



Testing Intro

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Outline

- Motivation
- Unit Tests & Component Tests
 - Jest
 - Puppeteer
 - 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

Testing pyramid

End-to-End (E2E) Tests

Component Tests
(Functional & Visual)

Unit Tests



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Official version (until NG 12)

End-to-End (E2E) Tests



Component Tests



Unit Tests



Our recommendation





jasmine vs jest

Enter an npm package...

jasmine x

jest x

+ mocha

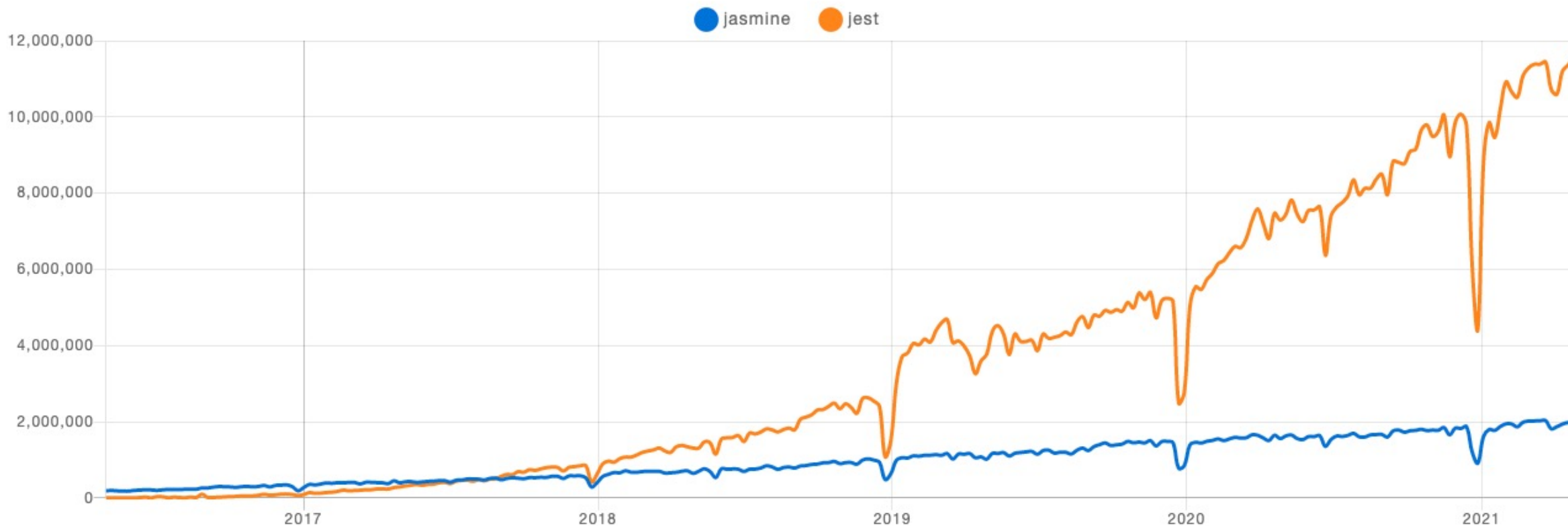
+ qunit

+ ava

+ chai

+ expect

Downloads in past 5 Years ▾





protractor vs cypress

Enter an npm package...

