ANGULAR
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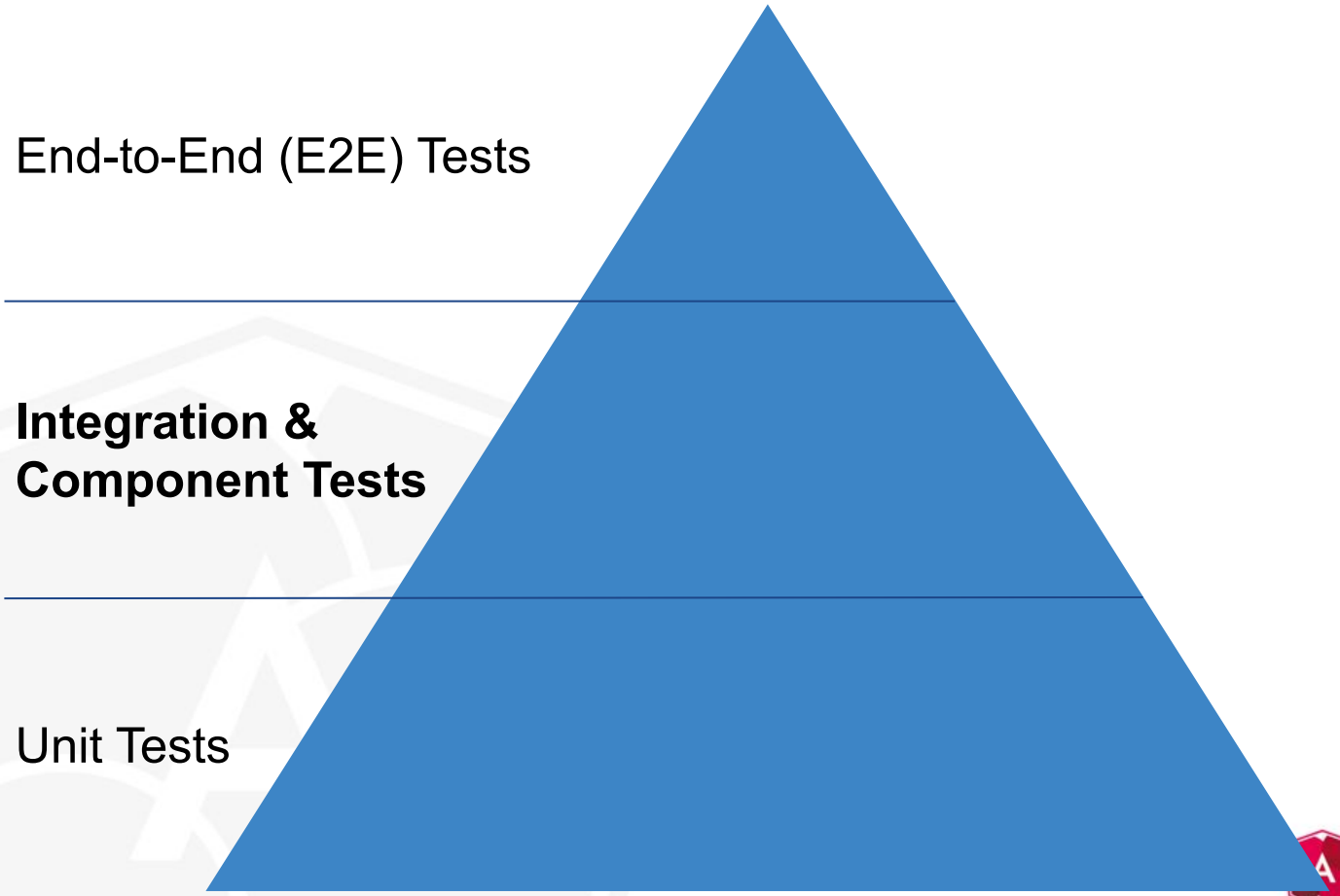
INSIDE KNOWLEDGE

Angular Testing

5 - Component Tests - Functional



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Test Specs

Application Code

JSDom

@angular/testing

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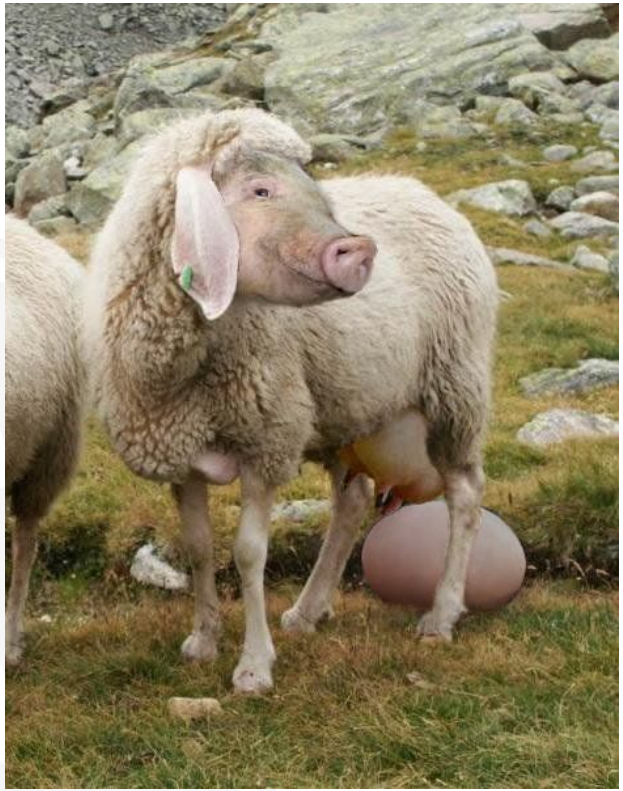
TestBed



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TestModule

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


const component = fixture.componentInstance;
```

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Interacting with the DOM

```
fixture.detectChanges();

const button = fixture.debugElement

  .query(By.css('button'))

