ANGULAR
ARCHITECTS
INSIDE KNOWLEDGE

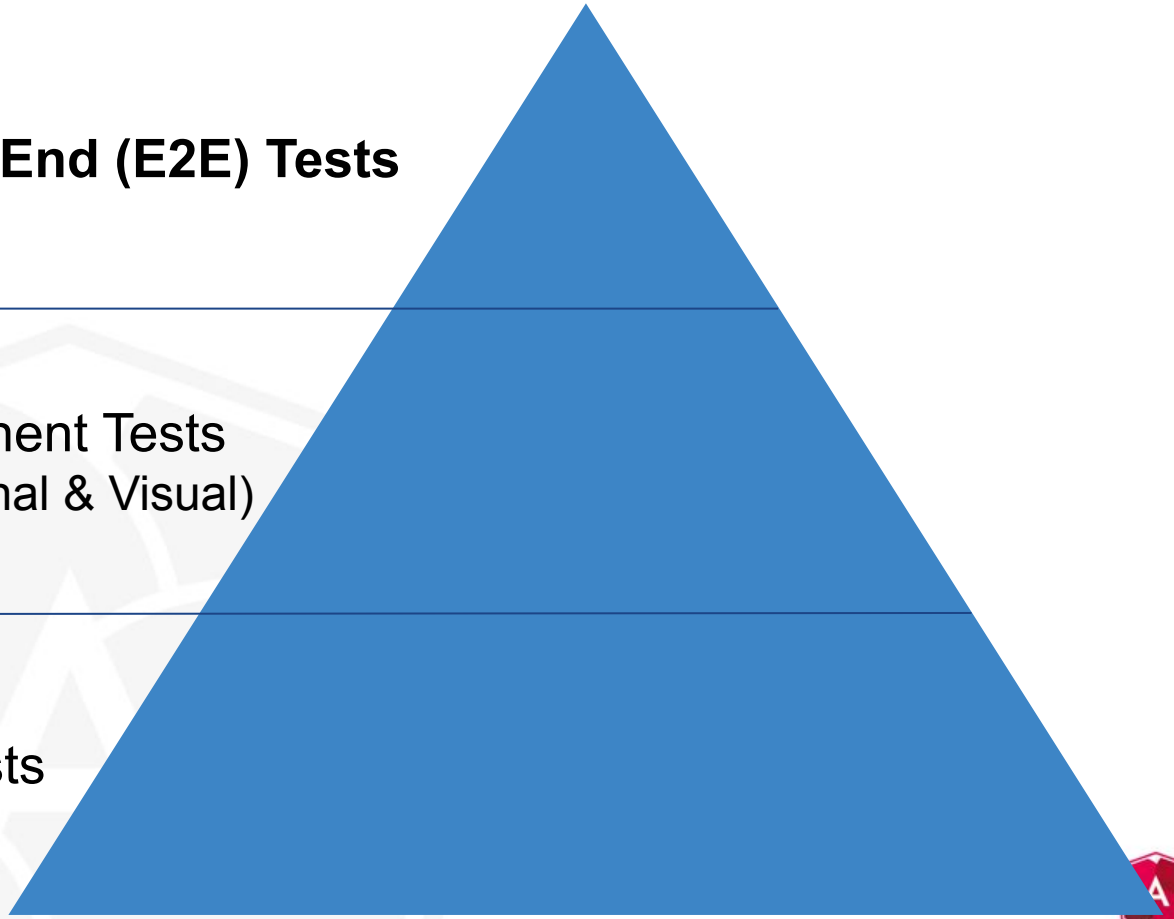
Angular Testing

6 - E2E Basics

End-to-End (E2E) Tests

Component Tests
(Functional & Visual)

Unit Tests



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2 Core Technologies for E2E Frameworks

1. WebDriver
2. Chrome DevTool Protocol (CDP)

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WebDriver

- W3C Standard
- Cross-Browser Support
- Known to be flaky
- WebDriver BiDi as successor
- Popular E2E Tools
  - Protractor
  - Selenium
  - NightWatch
  - WebDriverIO

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CDP (Chrome DevTools Protocol)

- Debugging Tool for Chromium-based Browsers
- Puppeteer as primary library
- Playwright incl. Safari
- Much more stable
- Constrained to CDP-Browsers