protractor x

cypress x

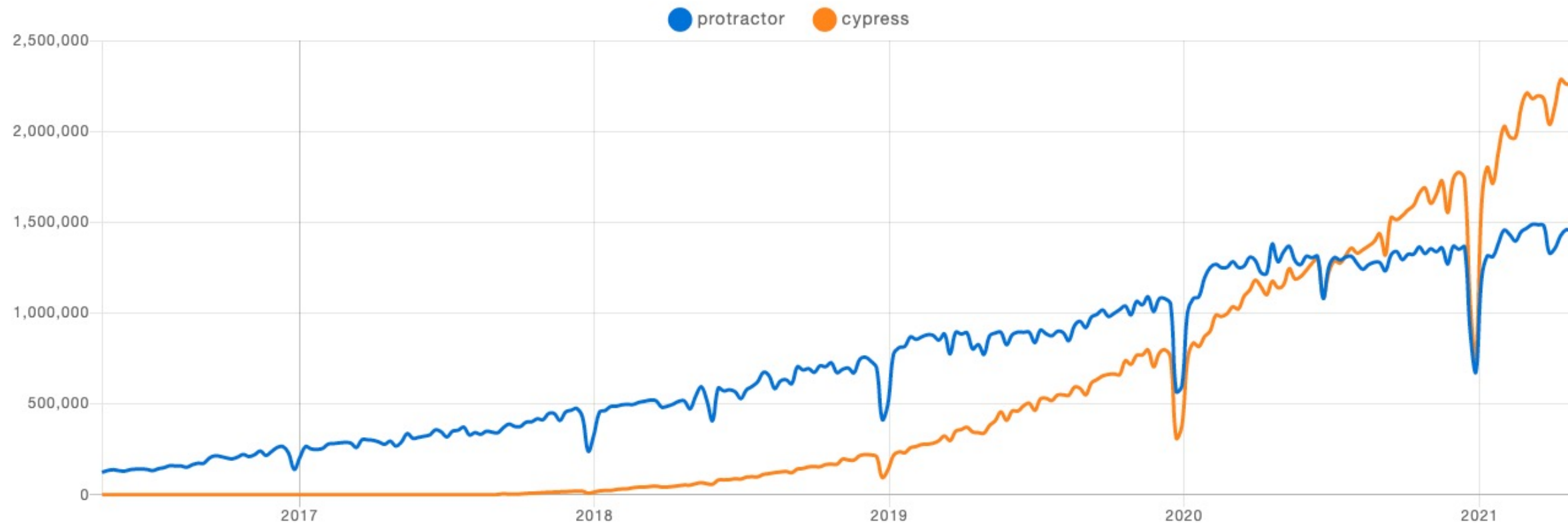
+ nightwatch

+ webdriverio

+ testcafe

+ puppeteer

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Unit Tests



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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



