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INSIDE KNOWLEDGE

Angular Testing

5 - Testing Strategies

Two Competing Schools of Unit Testing

Differences

London

- Unit is a **class**
- Mock everything except the class
  - Very tightly coupled to implementation
- Disadvantages
  - No refactoring
  - Lots of code for mocking
  - No interplay testing
- Advantages
  - Edge cases, finding bugs, exploratory
  - Great code quality (FP)
  - Fast

Detroit (Chicago)

- Unit is a **behaviour**
- Mock out-of-system dependencies
  - Runs against an API (UI)
- Advantages
  - Great for refactoring
  - Efficient (coverage)
- Disadvantages
  - Large setup required
  - Slow

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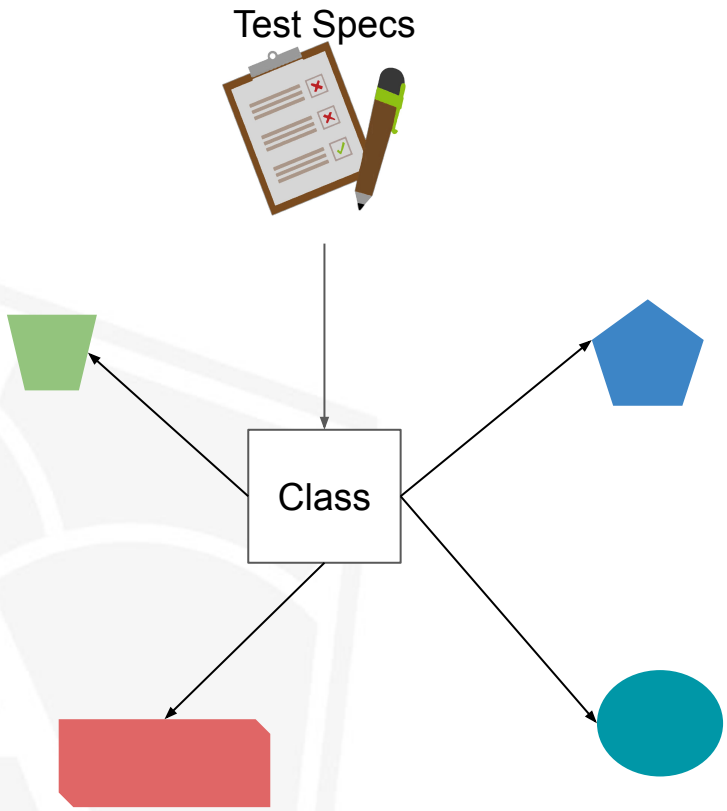
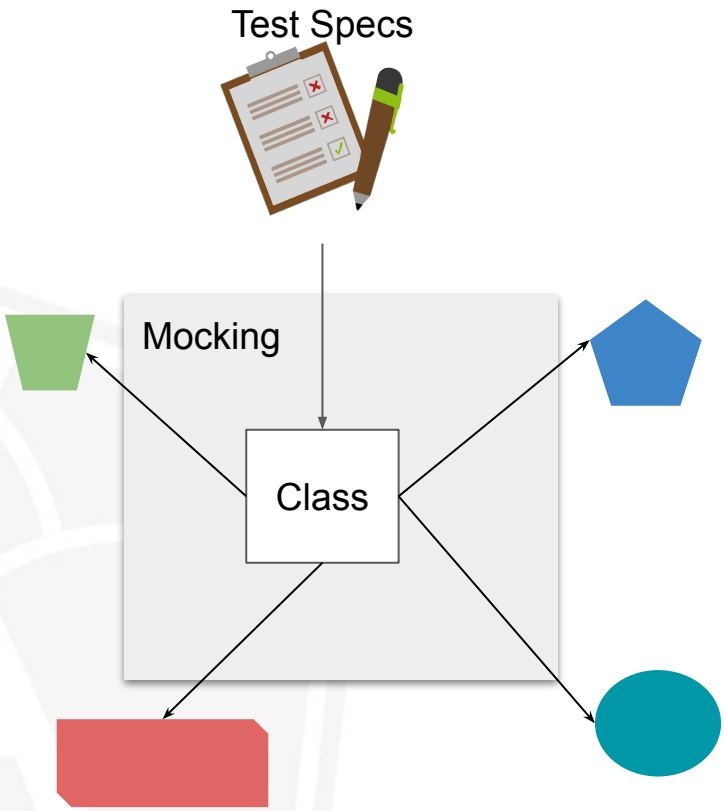
London Style



London Style



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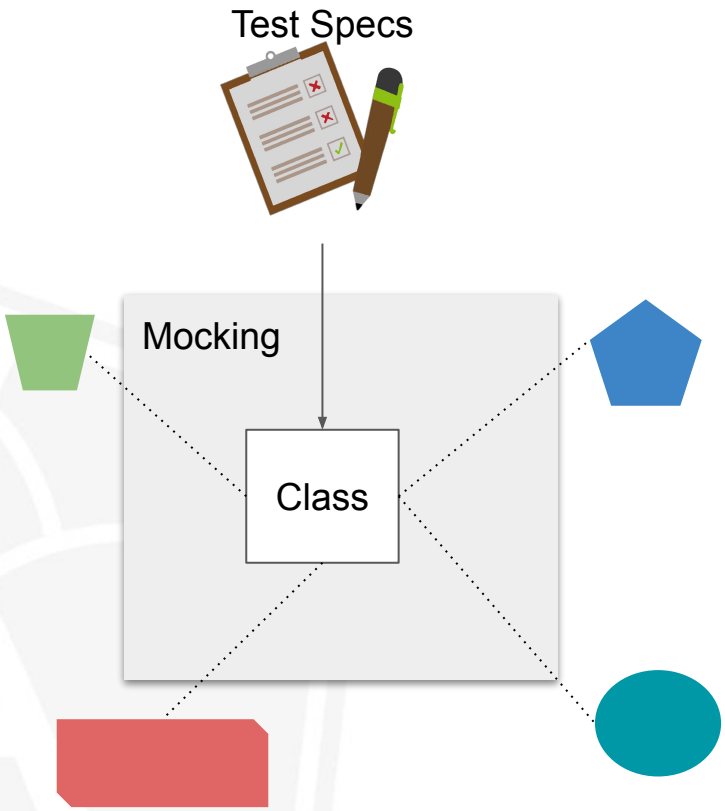

