ANGULAR
ARCHITECTS
INSIDE KNOWLEDGE

Testing Angular
Jest & Cypress

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Outline

- Motivation

- Unit Tests & Component Tests
  - Jest
  - Puppetteer
  - Story Book

- End-to-End Tests with Cypress

Motivation Testing

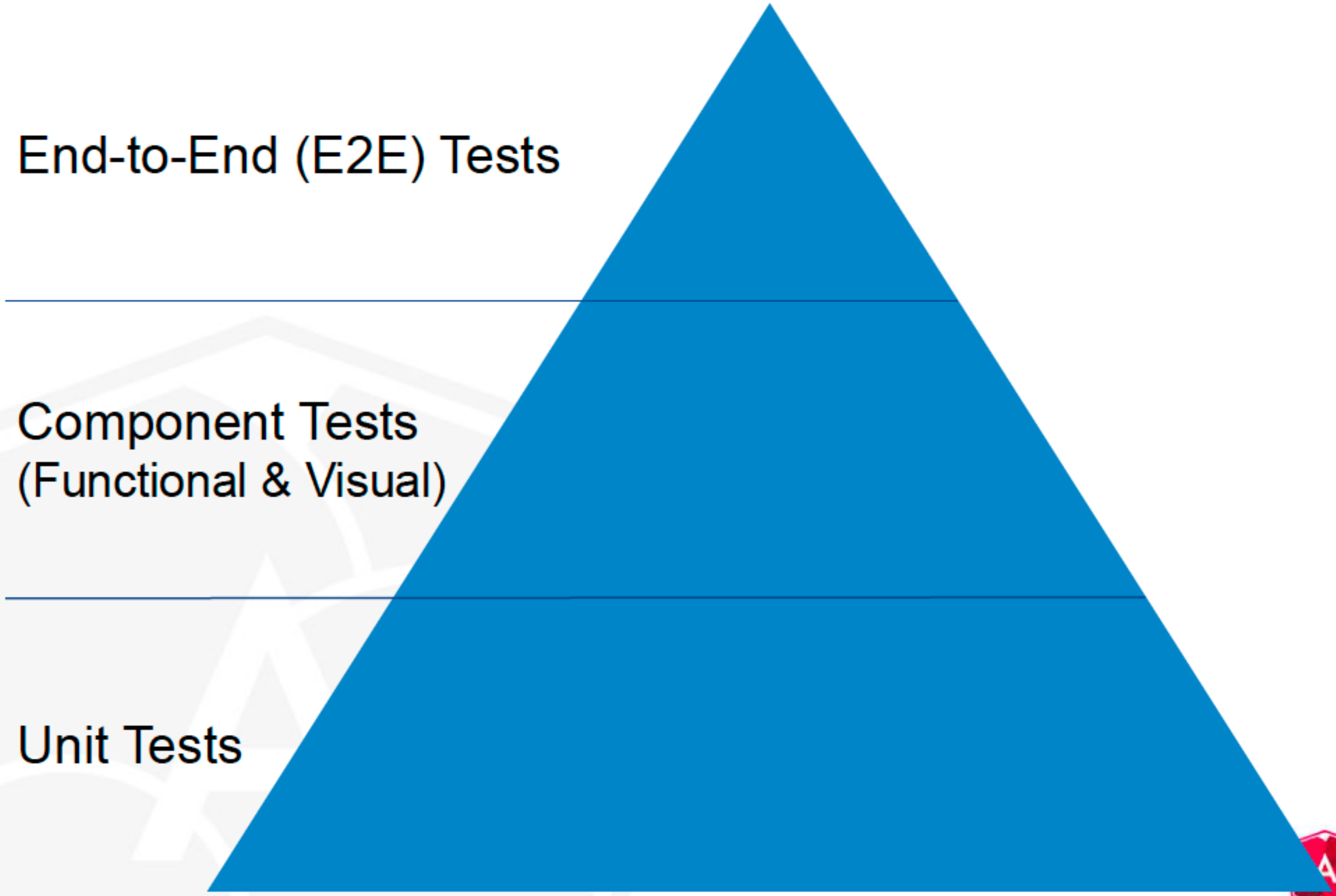
- Prevent bugs
- Enforce code quality
- Tests must be backed by Devs (require discipline)
- Writing Tests needs to be learned
- Tests must run fast, each has its own universe