  .nativeElement as HTMLButtonElement;

button.click();
```

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Remember fakeAsync?

Proper Handling of Event Listeners

```
it("should trigger search on click", fakeAsync(() => {
  fixture.detectChanges();
  const button = fixture.debugElement.query(By.css("button"))
    .nativeElement as HTMLButtonElement;
  button.click();
  tick();

  expect(lookuper.lookup).toHaveBeenCalled();
}));
```

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Snapshot

- Serialization Feature
- Good fit when it comes to rough template checks
- No CSS
- Is not an image, e.g. png or jpg.

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Lab Time

Nested Components

1. "Three Monkeys"
2. Component Stubs
3. ng-mocks
4. Import all Modules

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Nested Components - Three Monkeys

```
it('should mock components in 🙈🙉🙊 style, () => {
  const fixture = TestBed.configureTestingModule({
    declarations: [RequestInfoComponent],
    schemas: [NO_ERRORS_SCHEMA]
  }).createComponent(RequestInfoComponent);
  fixture.detectChanges();
  expect(true).toBe(true);
});
```

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Nested Components - Stubs

```
it('should stub the components', () => {
  @Component({ selector: 'mat-form-field', template: '' })
  class MatFormField {}

  const fixture = TestBed.configureTestingModule({
    declarations: [RequestInfoComponent, MatFormField],
    imports: [ReactiveFormsModule]
  }).createComponent(RequestInfoComponent);

  fixture.detectChanges();
  expect(true).toBe(true);
});
```

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Nested Components - Mocked

```
it('should stub the components', () => {
  const fixture = TestBed.configureTestingModule({
    declarations: [RequestInfoComponent, MockComponent(MatFormField)],
    imports: [ReactiveFormsModule]
  }).createComponent(RequestInfoComponent);

  fixture.detectChanges();
  expect(true).toBe(true);
});
```

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Nested Components - Import Modules

```
it('should import the modules', () => {
  const fixture = TestBed.configureTestingModule({
    declarations: [RequestInfoComponent],
    imports: [ReactiveFormsModule, MatFormFieldModule, MatHintModule, MatLabelModule]
}).createComponent(RequestInfoComponent);

  fixture.detectChanges();

  expect(true).toBe(true);
});
```

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Reducing Boilerplate

Customisable Factory Methods

Libraries

Testing Library

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Spectator

- Wrapper for TestBed
  - Queries
  - Factory method for component
  - Host
  - Eventtriggering
- Special Cases
  - Pipes
  - Directives

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Spectator: Pipe Test

```
describe('Customer Pipe', () => {
  const customer: Customer = {
    id: 1, firstname: 'Karl', name: 'Feiersberger', birthdate: '1991-01-20', country: 'AT'
  };

  @Component({template: '<p>{{ customer | customer}}</p>'})
  class CustomerPipeTestComponent {
    @Input() customer: Customer = customer;
  }

  const createPipe = createPipeFactory({
    pipe: CustomerPipe,
    host: CustomerPipeTestComponent
  });

  it("should print the user's name", () => {
    const spectator = createPipe();
    expect(spectator.element).toHaveText('Feiersberger, Karl');
  });
});
```

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Spectator: Directive Test

```
describe("Don't leave me", () => {
  const createDirective = createDirectiveFactory(DontLeaveMeDirective);


  it('should show the dog image', () => {
    const spectator = createDirective('<img appDontLeaveMe src="/dummy.jpg">');
    spectator.dispatchMouseEvent(spectator.element, 'mouseleave');