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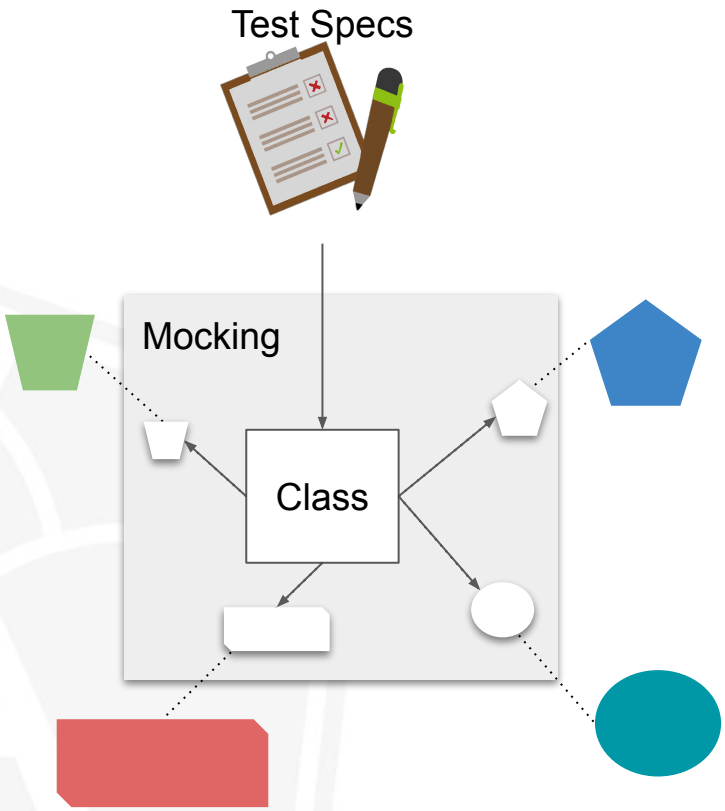
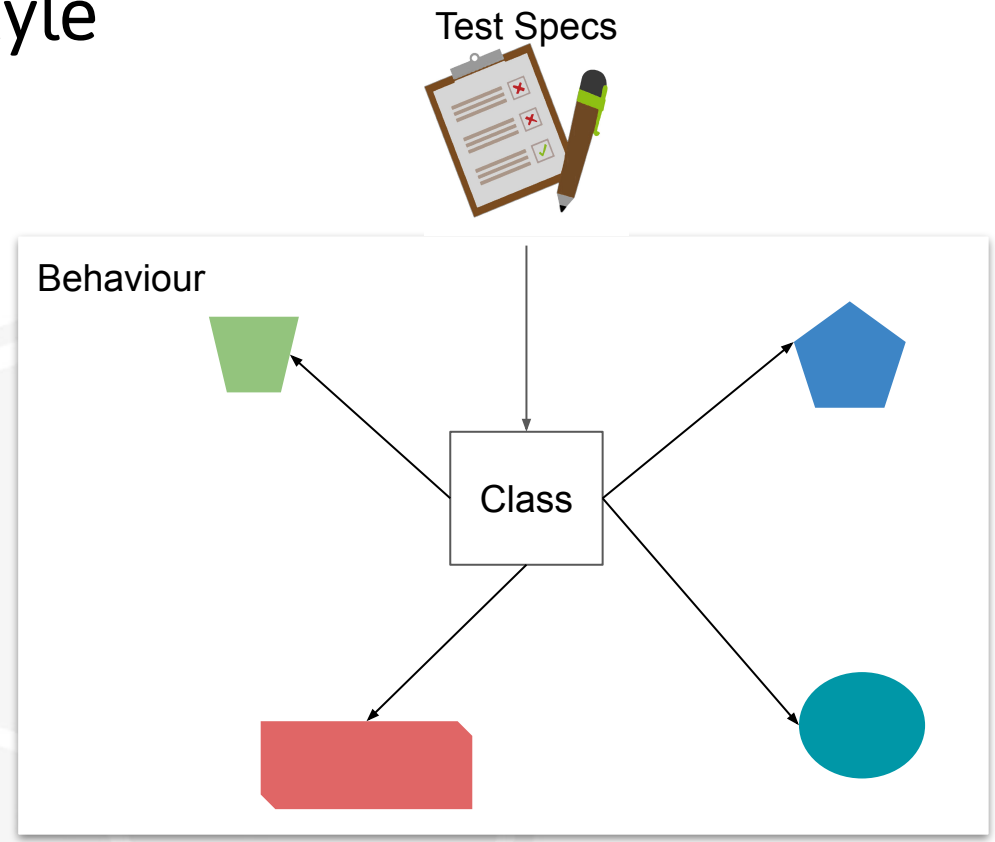
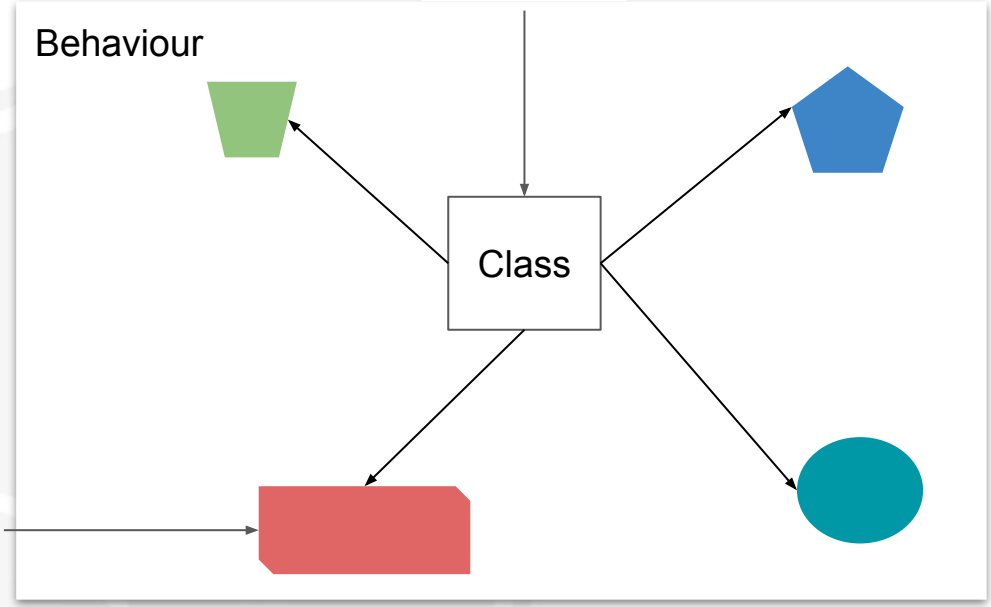