Unit tests vs. E2E tests

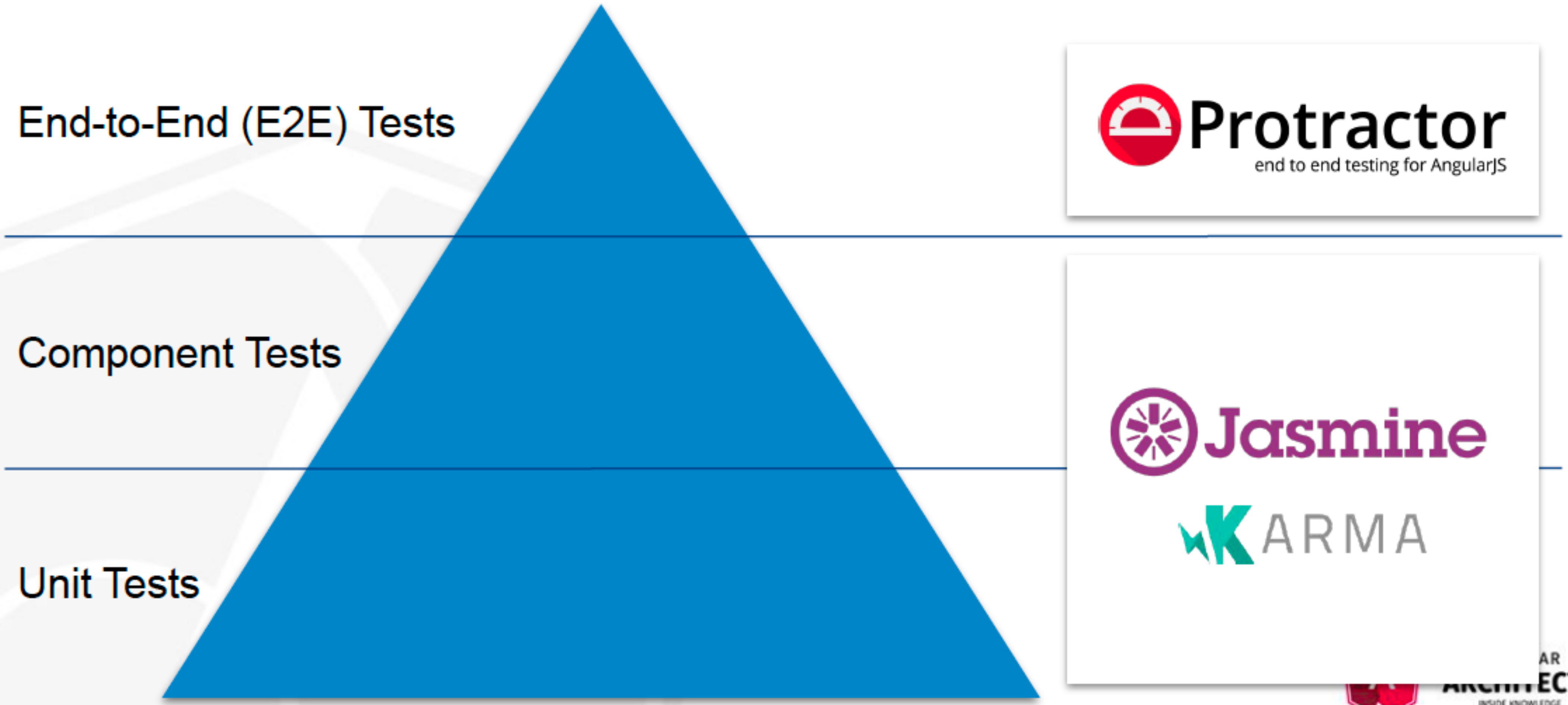
- Unit tests
  - Isolated component tests
  - Should be the majority of the tests
  - Quickly executable

