suites: 1 failed, 8 passed, 9 total
Tests:       1 failed, 5 skipped, 15 passed, 21 total
Snapshots:   1 passed, 1 total
Time:        3.53s
Ran all test suites.
```

Watch mode

- Nice for TDD



Code coverage

- Computes coverage out of the box

```
$ jest --coverage
 PASS  client/service/newExpectations.spec.js


Test Suites: 10 passed, 10 total
Tests:       5 skipped, 23 passed, 28 total
Snapshots:   5 passed, 5 total
Time:        4.099s
Ran all test suites.
-----------------------------|----------|----------|----------|----------|-----------------|
File                         |  % Stmts | % Branch |  % Funcs |  % Lines |Uncovered Lines |
-----------------------------|----------|----------|----------|----------|-----------------|
All files                    |    90.91 |      100 |    86.67 |    93.33 |                 |
 components                  |      100 |      100 |      100 |      100 |                 |
  App.jsx                    |      100 |      100 |      100 |      100 |                 |
  ListComponent.jsx          |      100 |      100 |      100 |      100 |                 |
  TextComponent.jsx          |      100 |      100 |      100 |      100 |                 |
 service                     |    81.25 |      100 |    77.78 |    84.62 |                 |
  httpService.js             |      100 |      100 |      100 |      100 |                 |
  httpServiceWithPromises.js |      100 |      100 |      100 |      100 |                 |
  serviceUser.js             |     62.5 |      100 |       50 |    66.67 |            9,10 |
-----------------------------|----------|----------|----------|----------|-----------------|
```

Even nicer output

- verbose Option

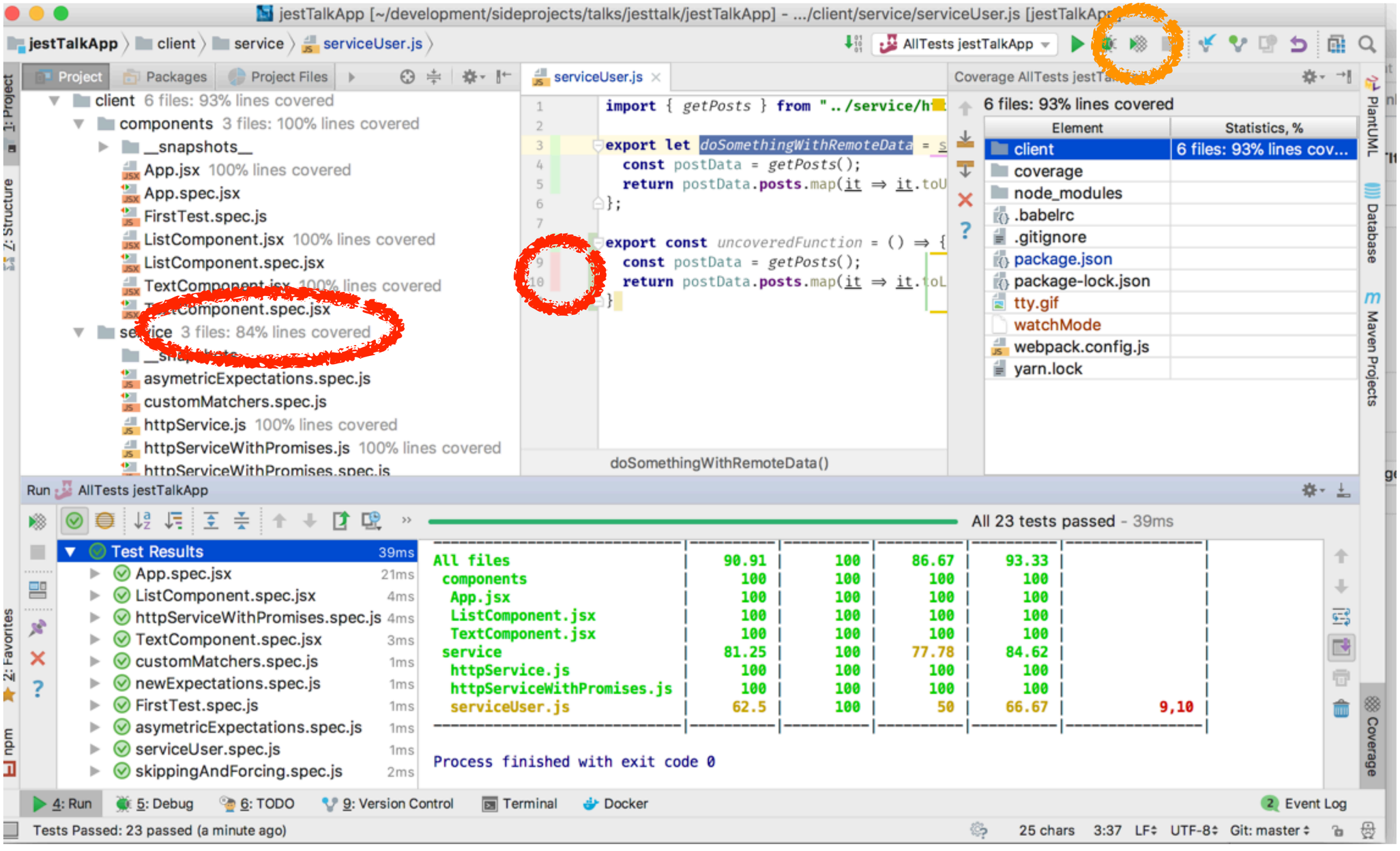
```
$ jest --verbose
 PASS  client/components/App.spec.jsx
  App
    ✓ renders (14ms)
    ✓ calling Service correctly (3ms)
    ✓ renders with defined data (1ms)
    ✓ renders with defined return function (1ms)