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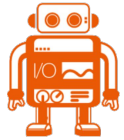
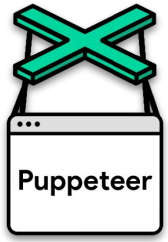
WebDriver

CDP
(Chrome DevTools Protocol)

Native





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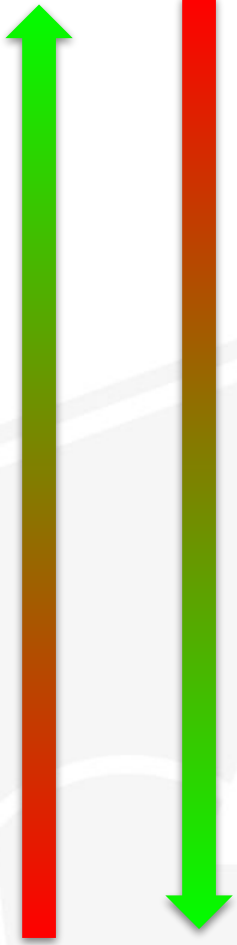
Cross Browser Support

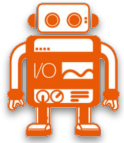
Reliability

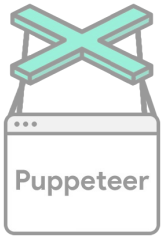


WebDriver

CDP
(Chrome DevTools Protocol)

Native





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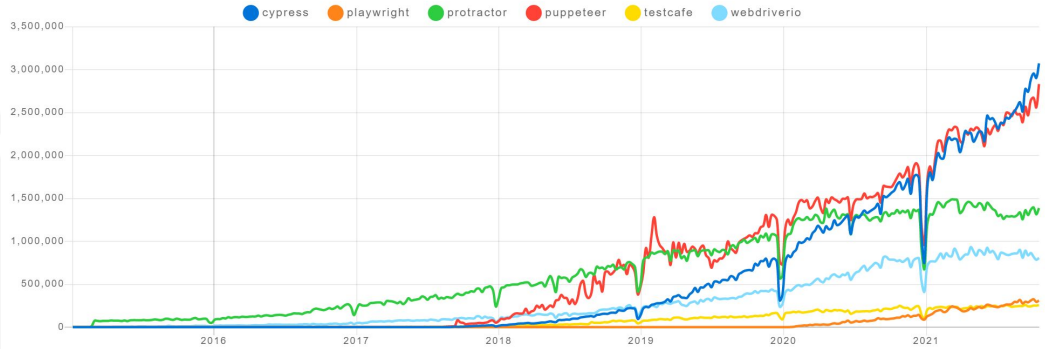
npm trends

cypress vs playwright vs protractor vs puppeteer vs testcafe vs webdriverio

Enter an npm package...

cypress × playwright × protractor × puppeteer × testcafe × webdriverio × + nightwatch + slimerjs + nightmare + casperjs + selenium

Downloads in past All time



Stats

	Stars	Issues	Version	Updated	Created	Size
cypress	34,213	1,792	8.6.0	13 days ago	8 years ago	minzipped size 401.6 KB
playwright	-	-	1.16.1	2 days ago	7 years ago	minzipped size 364.9 KB
protractor	8,755	669	7.0.0	a year ago	9 years ago	minzipped size 61.7 KB
puppeteer	73,363	1,714	10.4.0	a month ago	9 years ago	minzipped size 96.5 KB
testcafe	9,132	432	1.16.1	19 days ago	8 years ago	minzipped size 1.5 MB
webdriverio	6,976	125	7.16.2	2 days ago	7 years ago	minzipped size 301.7 KB

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Cypress

- Node.js Application
- Great Developer Experience
- Good Documentation
- Easy Setup
- Internal "IDE"
- CI Features like Videorecording and Screenshots