    expect(spectator.element).toHaveAttribute('src', '/assets/dontleaveme.jpg');
  });
});
```

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Harnesses

Taming the Beast…

Test Harnesses

- Page Object Models for Component Tests
- Available since Angular v9
- Provide a test abstraction for components
- Developed by @angular/material
- Full coverage for material since v11
- Reduces code size significantly
  - Better Readability
  - Better Maintainability

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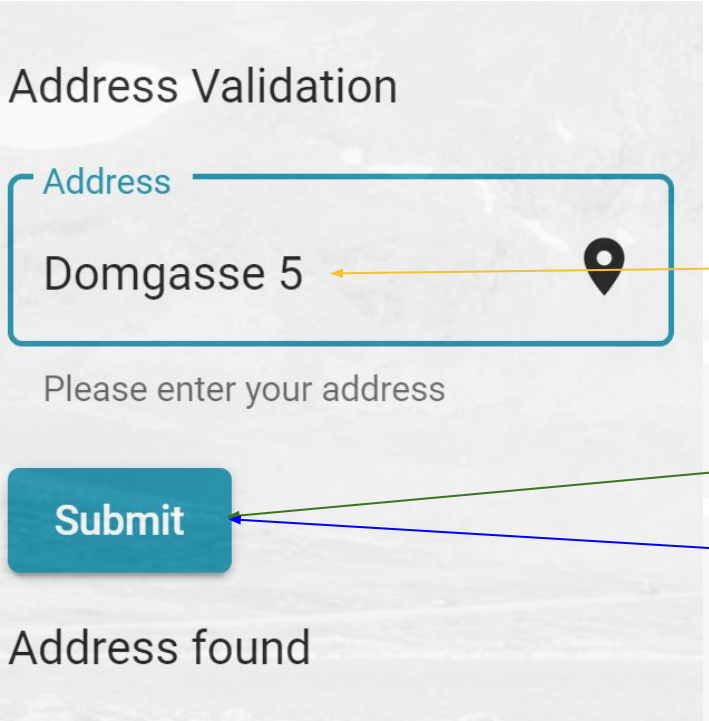

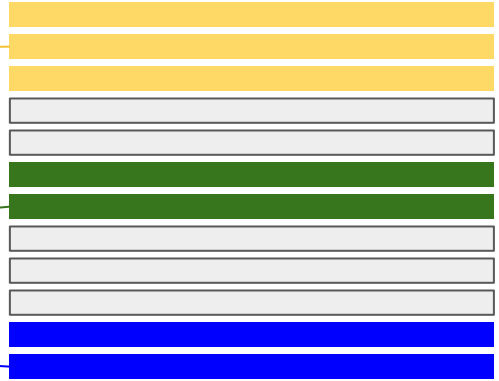

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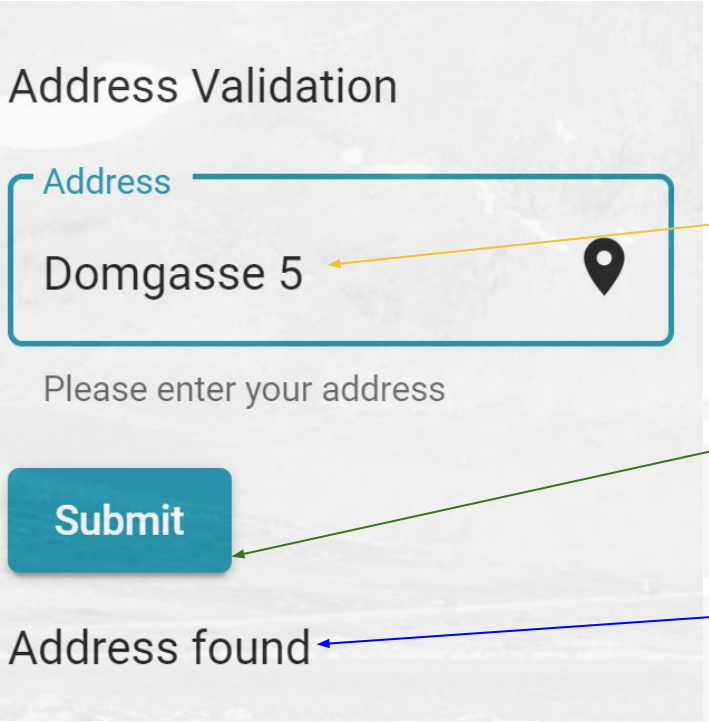

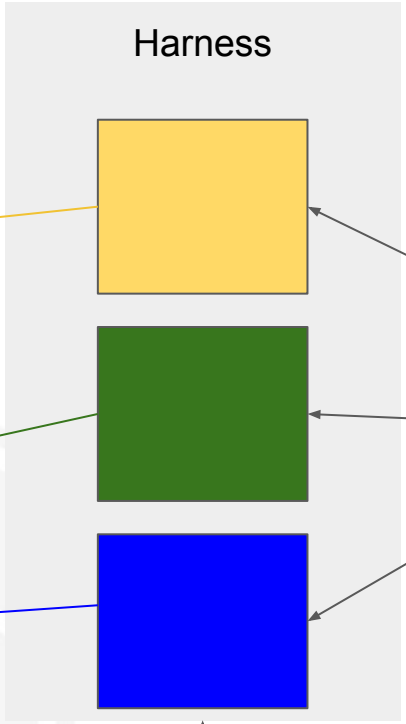

- Element Selection
- Change Detection
- Asynchronity
- Rendering

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Creating a Harness

```
export class RequestInfoComponentHarness extends ComponentHarness {

  static hostSelector = "app-address";

  protected getButton = this.locatorFor("button[type=submit]");


  async submit(): Promise<void> {

    const button = await this.getButton();

    return await button.click();