- E2E tests
  - Cross-component tests
  - Simulation of user inputs

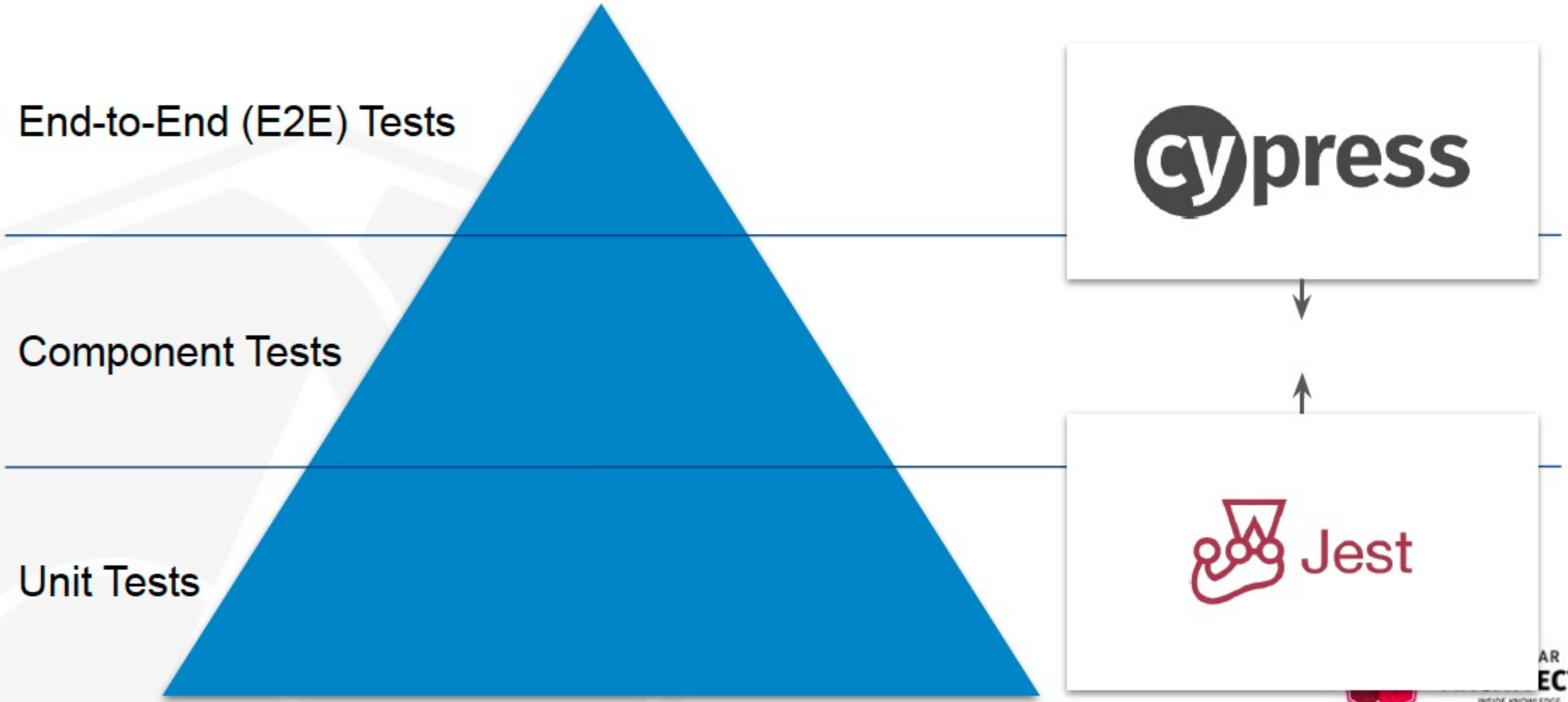
Testing pyramid



Official version (until NG 12)



Our recommendation



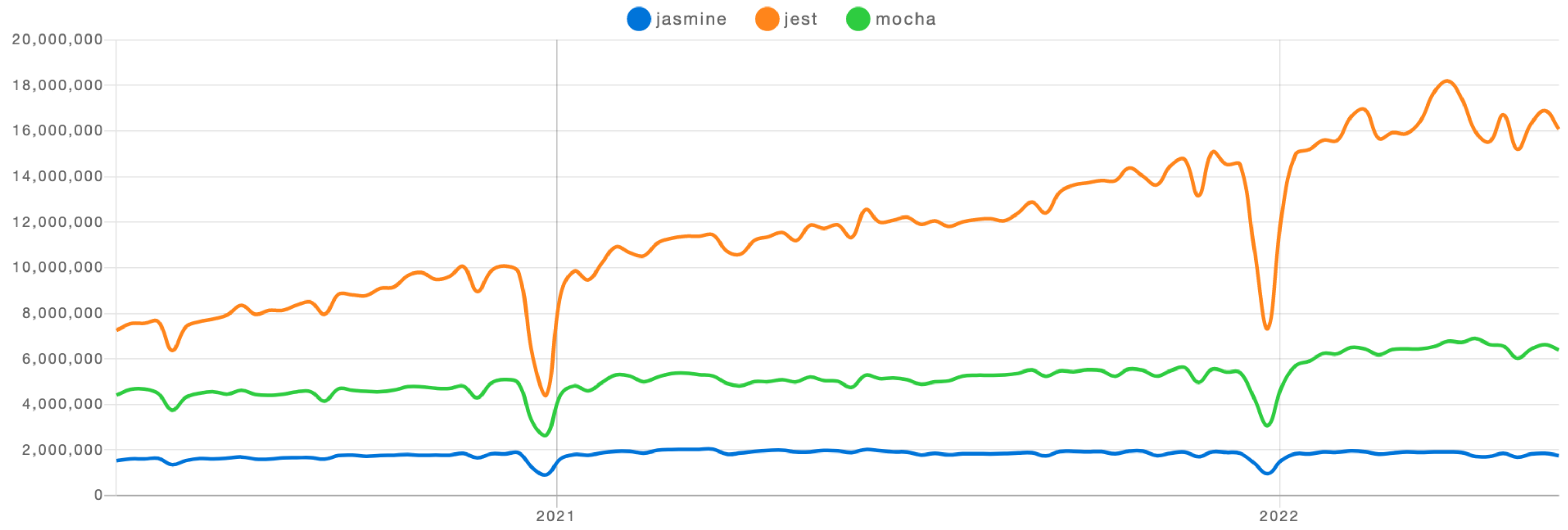
npm trends

jasmine vs jest vs mocha

Enter an npm package...