 PASS  client/service/httpServiceWithPromises.spec.js
  httpService getPosts should
    ✓ talk to the backend using done (1ms)
    ✓ talk to the backend using promise returns
    ✓ talk to the backend using expectations (1ms)
    ✓ talk to the backend using async await (1ms)
  httpService getPostsRejecting should
    ✓ reject using done
    ✓ reject using promise returns (1ms)
    ✓ reject using expectations
    ✓ reject using async await (1ms)


Test Suites: 10 passed, 10 total
Tests:       5 skipped, 23 passed, 28 total
Snapshots:   5 passed, 5 total
Time:        2.187s
Ran all test suites.
```

There’s more

- —onlyChanged /-o
  - runs test affected by files changed

- --lastCommit
  - runs test affected by files changed in the last commit

Editor integration IntelliJ



IDE Support

It just works

- **I use it mainly in IntelliJ/Webstorm and it just works**
  - Use a Run Config like any other test
  - In EAP even coverage is shown
- **Works fine in VSCode**
  - Some more config
    - Not that polished than IntelliJ
    - But fine for me
  - I use the Jest extension
- **Did not test it with Eclipse**
- **I often use it on the command line**
  - Alongside the IDE
  - The watch feature shines there

Batteries included

Less need for 3rd Party libs

What's in the box

- Expectations
- Mocking
- Snapshot Tests
- Async Tests
- DOM Testing
- Code coverage

Expectations

- No need for separate Mocha/Jasmine/expect
- All the expectations you need
- https://facebook.github.io/jest/docs/en/expect.html

```
.toBe(value)
.toHaveBeenCalled()
.toBeCloseTo(number, numDigits)
.toBeDefined()
.toBeFalsy()
.toBeGreaterThan(number)
.toBeGreaterThanOrEqual(number)
.toBeLessThan(number)
.toBeLessThanOrEqual(number)
.toBeInstanceOf(Class)
.toBeNull()
.toBeTruthy()
.toBeUndefined()
.toContain(item)
.toContainEqual(item)
.toEqual(value)
.toHaveLength(number)
.toMatch(regexpOrString)
.toMatchObject(object)
...
```

Expectations: Examples

Expecting Objects

```
export const objectProducer = (index) => ({
    booleanProperty: (index % 2) === 0,
    stringProperty: 'test' + index
});
```

```
describe('object producer should', () => {
    it('produce an object', () => {
        const object = objectProducer(1);
        expect(object).toBeDefined();
        expect(object.booleanProperty).toBe(false);
        expect(object.stringProperty).toEqual("test1");
        expect(object.stringProperty).toEqual(expect.stringContaining('est'));
        expect(object).toEqual(expect.objectContaining({booleanProperty: false}));
    });
});
```

Expecting Arrays

```
export function arrayProducer() {
    return [objectProducer(1), objectProducer(3), objectProducer(3), objectProducer(4)];
}
```