Detroit Style

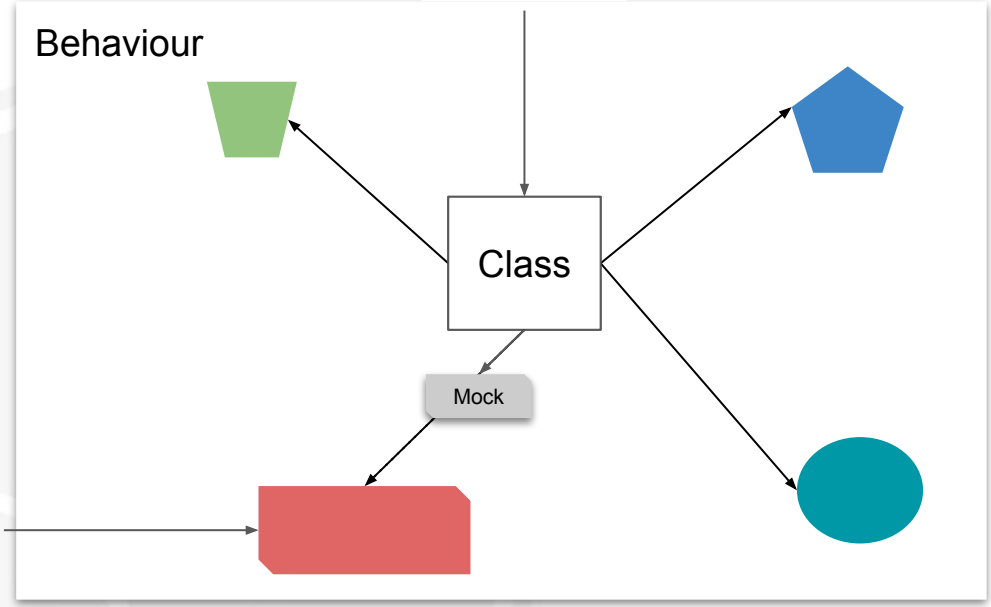


Detroit Style



Out-of-System Dependency
e.g. HttpClient

Detroit Style



Out-of-System Dependency
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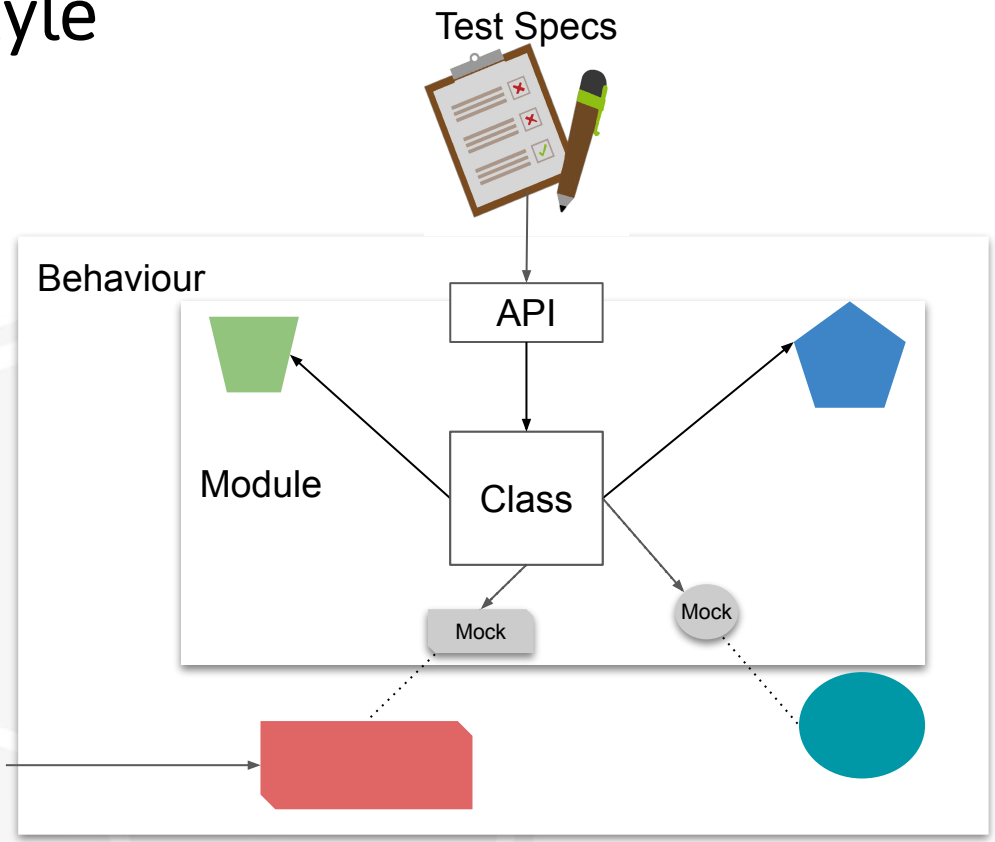