jasmine × jest × mocha × + qunit + ava + chai + expect + should

Downloads in past 2 Years



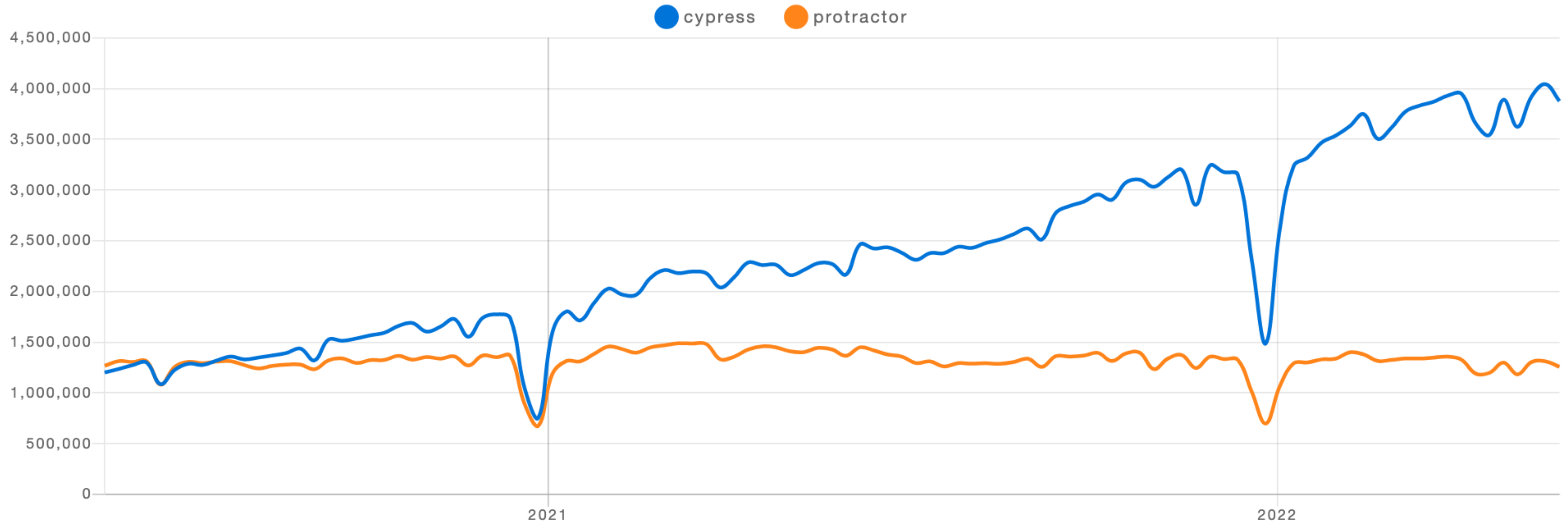
npm trends

cypress vs protractor

Enter an npm package...

cypress × protractor × + nightwatch + webdriverio + testcafe + puppeteer

Downloads in past 2 Years



Unit Tests

Testdriven development process (ideal world)

- Start with a Test
- Define how you would like to use the functionality
- Make sure it fails
- Implement it
- For next use case, define test

Setup

- Angular CLI
  - ng add @briebug/jest-schematic
  - Remove all karma, jasmine, protractor deps
  - Make sure tsconfig is using jest types

- nrwl NX
  - Support out-of-the-box

Motivation

- Superior Code Quality
- Documentation
- Find bugs quickly
- No issues with code coverage

Running Tests

- Running all tests
  - jest or ng test
- Running specific ones
  - jest -t [namePattern]
- Running interactively (Developer Mode)
  - jest --watch

A basic test

```
describe('Initial Tests', () => {
	it('should work', () => {
		expect(true).toBe(true);
	});
});
```

Basic Expects

- expect(true).not.toBe(false);

- expect(true).toBeTruthy();
- expect({}).toBeTruthy();
- expect('').toBeFalsy();

- expect('').toBeDefined();
- expect(null).toBeNull();
- expect(null).toBeDefined();

Data-Type Expects

- string & number
  - expect('hallo').toMatch(/l/);
  - expect(5).toBeGreaterThan(2);
  - expect(0.2 + 0.1).toBeCloseTo(0.3);

- arrays
  - expect([]).toHaveLength(0);
  - expect([1, 2, 3]).toContain(1);

- types
  - expect(new Date()).toBeInstanceOf(Date);
  - expect(new A()).toBeInstanceOf(A);
  - expect(() => true).toBeInstanceOf(Function);

Object Expects

```
const address = {
		street: 'Domgasse’,
		streetNumber: '5’,
		zip: '1010’,
		city: 'Vienna’
};
const clone = { ...address };
```

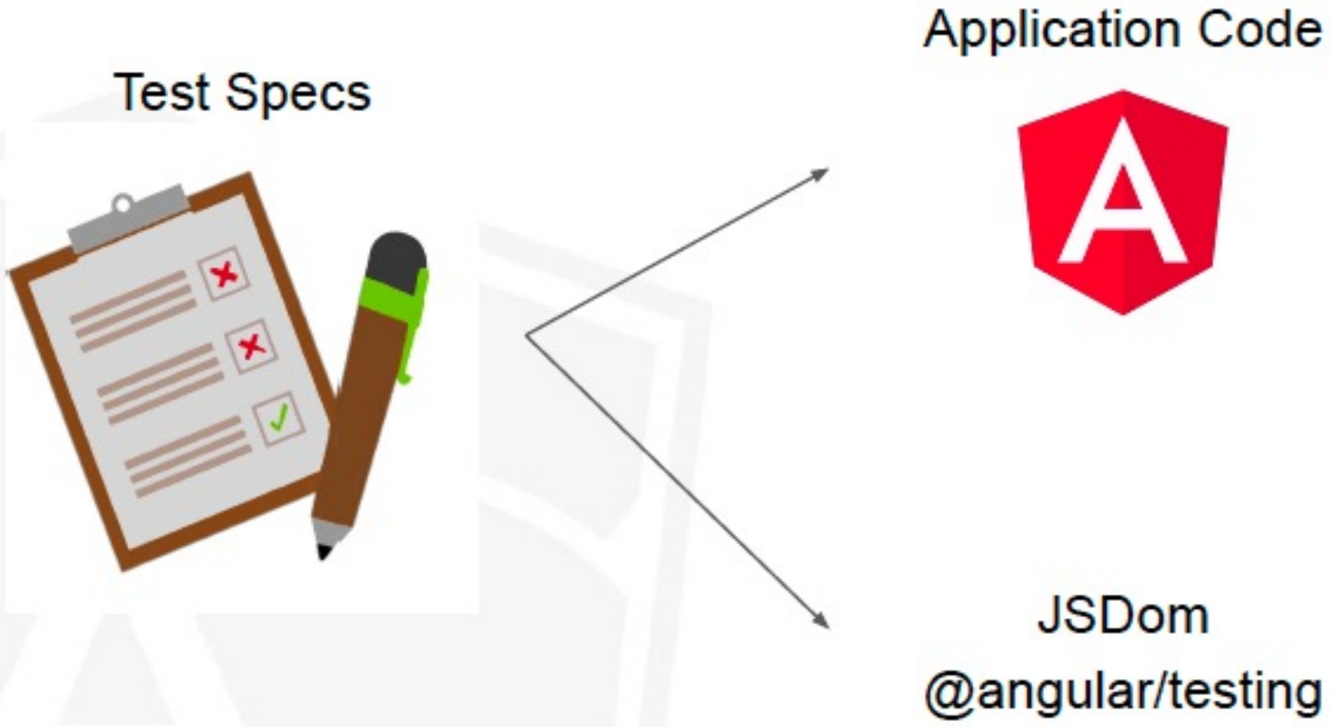
- expect(address).toBe(clone); // fails
- expect(address).toEqual(clone); // succeeds
- expect(address).toMatchObject({ street: 'Domgasse', city: 'Vienna' }); // succeeds
- expect(address).toMatchObject({ city: expect.stringMatching(/Vienna|Wien/) }); // succeeds