  }

}
```

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Using a Harness

```
it("should use the harness", async () => {
  // setup TestModule…

  const harness = await TestbedHarnessEnvironment.harnessForFixture(
    Fixture,
    RequestInfoComponentHarness
  );
  await harness.submit();
  // expect something
});
```

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Lab Time

Two Competing Schools of Unit Testing

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Differences

London

- Unit is a Class
- Mock everything except the class
  - Very tightly coupled to implementation
  - Lots of Code for Mocking
  - Refactoring not really possible
- Great Code Quality

Detroit

- Unit is Behaviour
- Mock out-of-system dependencies
- Works against a "public contract"
  - No usage of private function
  - Refactoring without changing tests

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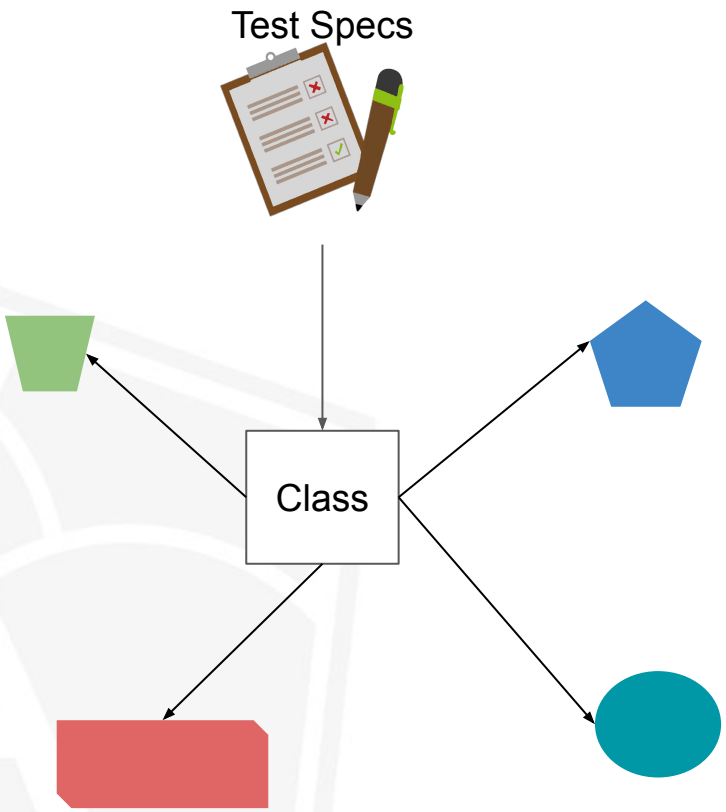