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Setup

- Angular CLI
 - ng add @bribug/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);  
    });  
});
```



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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);`



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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`



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Expect Exceptions

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

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



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Component Tests



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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.

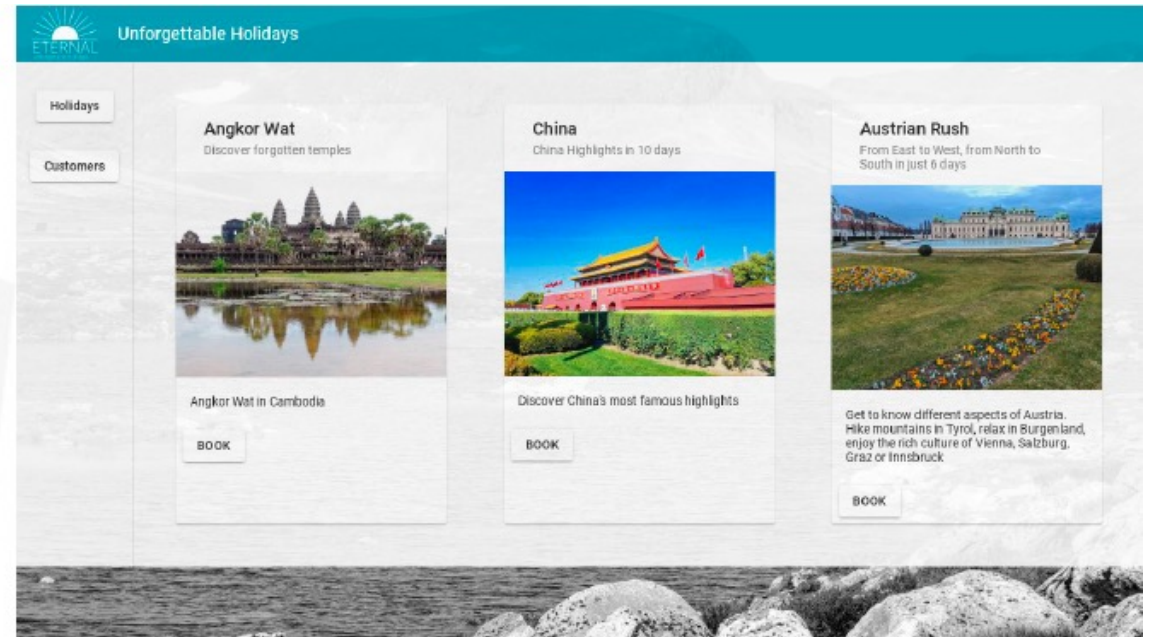
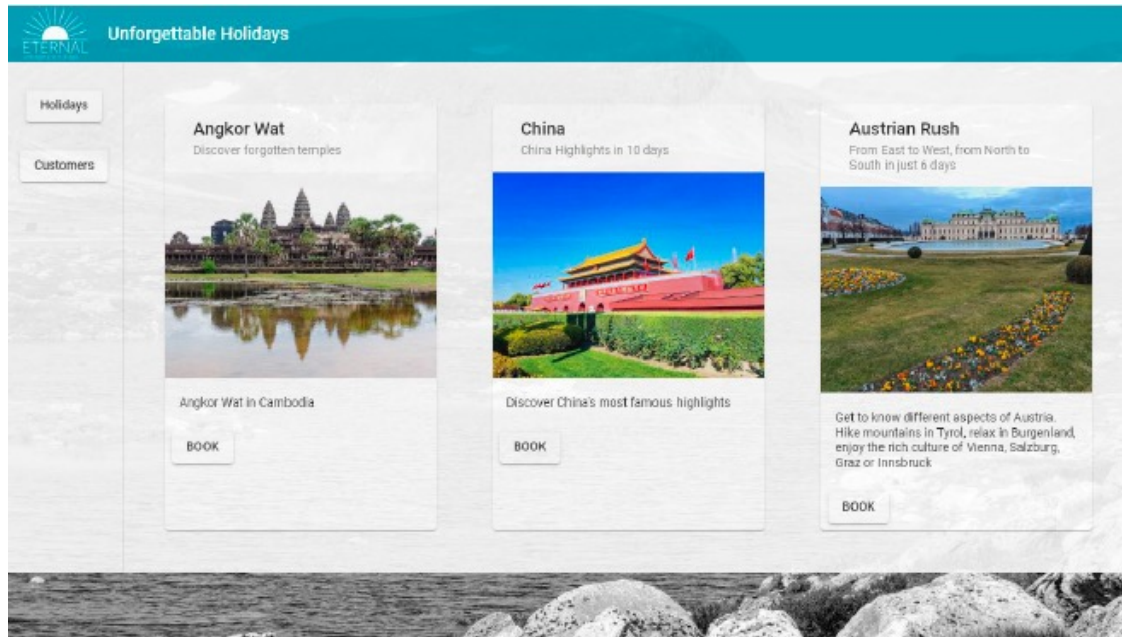
- TestBed

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