Expect Exceptions

```
const fn = () => {
        throw new Error('nothing works');
};
```

- expect(fn).toThrowError();
- expect(fn).toThrowError('nothing works');

Component Tests


Jest
Test Specs
Application Code
JSDom
@angular/testing

Component Tests powered by Angular

- TestBed
  - Configures & initializes environment for unit testing
  - Provides methods for creating components and services in unit tests.

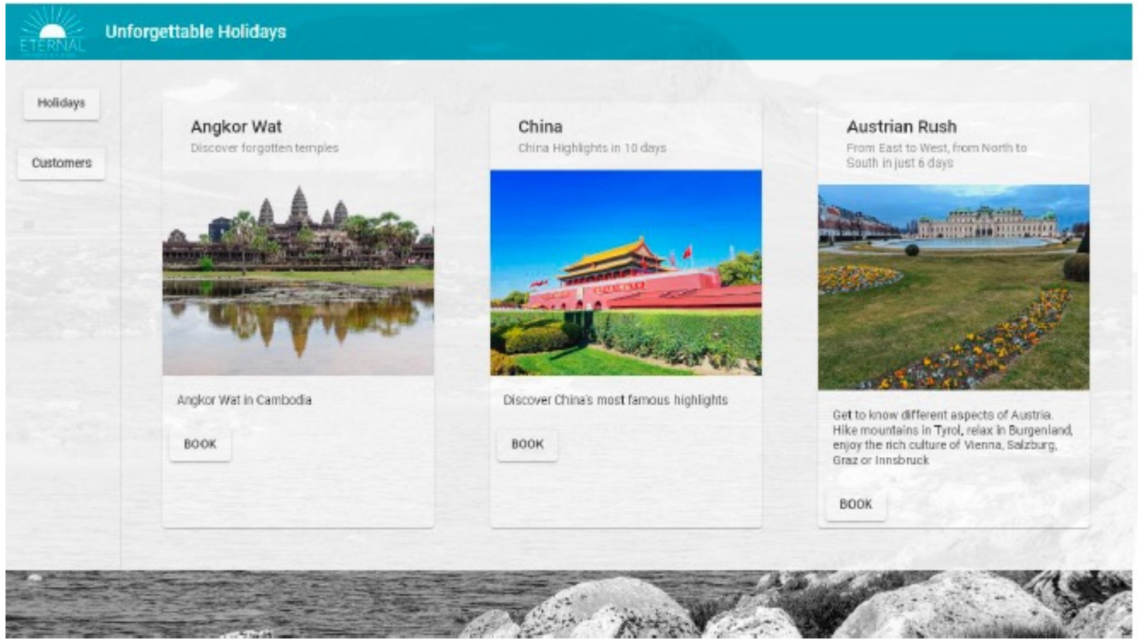
- TestModule

```
const fixture = TestBed.configureTestingModule({
            declarations: [AddressComponent],
            imports: [ReactiveFormsModule],
            providers: [{ provide: AddressLookuper, useValue: null }]
}).createComponent(AddressComponent);

const component = fixture.componentInstance;
```