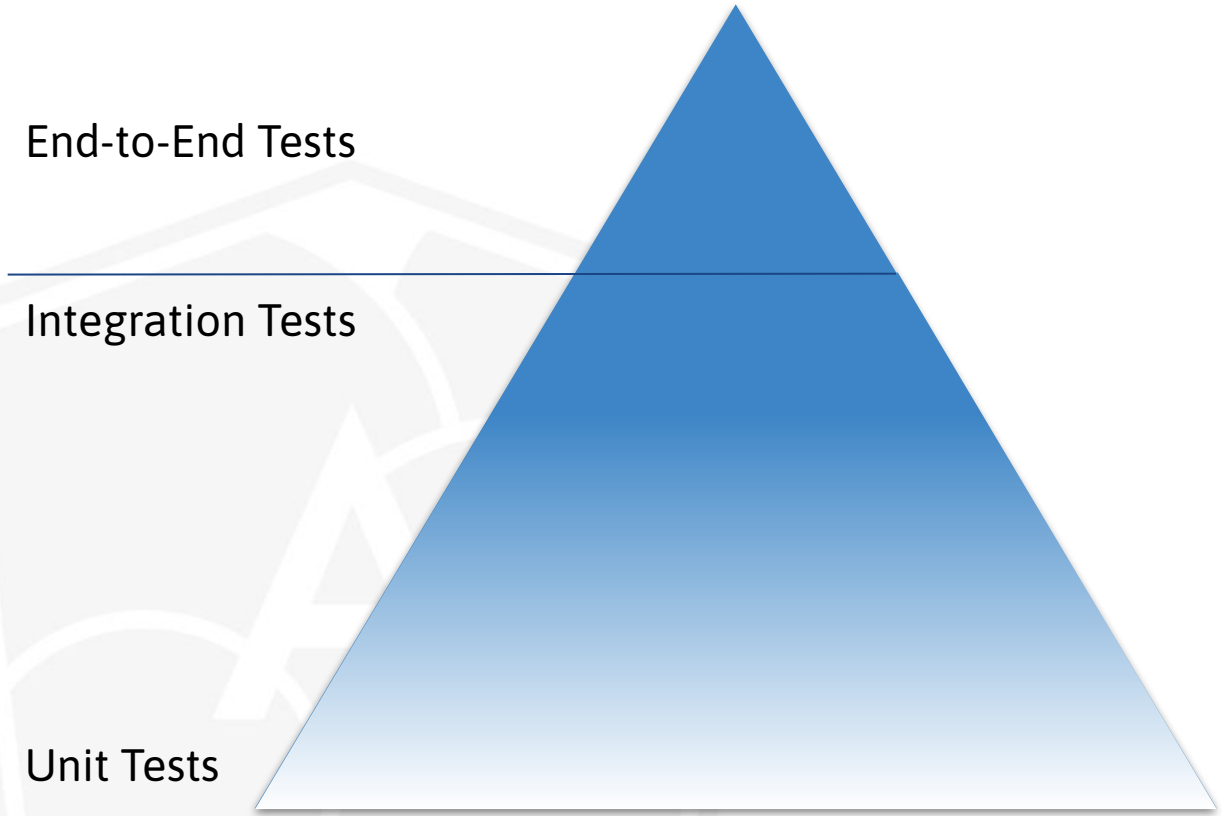


Testing Pyramid Revisited



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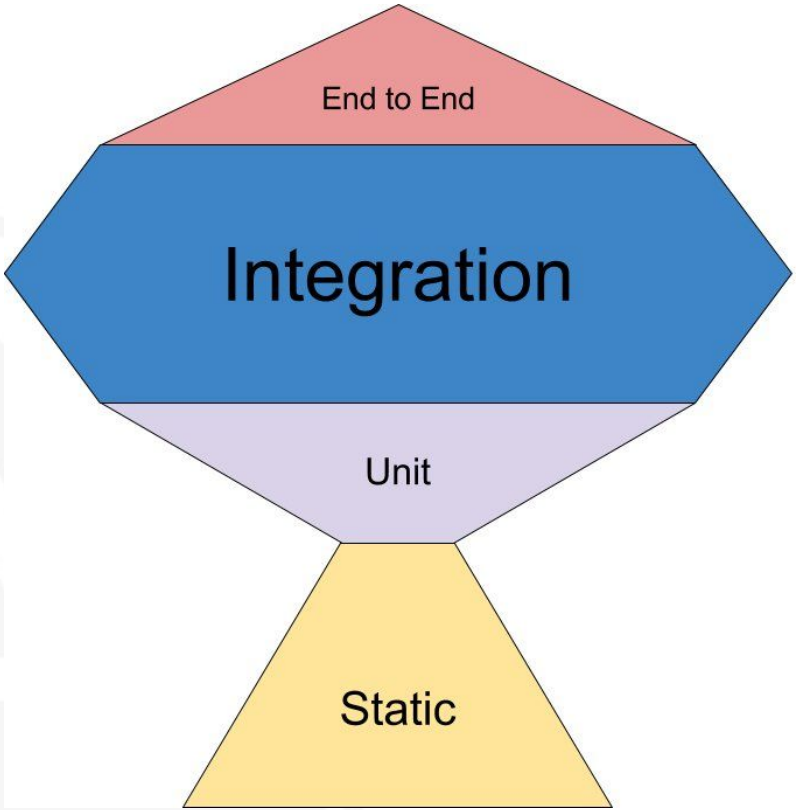
Testing According to ROI