```
const component = fixture.componentInstance;
```

Component Tests - Puppeteer I

- Puppeteer
 - Headless Browser
 - Spot the difference

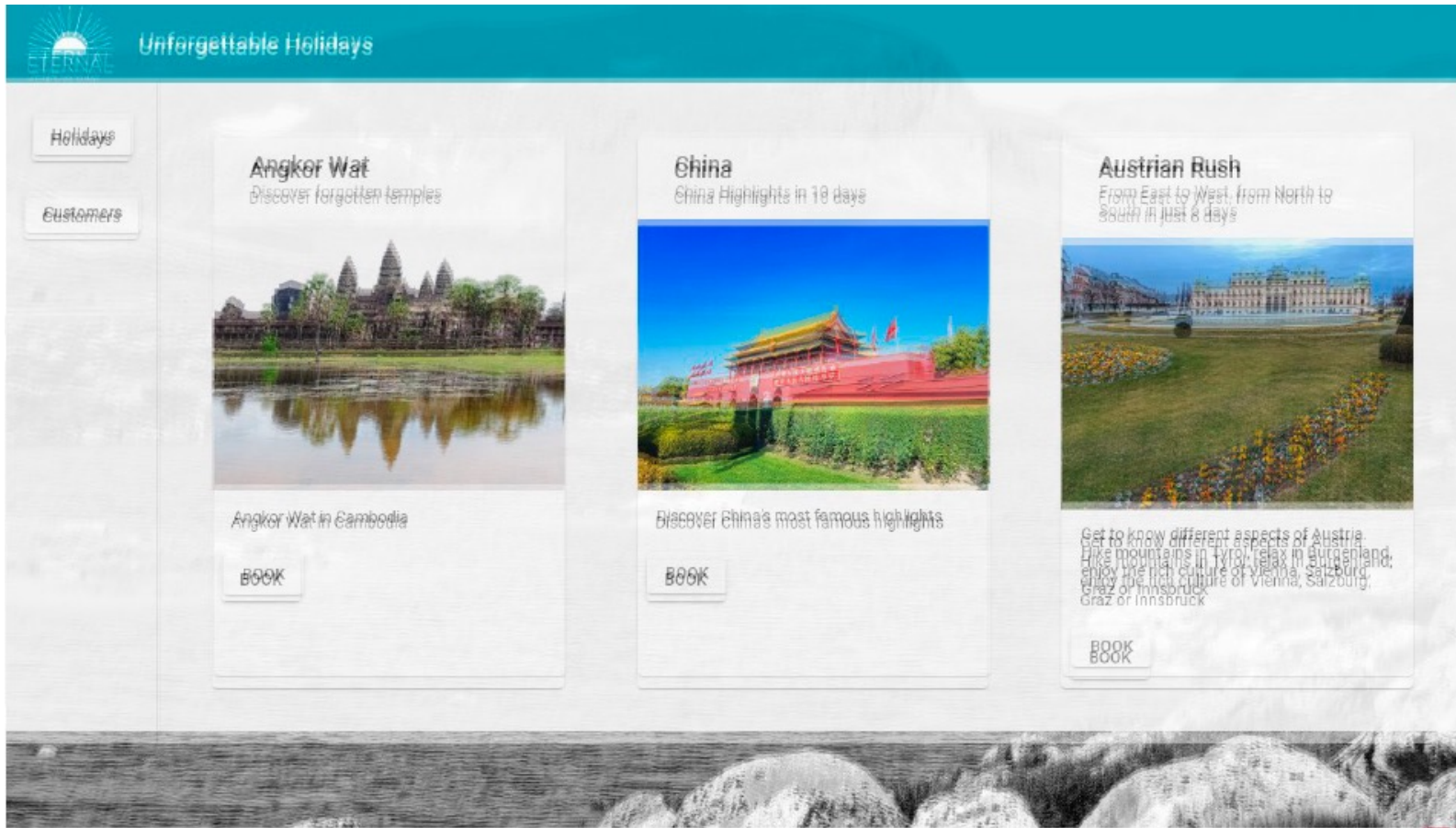


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Component Tests - Puppeteer II

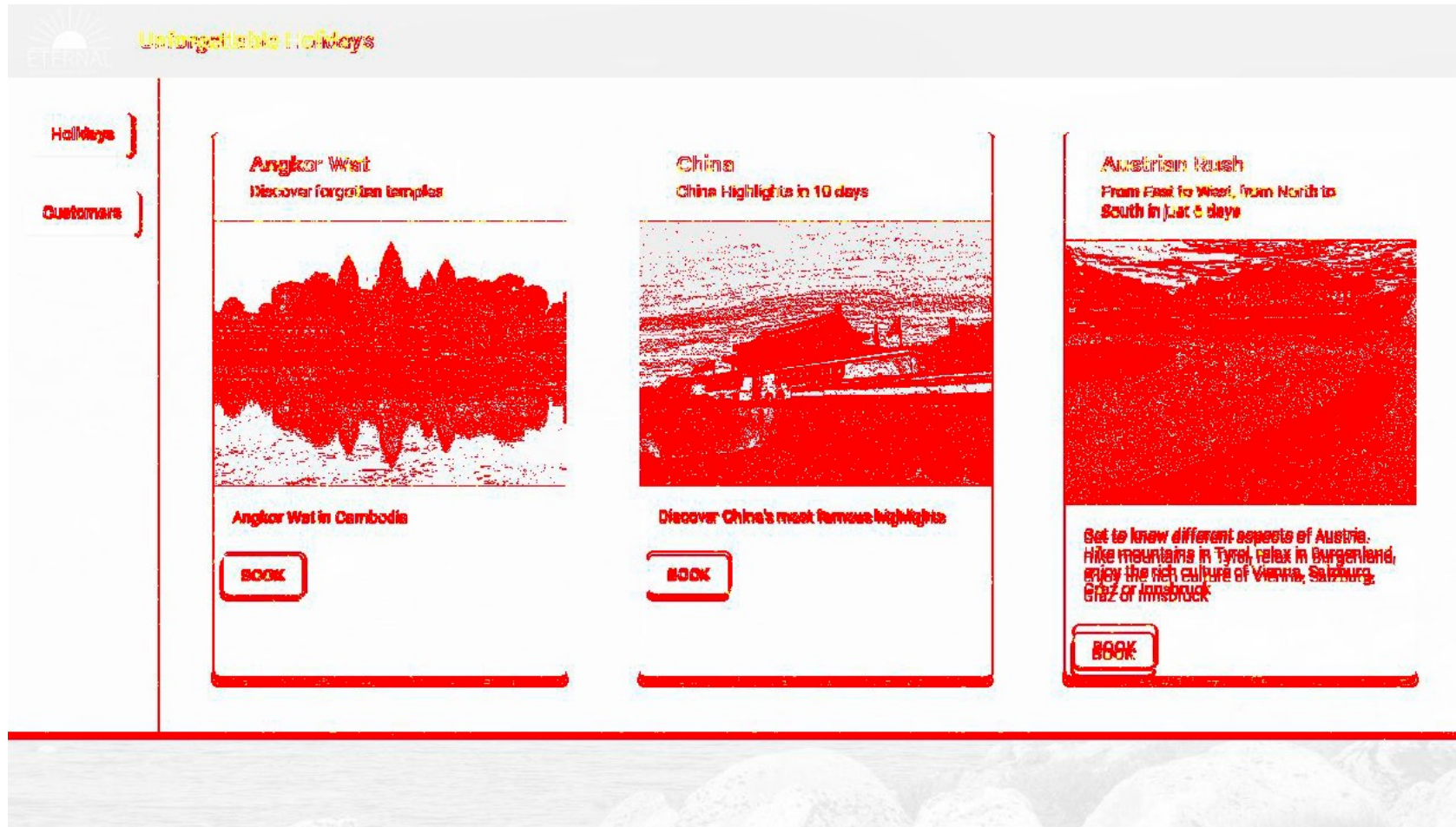


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Component Tests - Puppeteer III



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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