Component Tests - Puppetteer I

- Puppetteer
  - Headless Browser
  - Spot the difference



Unforgettable Holidays

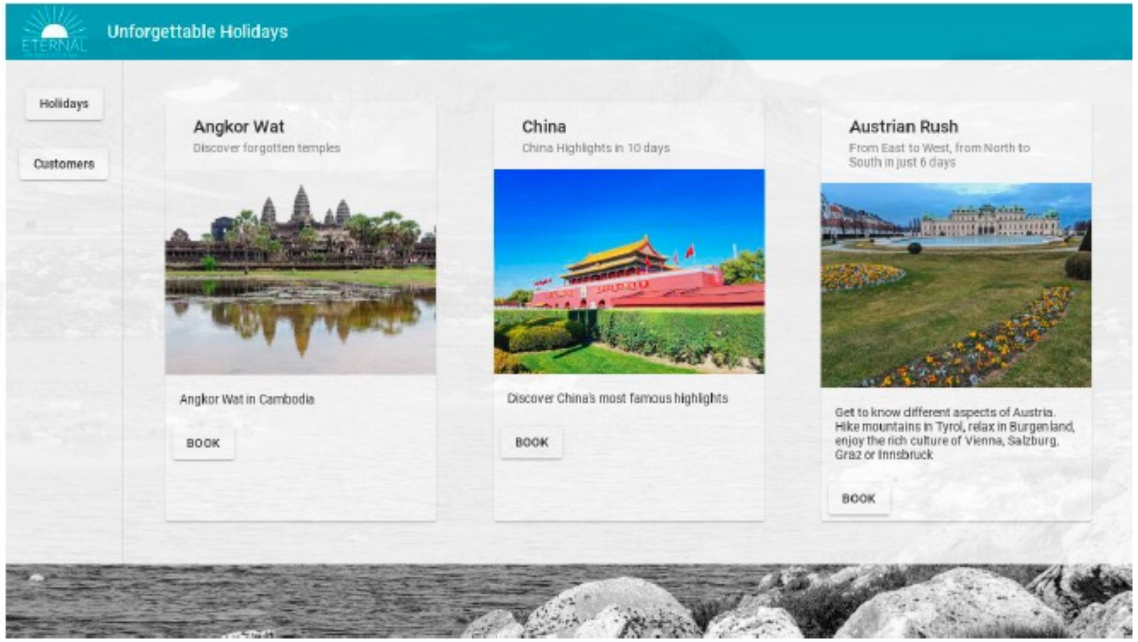
Holidays

Customers

Angkor Wat
Discover forgotten temples
Angkor Wat in Cambodia
BOOK

China
China Highlights in 10 days
Discover China's most famous highlights
BOOK

Austrian Rush
From East to West, from North to South in just 6 days
Get to know different aspects of Austria. Hike mountains in Tyrol, relax in Burgenland, enjoy the rich culture of Vienna, Salzburg, Graz or Innsbruck
BOOK



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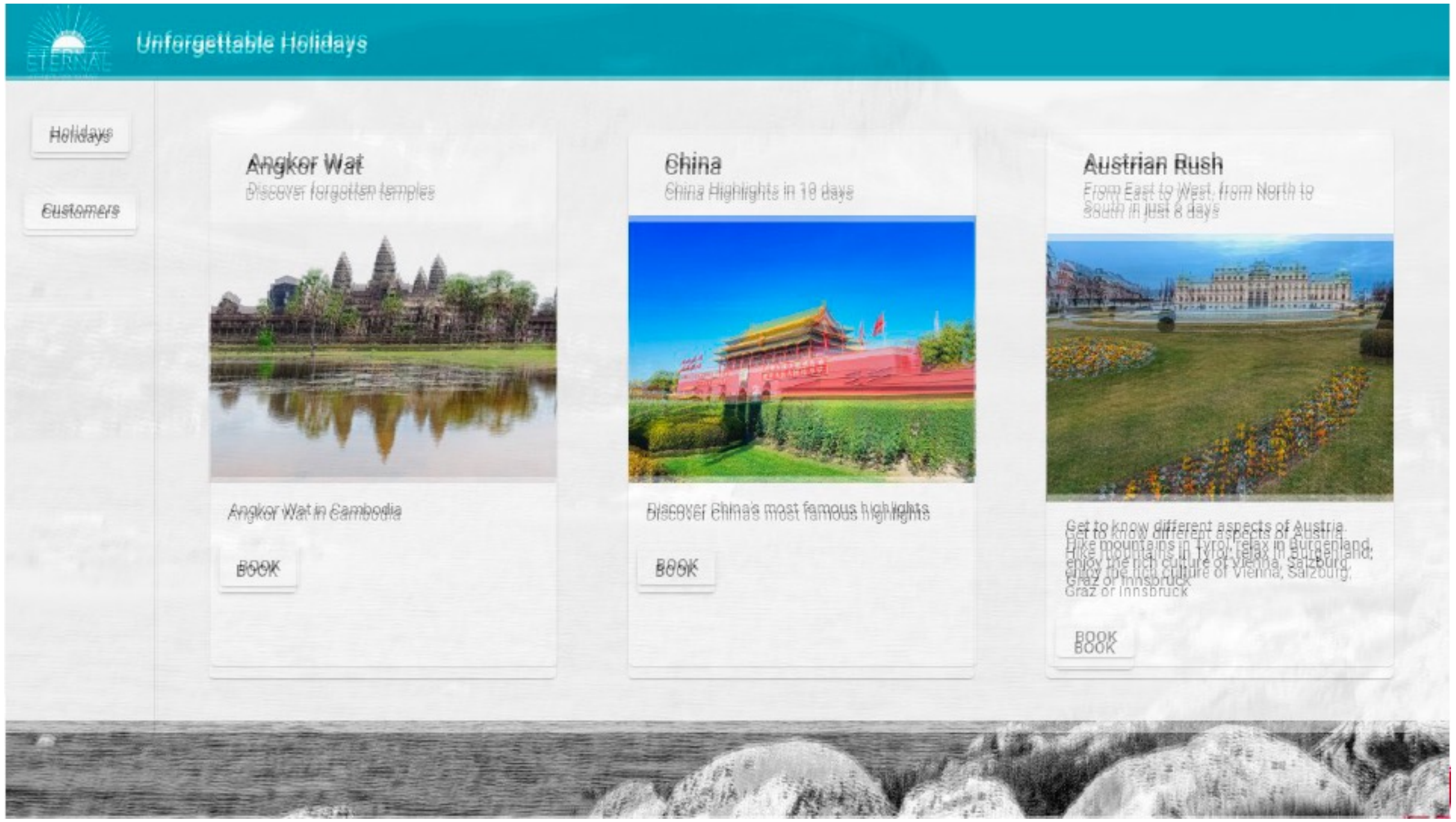
SOFTWARE ARCHITECT