Kent C. Dodds: https://twitter.com/kentcdodds/status/960723172591992832

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/))[0];
  request.flush([{ street: "Domgasse", streetNumber: 5 }]);
  expect(lookupResult.textContent.trim()).toBe("Address found");
});
```

Instead of HttpClientModule

Runs AFTER http request

RoutingTest

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

Testable Architecture

Different Testing Techniques

1. Unit / Integration Range
    a. Full mocking, no TestBed
    b. Selected mocking, without DOM interaction
    c. Selected mocking, DOM interaction
    d. Most minimal mocking, DOM Interaction
2. Exotic
    a. RxJs Marbles
    b. Visual Regression
    c. Component Tests via Storybook/Cypress (E2E)

Potential Problems

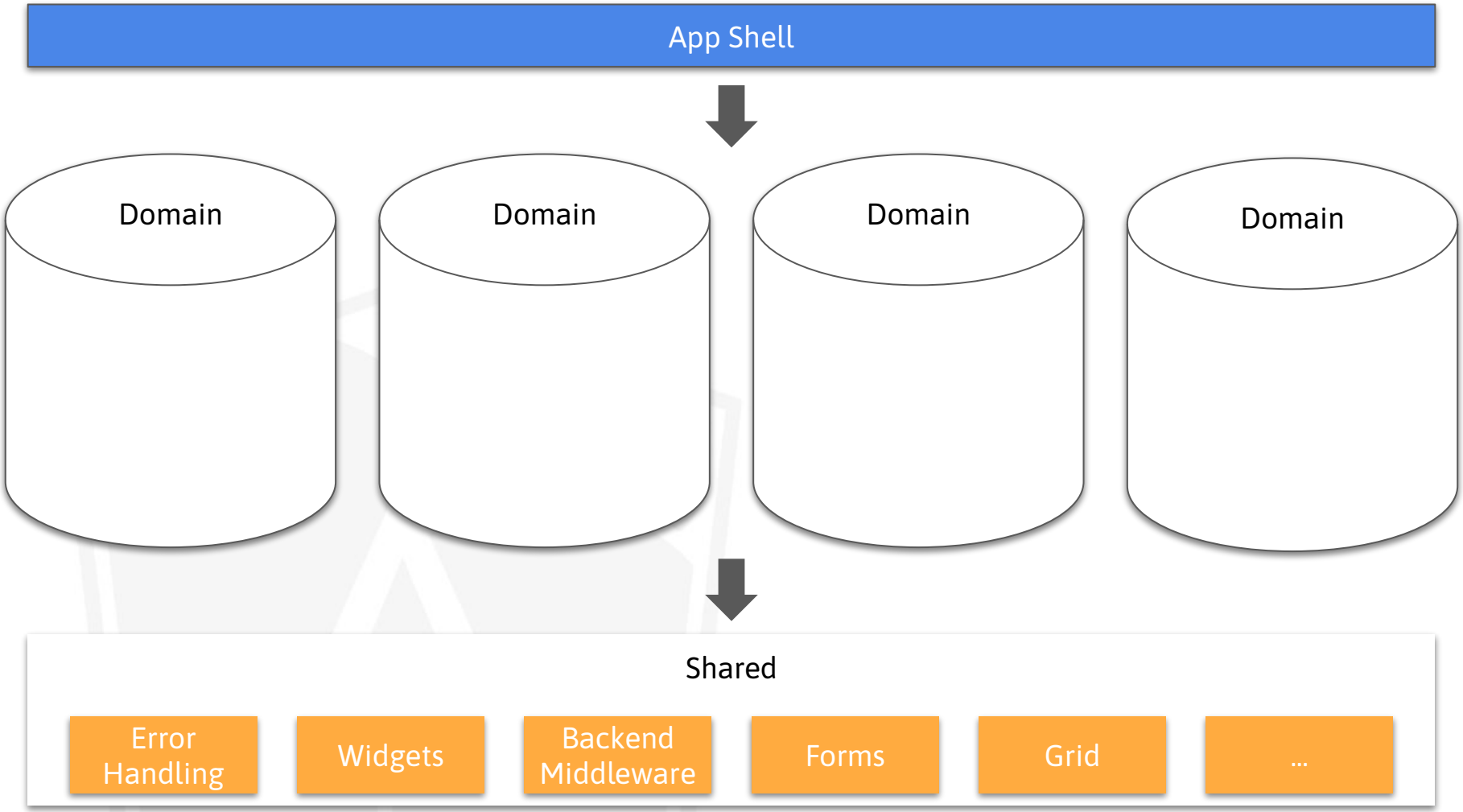
- Unit Tests (London)
  - What technique should be applied?
  - Too much mocking
  - Should I have unit test for everything?
- Integration Tests (Detroit Unit)
  - Too much setup required → feels like E2E
  - What should I mock?

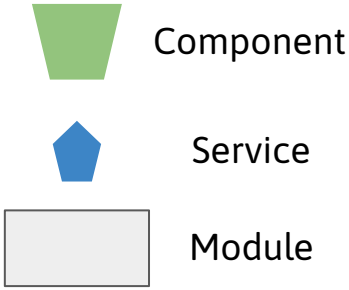
Unit vs. Integration

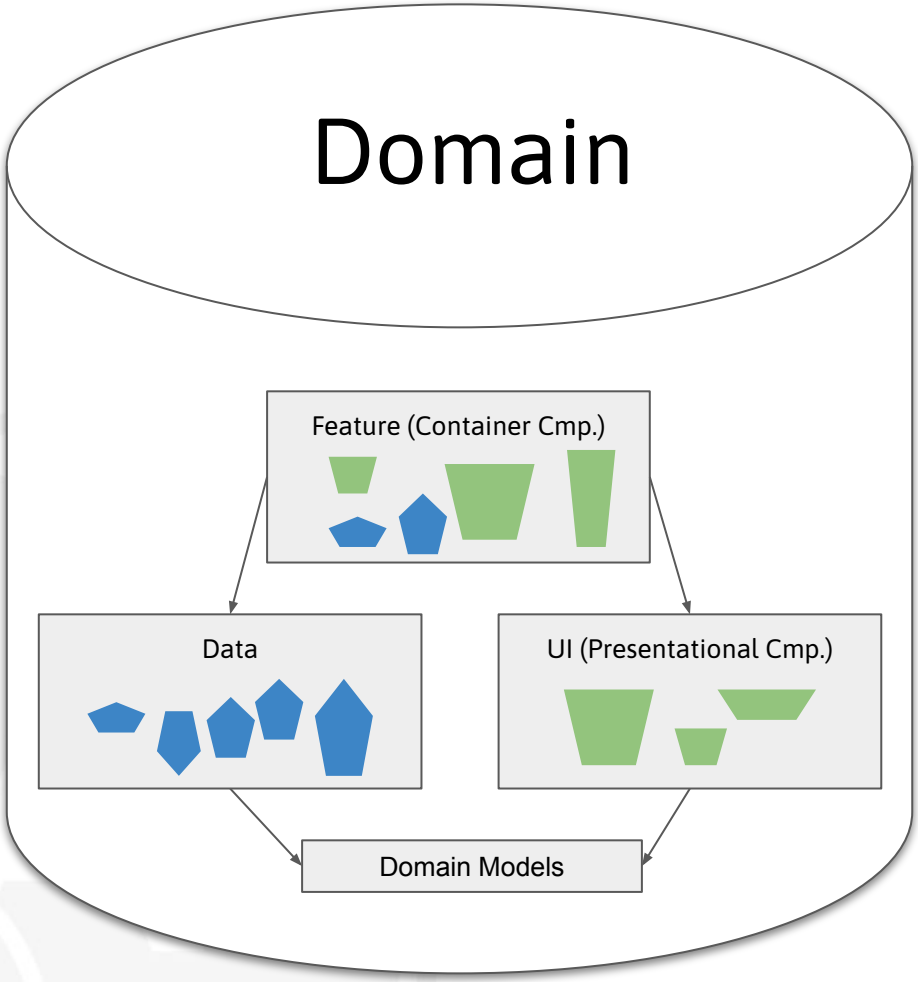
- Largely Depends on Application
- Most parts of data processing (unit test) done in backend
- Frontend as "proxy" → less logic
- Integration is King

Testable Architecture

- Unit Tests
  - Class has a defined type
  - One testing technique per Type
- Integration Tests