London Style



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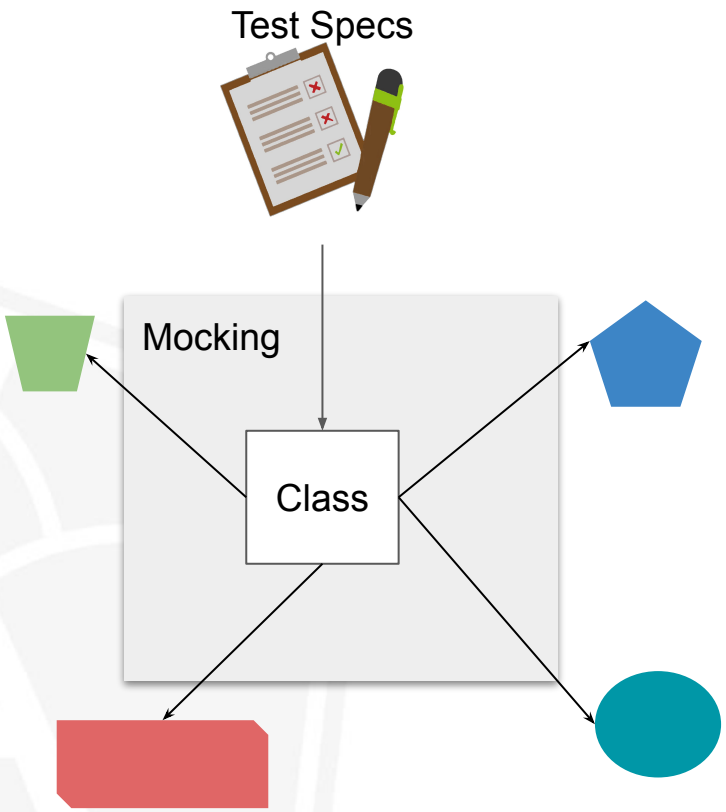
London Style



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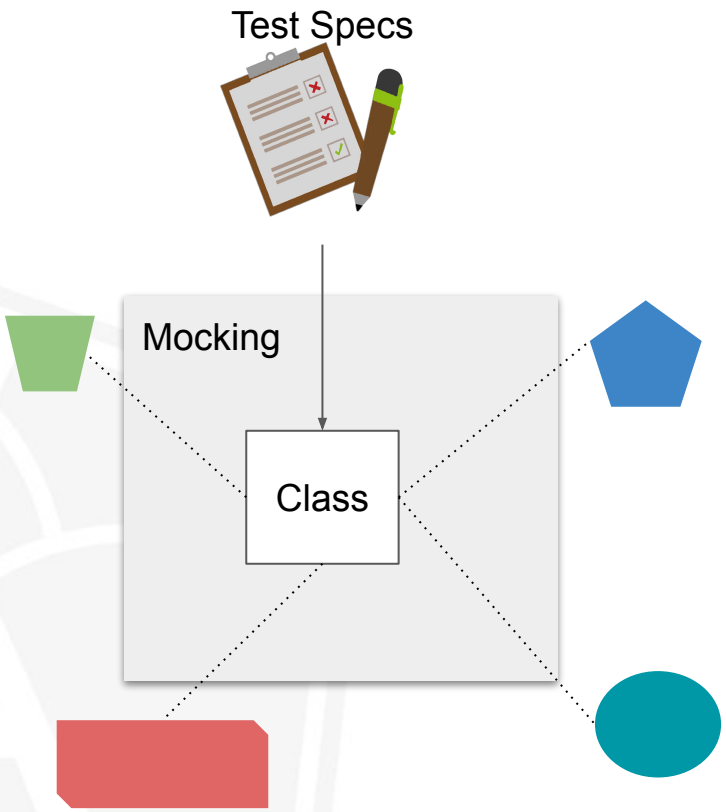
London Style



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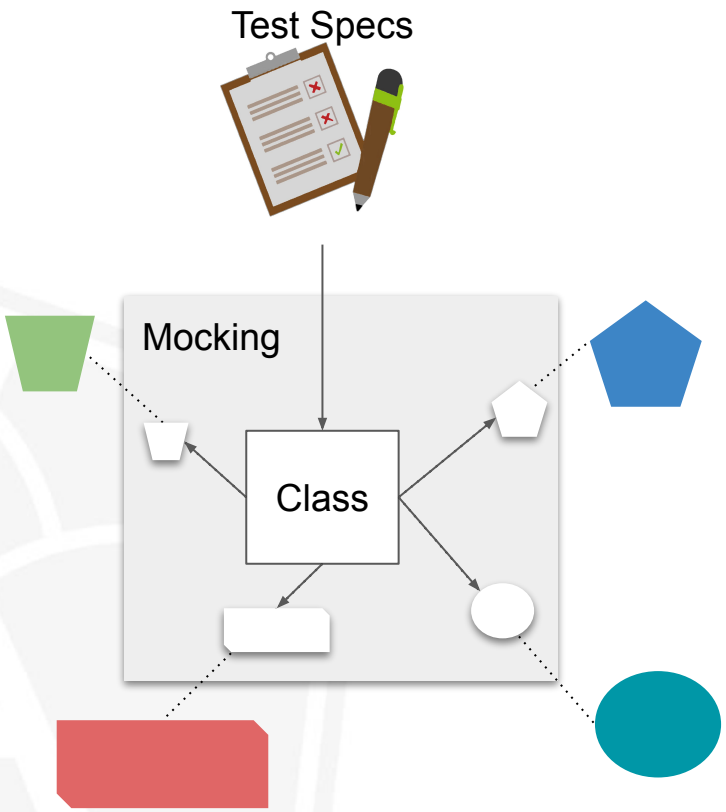
London Style



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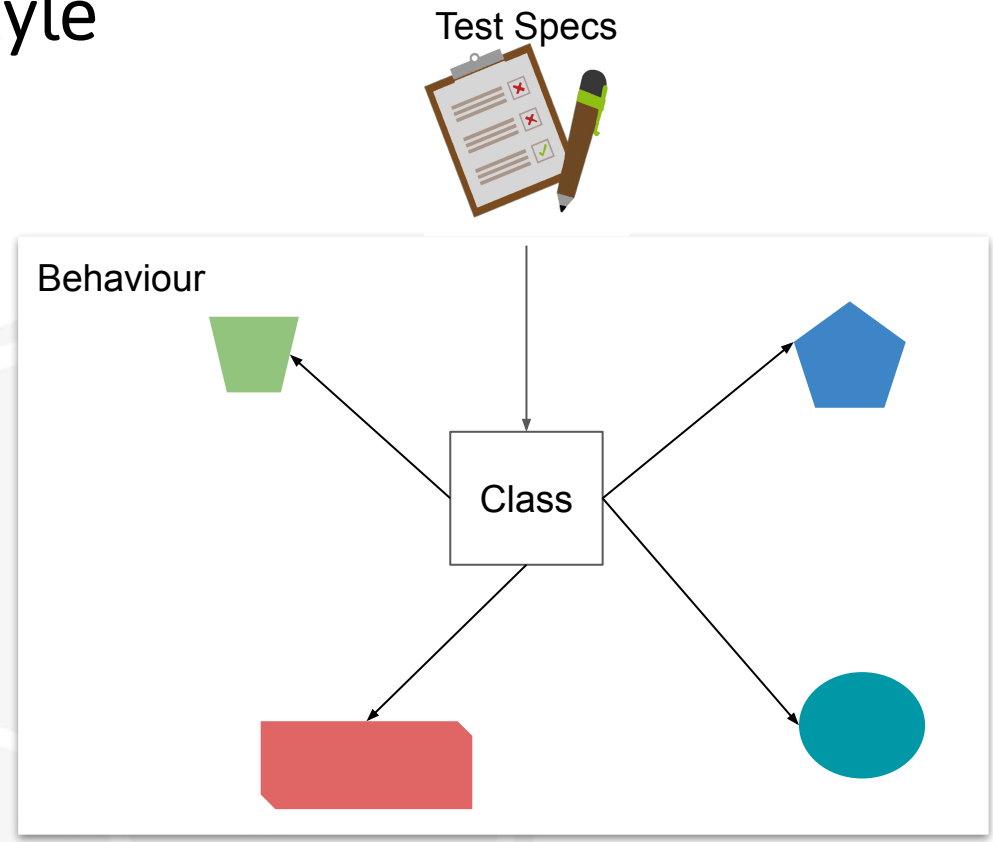
Detroit Style