Component Tests - Puppetteer II



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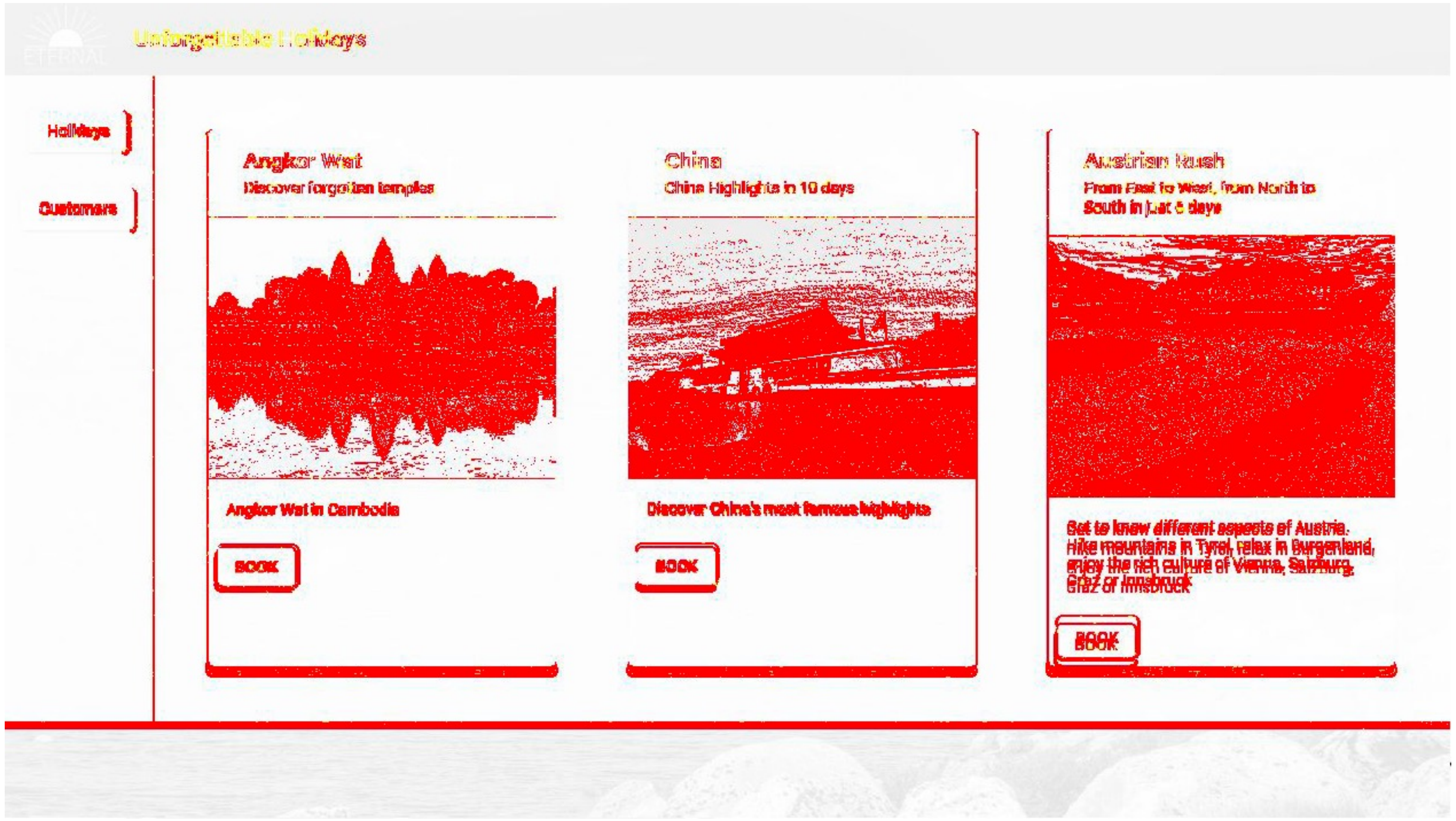
Component Tests - Puppetteer III