  - Reduction of dependencies via domain/feature boundaries
  - Integration Test per Domain/Feature
  - Entry point is the feature component


App Shell
Domain
Domain
Domain
Domain
Shared
Error Handling
Widgets
Backend Middleware
Forms
Grid
...





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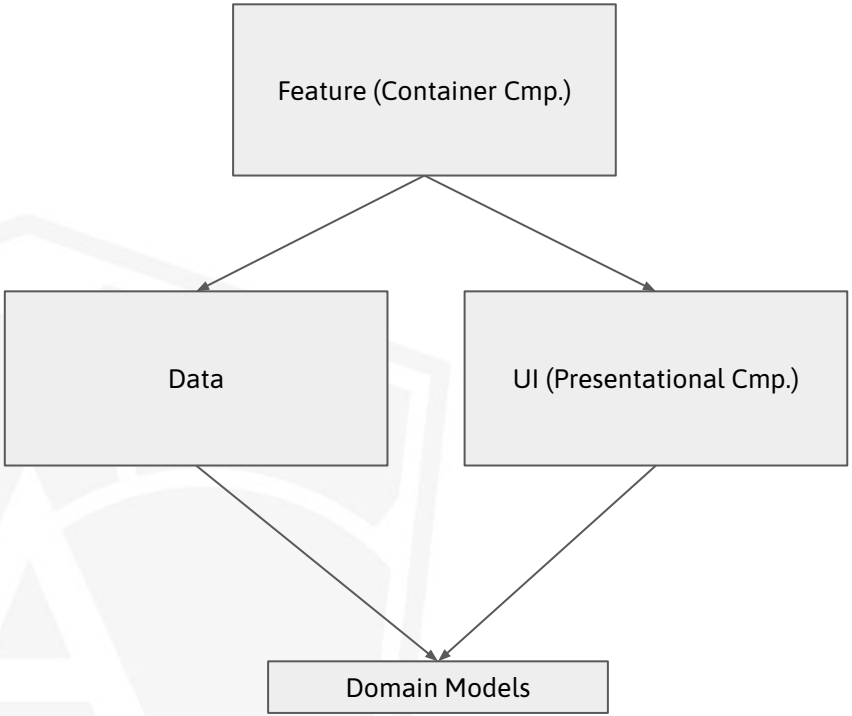
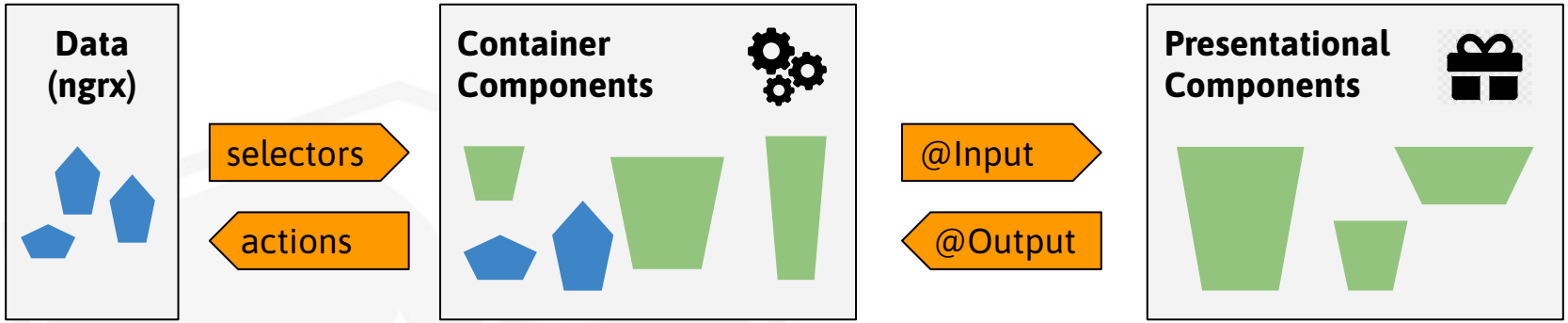


Container & Presentational Components



- Minimal HTML/CSS
- Lots of DI
- Facilitator

- HTML & CSS only
- Minimal Typescript
- No DI
- @Input & @Output
- No Observables

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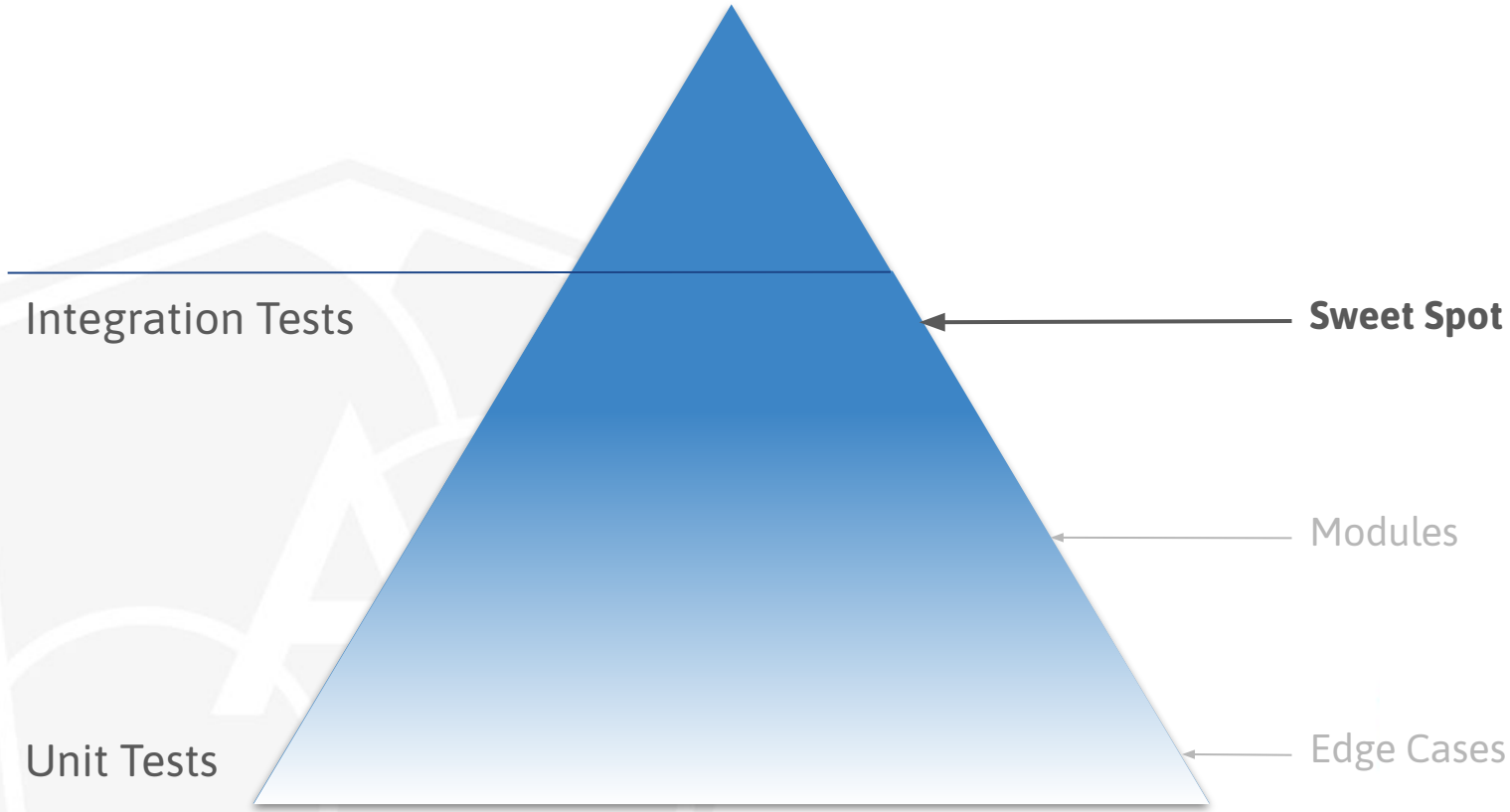
Sweet Spot


Integration Tests
Sweet Spot
Modules
Unit Tests
Edge Cases