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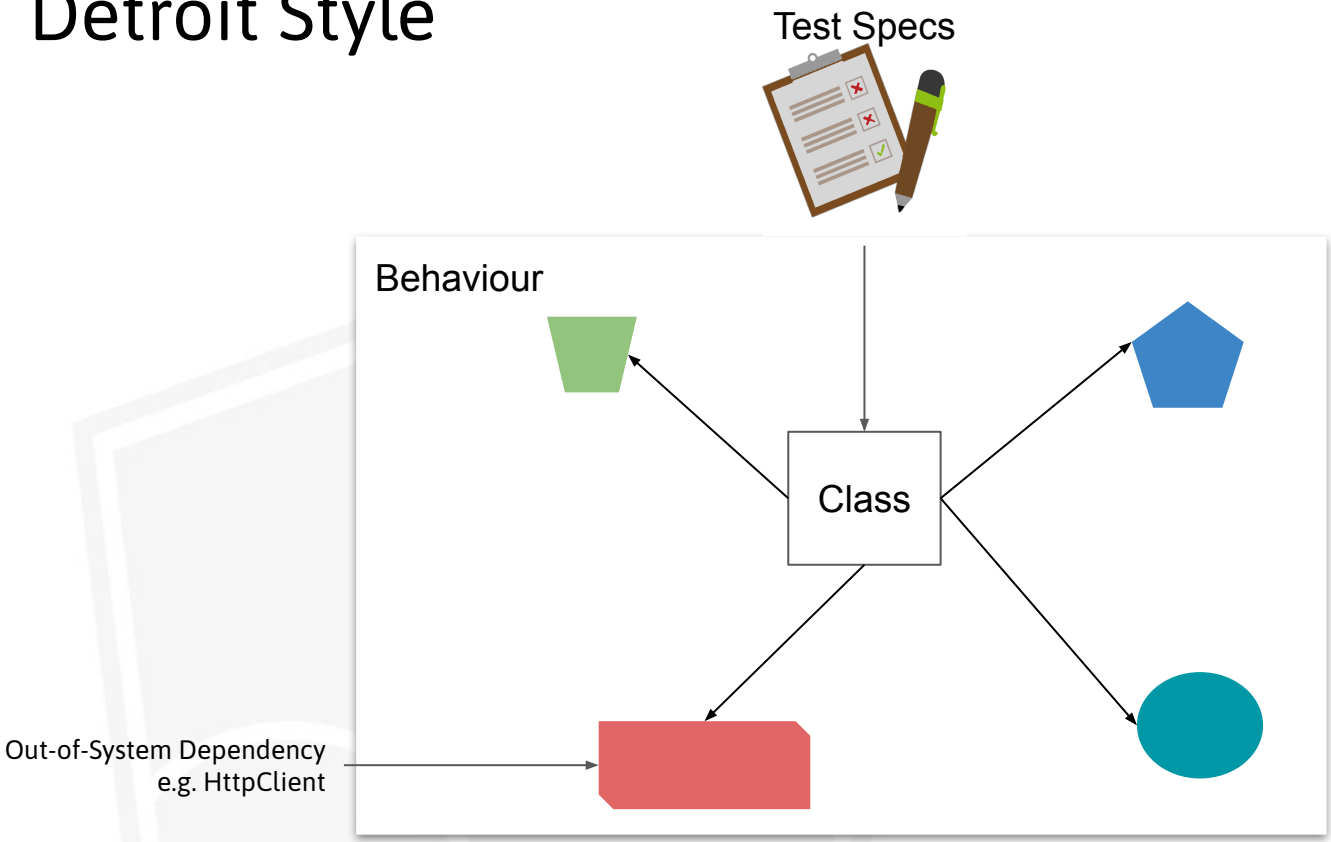
Detroit Style



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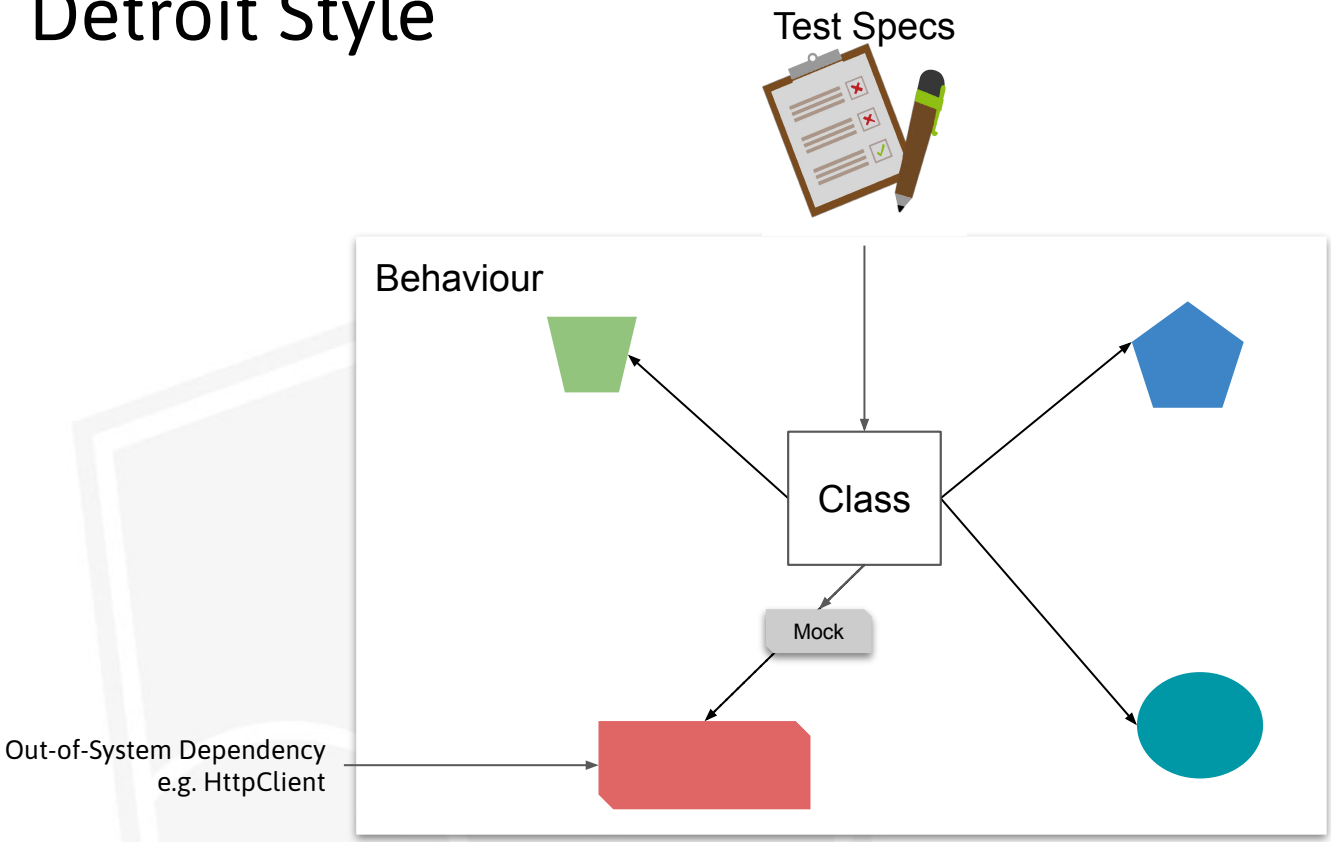
Detroit Style



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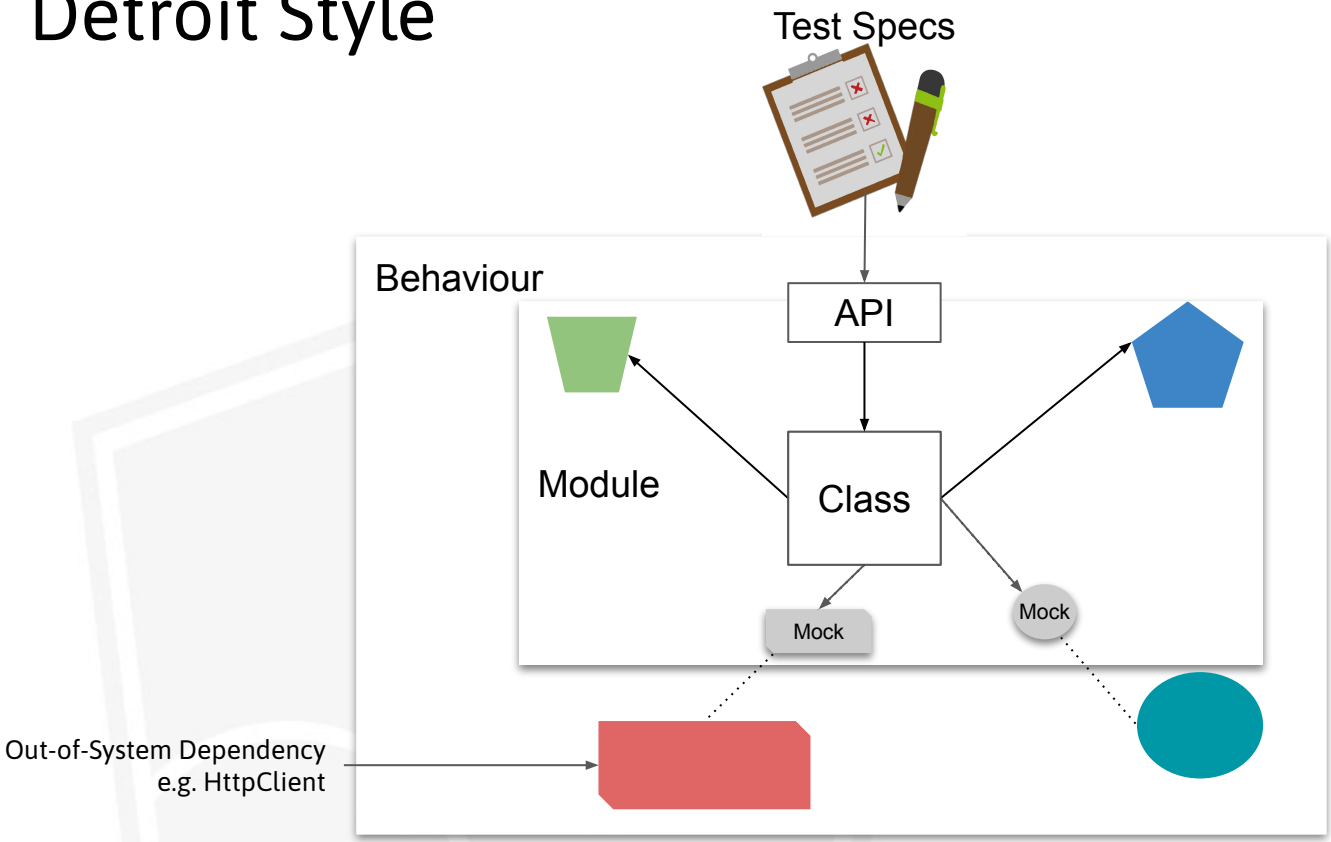

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What should it be?

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Refactoring
Precision
& Speed

HttpTest