```
describe('array producer should', () => {
    it('produce an array', () => {
        const array = arrayProducer();
        expect(array).toContainEqual({stringProperty: "test2", booleanProperty: true});
    });
});
```

Useful shortcuts

`xdescribe()/describe.skip()`
`xit()/it.skip()`
`xtest()/test.skip()`

Skips the block

`fdescribe()/describe.only()`
`fit()/it.only()`
`ftest()/test.only()`

Executes only this block (in the block)

Matchers are extendable

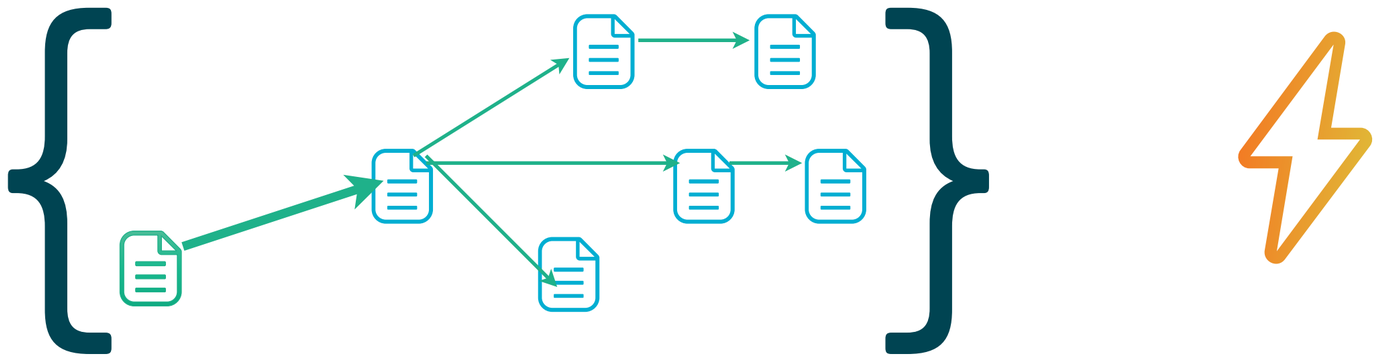
- To make your tests better readable

```
expect.extend({
    arrayLengthDivisibleBy(received, argument) {
      const pass = received.length % argument == 0;
      if (pass) {
        return {
          message: () =>
            `expected ${received} not to be divisible by ${argument}`,
          pass: true,
        };
      } else {
        return {
          message: () => `expected ${received} to be divisible by ${argument}`,
          pass: false,
        };
      }
    },
  });
```

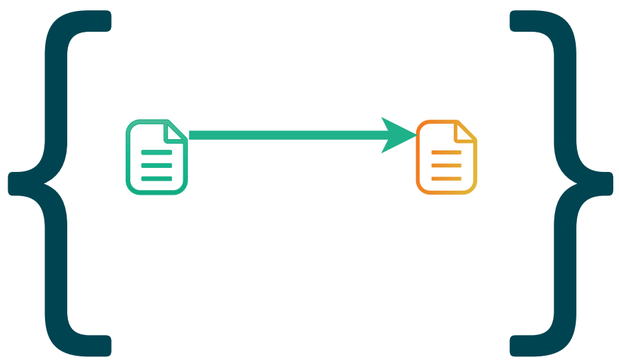
```
describe('array producer should', () => {
    it('produce an array with even number', () => {
        const array = arrayProducer();
        expect(array).arrayLengthDivisibleBy(2);
    });
});
```

Mocking

In a unit test it is often unfeasible to kickstart your whole dependency graph



Mocking lets you narrow down the scope of your test



Mocking

- No need for separate Sinon.js
- Works similar to Mockito in Java

Mock Functions

Lets you replace more complex logic with logic right for your test

Manual Mocks

Lets you replace whole modules for your test

Mock functions

- Mock calls

```
export function objectCaller(toBeCalled) {
    toBeCalled.fire('1');
    toBeCalled.fire('2');
    toBeCalled.fire('3');
}
```

```
 it('call collaborator', () => {
     const collaborator = {
         fire: jest.fn()
     };
     objectCaller(collaborator);
     expect(collaborator.fire).toHaveBeenCalled();
     expect(collaborator.fire).toHaveBeenCalledTimes(3);
     expect(collaborator.fire).lastCalledWith('3');
     expect(collaborator.fire).toHaveBeenCalledWith('2');
     expect(collaborator.fire.mock.calls[1][0]).toBe('2');
});
```

- Mock returns