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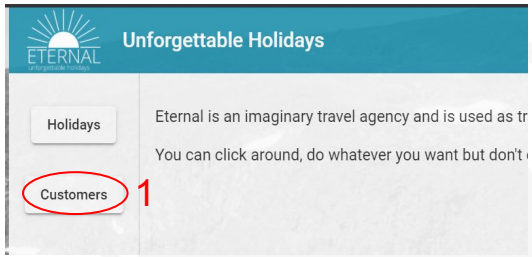
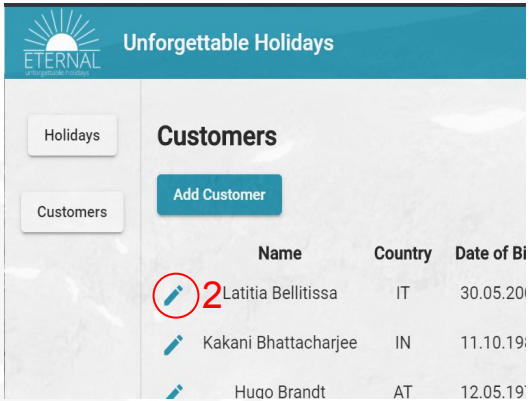
The Await Feature



1. Select Customers



2. Select Customer

3. Edit Firstname

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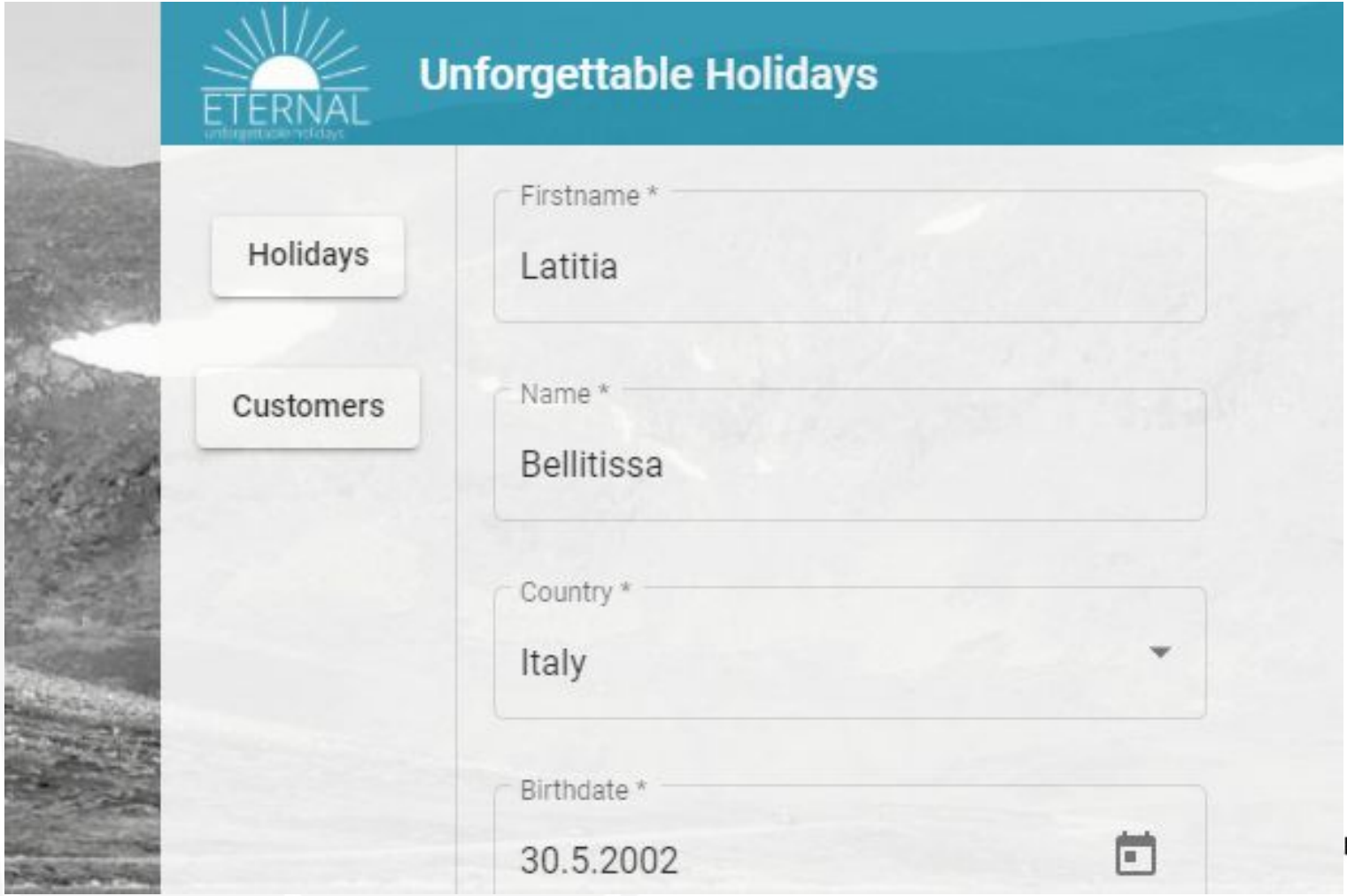