```
it("should use Angular's http mock", () => {
  TestBed.configureTestingModule({
    declarations: [RequestInfoComponent],
    imports: [ReactiveFormsModule, HttpClientTestingModule],
  });

  const httpController = TestBed.inject(HttpTestingController);
  const fixture = TestBed.createComponent(RequestInfoComponent);
  fixture.componentInstance.search();

  const [request] = httpController.match((req) => !!req.url.match(/nominatim/));
  request.flush([{ street: "Domgasse", streetNumber: 5 }]);
  expect(lookupResult.textContent.trim()).toBe("Address found");
});
```

Instead of HttpClientModule

Runs AFTER http request

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RoutingTest

- RouterTestingModule provides routing functionality for tests
- Location can verify the expected url
- RoutingConfiguration is required

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Lab Time

Towards a Testable Architecture

- Level 1 - Atomic
  - Unit Tests for complex Container Components, Services, Functions,...
  - Visual Regression
  - RxJS Marbles
- Level 2 - Logical Groups
  - Interplay between Container & Presentational Components
  - Complex Components (DataGrid)
  - State Management
- Level 3 - Integration Tests
  - Per Domain
  - Per Feature
- Level 4 - E2E Tests
  - Per User Story

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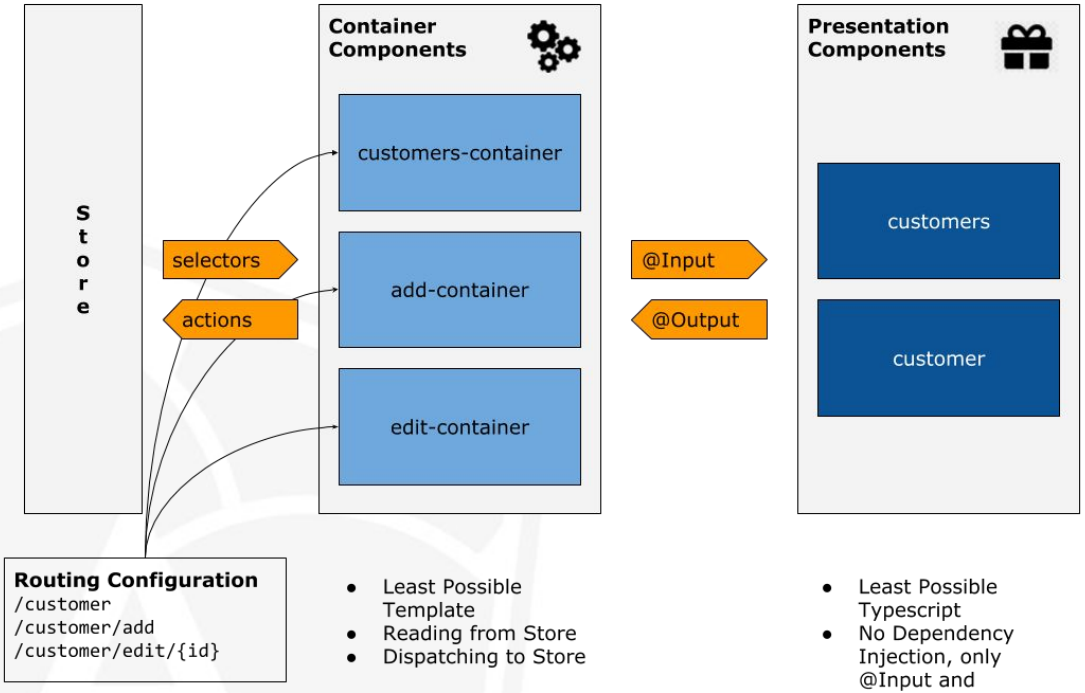
Container & Presentation Components



- Least Possible Template
- Reading from Store
- Dispatching to Store

- Least Possible Typescript
- No Dependency Injection, only @Input and @Output
- No Observables!

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Presentational Component

- Easy to setup in Storybook
- Decoupled from business logic
- No Dependency Injection
- Use primitive types for @Input

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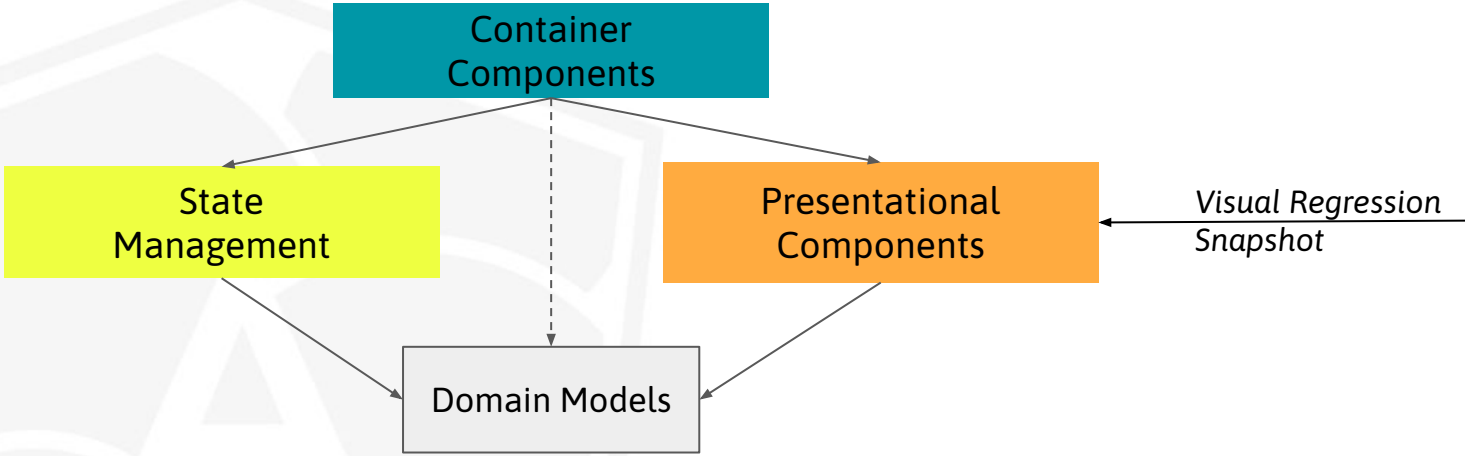
Testable Architecture
Level 1 - Atomic



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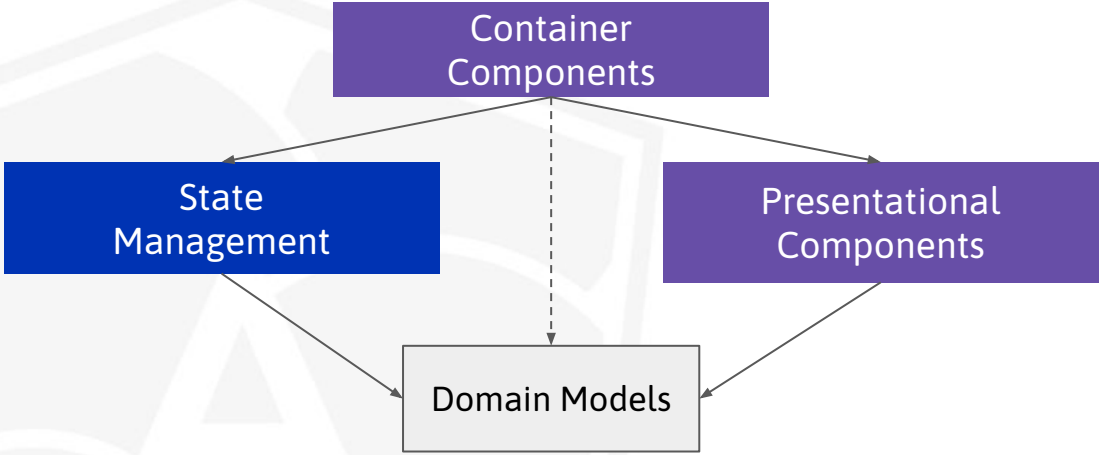
Testable Architecture
Level 2 - Logical Groups



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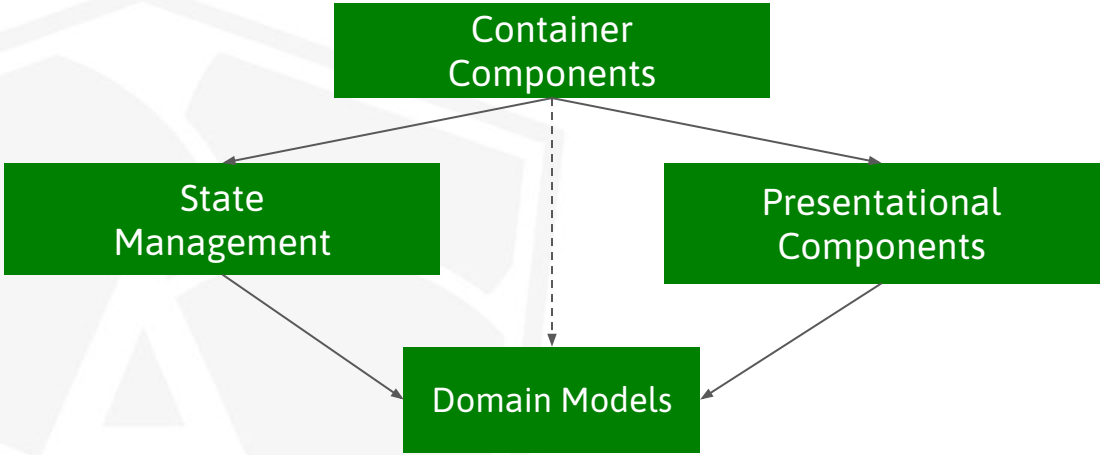
Testable Architecture
Level 3- Integration Tests



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