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BOOK

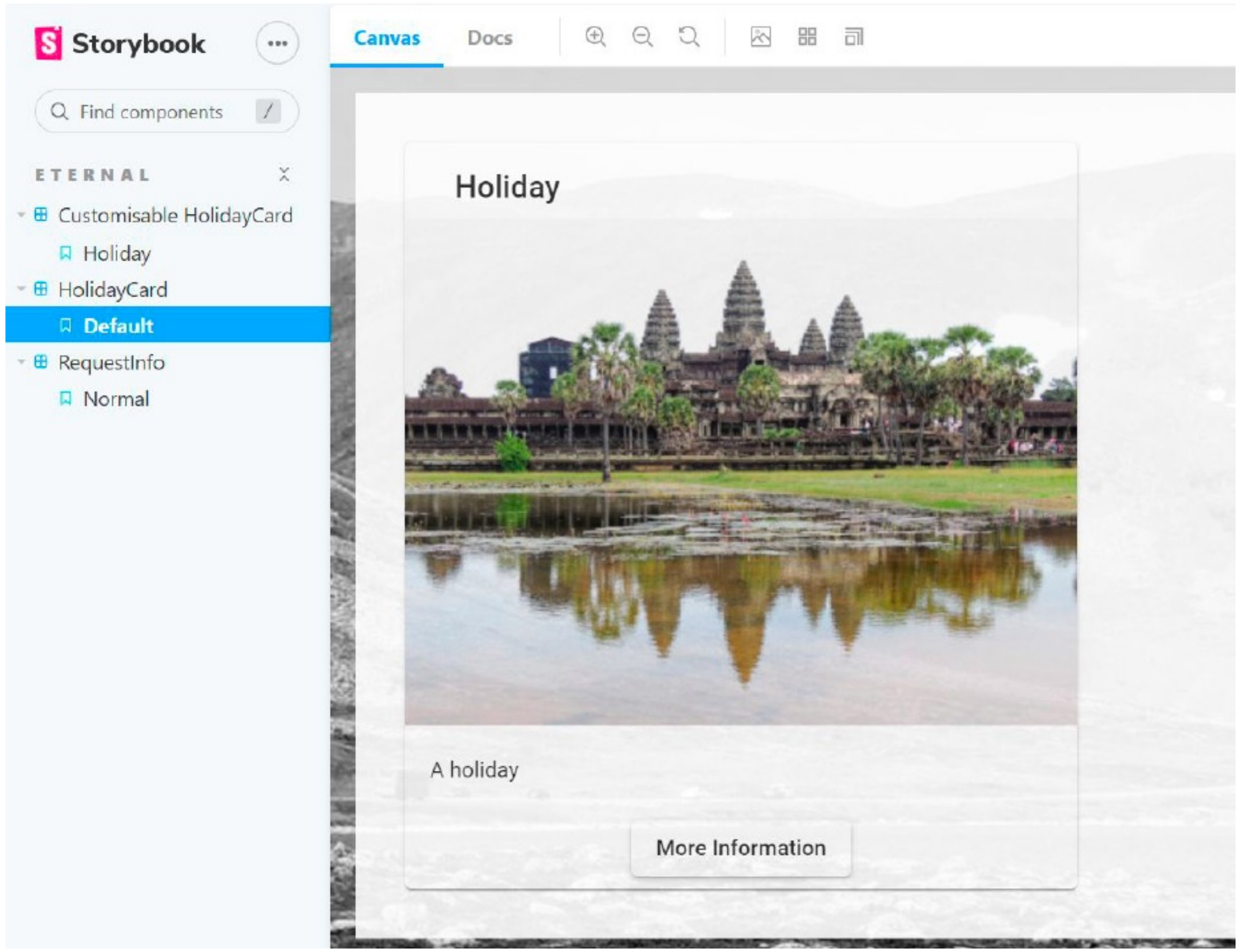
Component Tests – Storybook I

- Allows to isolate Components
- Not Angular Specific
- Configure a Component for various states
- Can also used for visual widget library (not just testing)

Component Tests – Storybook II

- Easy to setup in Storybook
- Decoupled from business logic
- No Dependency Injection
- If possible only primitive types as @Input

Component Tests – Storybook III



Storybook – Get Started

- npx sb init
- will auto generate examples
- yarn / npm run storybook

Storybook – Conclusion

- most popular tool for UI component development & documentation
- used by GitHub, Airbnb, and Stripe
- but it has issues with not using default webpack

Intro cypress.io

- Cypress (in most cases) perfect successor

- Migration is a rewrite

Motivation cypress.io

- Great Developer Experience
- Good Documentation
- Easy Setup
- Internal "IDE”
- CI Features like Videorecording and Screenshots

Cypress Setup

- Cypress has no Angular integration (yet?)
- yarn add / npm i -D cypress
- add tsconfig.json to newly cypress directory
- cypress open (open the Cypress Dashboard) or
- cypress run (just runs the tests)

ANGULAR ARCHITECTS INSIDE KNOWLEDGE SOFTWARE ARCHITECT

Basic commands

- cy.visit(url: string)
  - Can only be run at the beginning (of a test)
  - Domain can't be changed

- cy.get(selector)
  - Uses jQuery style selectors
  - Runs asynchronously
  - Chainable
    - contains
    - click
    - type
    - …

Assertions Implicit

- Behaves like a normal command
- Does waiting as well (asynchronicity)
- Good for single assertions

```
cy
  .get('h1')
  .should(
    'have.text',
    ' Unforgettable Holidays '
  );
```

Assertions Explicit

- More verbose
- Good when more logic is involved

```
cy.get('h1').should(($h1) => {

  expect($h1).to.have

    .text(' Unforgettable Holidays ');

});
```

Assertions are not required!

ANGULAR ARCHITECTS
INSIDE KNOWLEDGE

Cypress – Demo

Ready for the labs!

- Questions so far?