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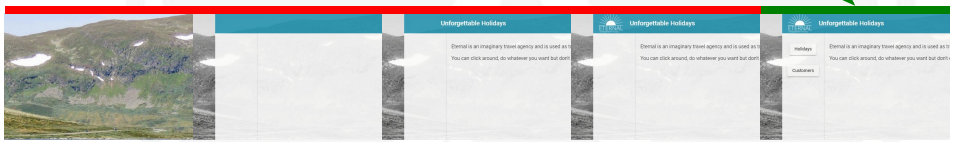
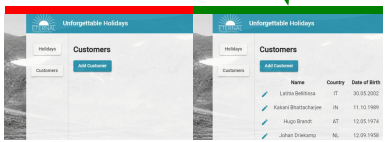
Non-Waiting Style

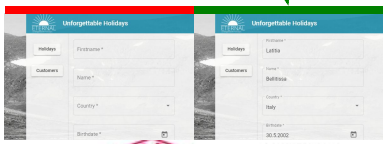
1. Select Customers

2. Select Customer

3. Edit Firstname







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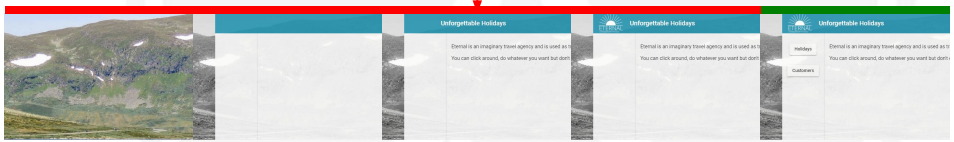
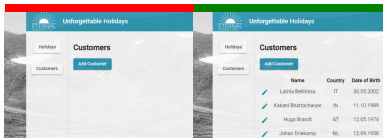
Non-Waiting Style

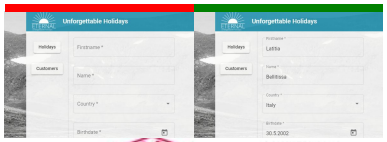
1. Select Customers

2. Select Customer

3. Edit Firstname







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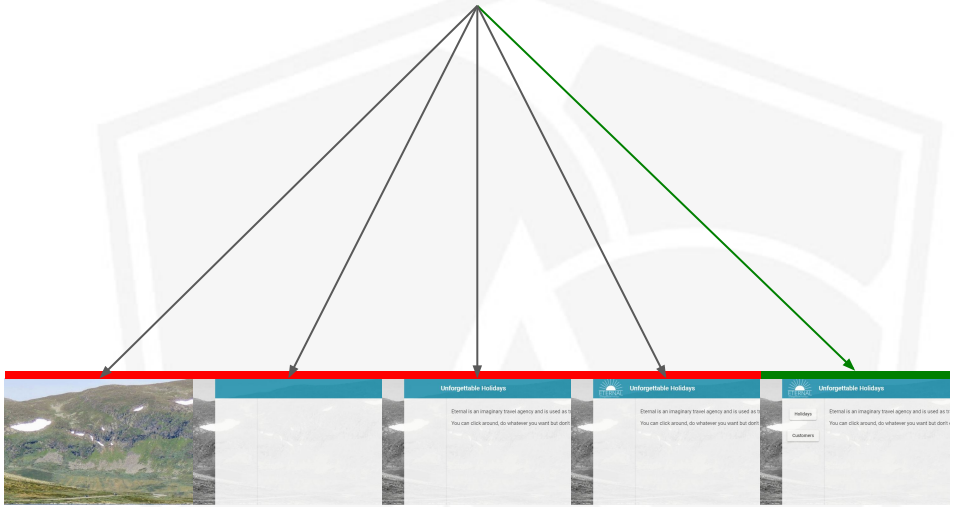
Waiting Style