```
export function objectCallerAndReturner(toBeCalled) {
   return toBeCalled.trigger('1');
}
```

```
it('return data from collaborator', () => {
     const collaborator = {
         trigger: jest.fn().mockReturnValue('22')
      };
     objectCallerAndReturner(collaborator);
     expect(collaborator.trigger()).toBe('22');
});
```

Mock a module

```
import { doSomethingWithRemoteData } from "./serviceUser.js";

jest.mock("./httpService", () => {
  const getPostMock = () => {
    return {
      posts: ["fake", "data"]
    };
  };
  return {
    getPosts: getPostMock
  };
});

describe("serviceUser should", () => {
  it("talk to backendService", () => {
    const data = doSomethingWithRemoteData();
    expect(data).toEqual(["FAKE", "DATA"]);
  });
});
```

Snapshot tests by example

Code to be tested

```
export const stringProducer = (a) => {
    return "myString" + a;
}
```

Snapshot Test

```
const myString = stringProducer('Reactjs');
expect(myString).toMatchSnapshot();
```

```
exports[`stringProducer should prepend the given string 1`] = `"myStringReactjs"`;
```

Snapshot

```
export const stringProducer = (a) => {
    return "yourString" + a;
}
```

```
FAIL  ./foo.test.js
  ● stringProducer › should prepend the given
string

    expect(value).toMatchSnapshot()

    Received value does not match stored snapshot
1.

    - "myStringReactjs"
    + "yourStringReactjs"

      at Object.<anonymous> (foo.test.js:6:26)
          at Promise (<anonymous>)
          at <anonymous>
      at process._tickCallback (internal/process/
next_tick.js:188:7)

 › 1 snapshot test failed.
```

Result

So what is this useful for?

Test that would require some effort to expect

React components (that should not change)

Things you would not test otherwise

That being said

Besides snapshot tests being awesome

Snapshot test may be brittle

You NEED to review your snapshot changes

No jest -u fire and forget

Prefer unit tests

DOM Testing

- Jest comes with JSDOM to support testing DOM.

- JSDOM simulates a DOM-enviroment.

```
const setupDOM = () => {
    document.body.innerHTML =
        '<div>' +
        '  <div id="openDialog" >Click</div>' +
        '  <div id="dialog" />' +
        '' +
        '</div>';
    initPage();
};
```

```
it('open on a click at the clickable element', () => {
    document.querySelector('#openDialog').click();
    expect(isDialogOpen()).toBe(true);
});
```

Async Tests

- Are supported out-of-the box

```
describe("httpService getPosts should", () => {
  const response = {
    posts: ["complicated", "JSON", "Response"]
  };

  it("talk to the backend using done", done => {
    getPosts().then(data => {
      expect(data).toEqual(response);
      done();
    });
  });

  it("talk to the backend using promise returns", () => {
    return getPosts().then(data => {
      expect(data).toEqual(response);
    });
  });

  it("talk to the backend using expectations", () => {
    expect(getPosts()).resolves.toEqual(response);
  });

  it("talk to the backend using async await", async () => {
    const posts = await getPosts();
    expect(posts).toEqual(response);
  });
});
```

- I like the async/await Syntax

What's in the box

- Expectations
- Mocking
- Snapshot Tests
- Async Tests
- DOM Testing
- Code coverage
- And more

Coming to an end

Some closing words

What we had to do

- Install dependencies
- package.json
- babel

https://github.com/holgergp/jestStarter

```
$ npm install -D jest
```

```
"scripts": {
  "test": "jest",
  "test:watch": "jest --watch"
}
```

```
$ npm install -D babel-jest babel-core babel-preset-env
```

```
//.babelrc
{
    "presets": ["env"]
}
```

Try Jest yourself

Easy to use and setup

Powerful features set yet familiar

Polished product (even the CLI)

Tryout Jest

https://facebook.github.io/jest/


Thanks!

Questions?

Picture Links

- https://unsplash.com/photos/FQjmQgSoRyQ
- https://unsplash.com/photos/gYxVSeZazXU
- https://unsplash.com/photos/h1v8lkfDUu4
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- https://unsplash.com/photos/6dvxVmG5nUU
- https://unsplash.com/photos/D56TpVU8zng
- https://unsplash.com/photos/TyQ-0lPp6e4
- https://unsplash.com/photos/gdBXlL053N4

Stay connected

Thanks for listening!

Our mission – to promote agile development, innovation and technology – extends through everything we do.

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