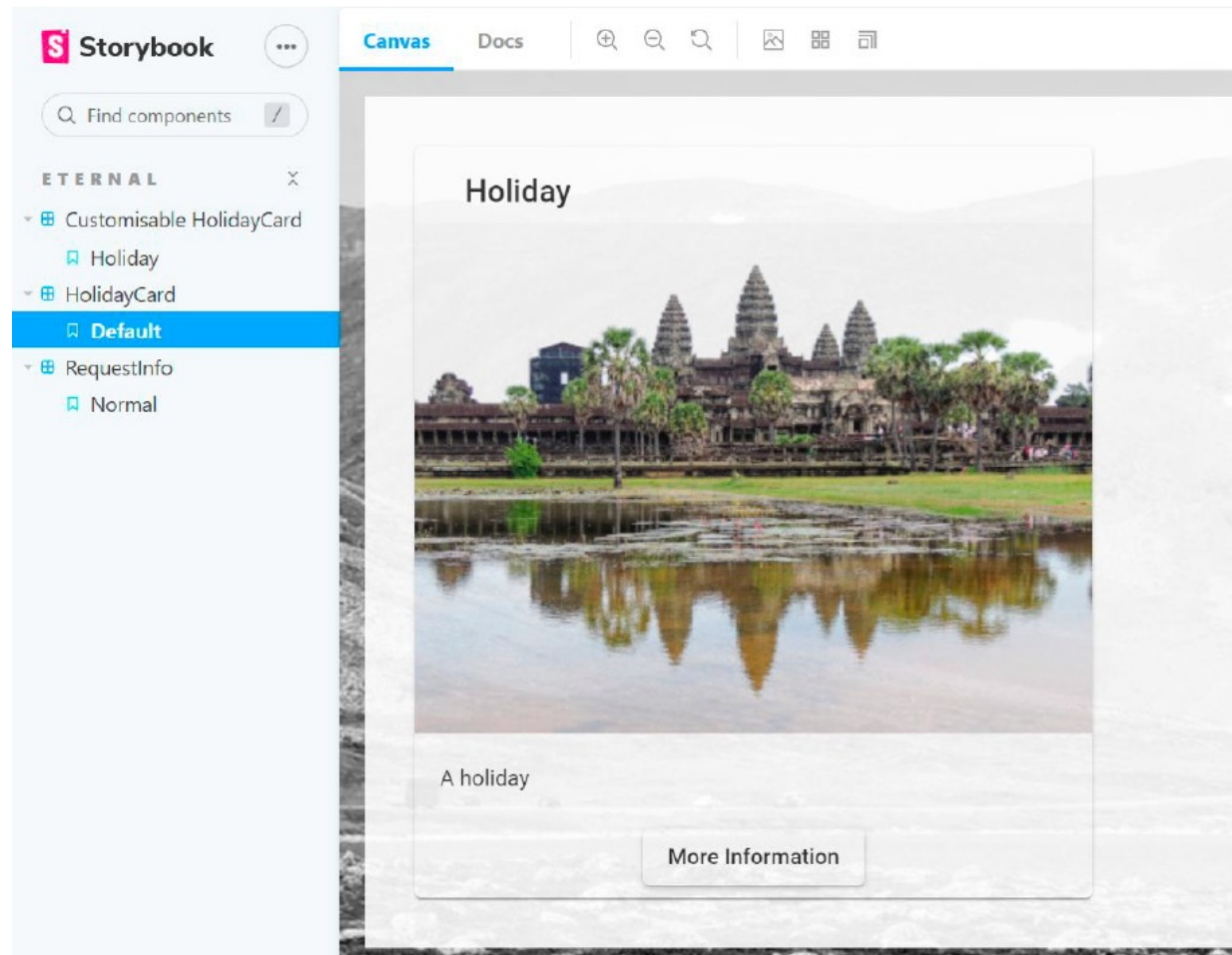


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Component Tests – Storybook III



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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 (in most cases) perfect successor
- Migration is a rewrite



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Motivation

- 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)

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
 - ...



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Assertions Implicit

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

```
cy

  .get('h1')

  .should(

    'have.text',

    ' Unforgettable Holidays '

  );
```



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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!



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That's it for testing introduction!

- Questions so far?