1. Select Customers



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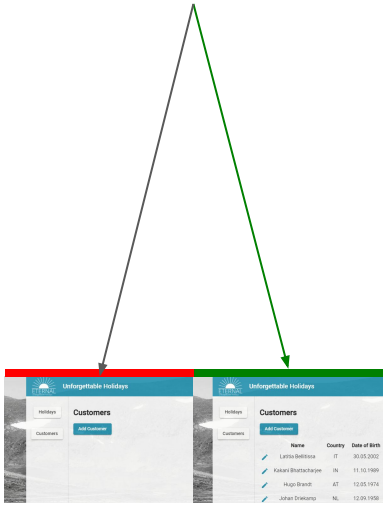
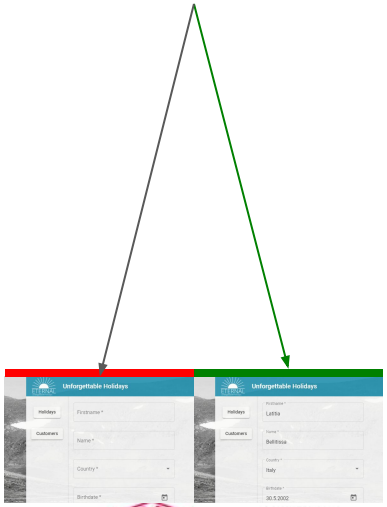


3. Edit Firstname



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Commands

- Methods of "cy." object
- Run asynchronously
  - "Feels" like a Promise (thenable) but isn't
  - Don't use async/await
- Are chainable

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Commands

- cy
  - .visit(url: string)
    - Can only be run at the beginning
    - Domain can't be changed
  - .get(selector)
    - Uses jQuery selectors
  - .contains
  - .click
  - .type

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An E2E Test in Cypress

```
it('should rename Latitia to Laetitia', () => {

  cy.visit('');

  cy.get('mat-drawer a').contains('Customers').click();

  cy.get('div').contains('Latitia Bellitissa').siblings('.edit').click();

  cy.get('input:first').clear().type('Laetitia');

  cy.get('button[type=submit]').click();



  cy.get('div').contains('Bellitissa').should('have.text', 'Laetitia Bellitissa');

});
```

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Assertions Implicit

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

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

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Assertions Explicit

- More verbose
- Good for multiple assertions
- Massaging

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

  expect($h1).to.have

    .text(' Unforgettable Holidays ');

});
```

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Cypress Goodies

- lodash: Cypress._
- jQuery: Cypress.$
- ~~Moment: Cypress.moment~~
- Uses Mocha and Chai
  - Not Jest
  - Very similar commands

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When not to use Cypress?

- Cross Browser Support
- Multiple Super Domains

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Demo

Flakiness / Unreliability

```
describe('Customers', () => {

  it('should add a customer', () => {

    cy.visit('');

    cy.get('a').contains('Customers').click();

    cy.get('a').contains('Add Customer').click();

  });

});
```

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Flakiness / Unreliability

- Commands are not retried when they are successful
- Chains are multiple commands
- cy.get & cy.contains are commands

```
cy.get('a').contains('Add Customer').click();
   ↑          ↑
   1          2
```

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Prevent Flakiness by Assertion

```
describe('Customers', () => {

  it('add customer', () => {

    cy.visit('');

    cy.get('a').contains('Customers').click();

    cy.get('a').should('contain', 'Add Customer');

    cy.get('a').contains('Add Customer').click();

  });

});
```

Prevent Flakiness by a better Selection

```
describe('Customers', () => {

  it('add customer', () => {

    cy.visit('');

    cy.get('mat-drawer a').contains('Customers').click();

    cy.get('mat-drawer-content a').contains('Add Customer').click();

  });

});
```

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Prevent Flakiness by a much better Selection

```
describe('Customers', () => {

  it('add customer', () => {

    cy.visit('');

    cy.get('[data-test=btn-customers]').click();

    cy.get('[data-test=btn-add-customer]').click();

  });

});
```

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Lab Time