Sweet Spot Examples

- Per Domain
- Per Feature
- Tests which are too hard for E2E

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Sweet Spot: Testing Techniques

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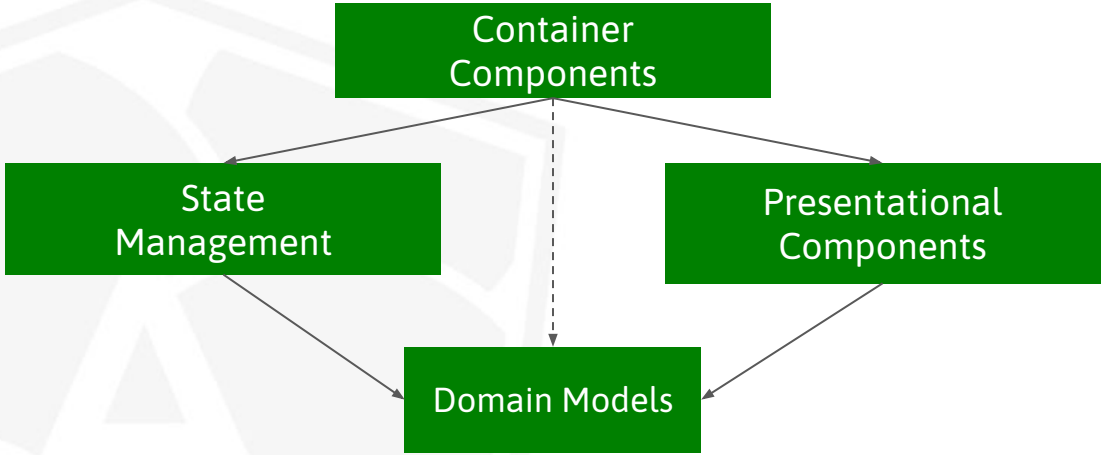
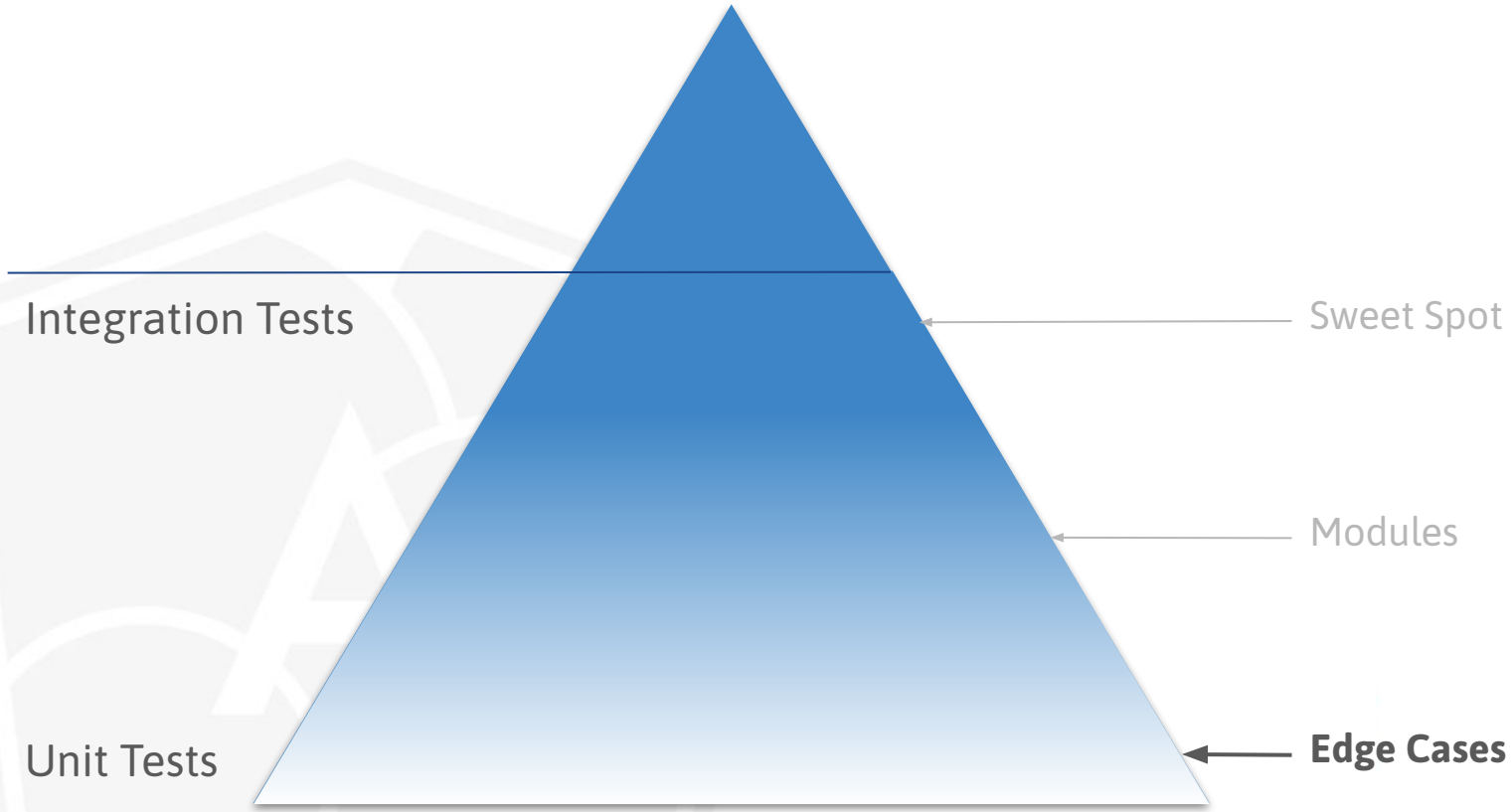
Sweet Spot



Edge Cases


Integration Tests
Sweet Spot
Modules
Unit Tests
Edge Cases

Edge Cases Examples

- Components
- Services
- Functions

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Edge Cases: Testing Techniques

1. Unit / Integration Range
    a. **Full mocking, no TestBed**
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2. Exotic
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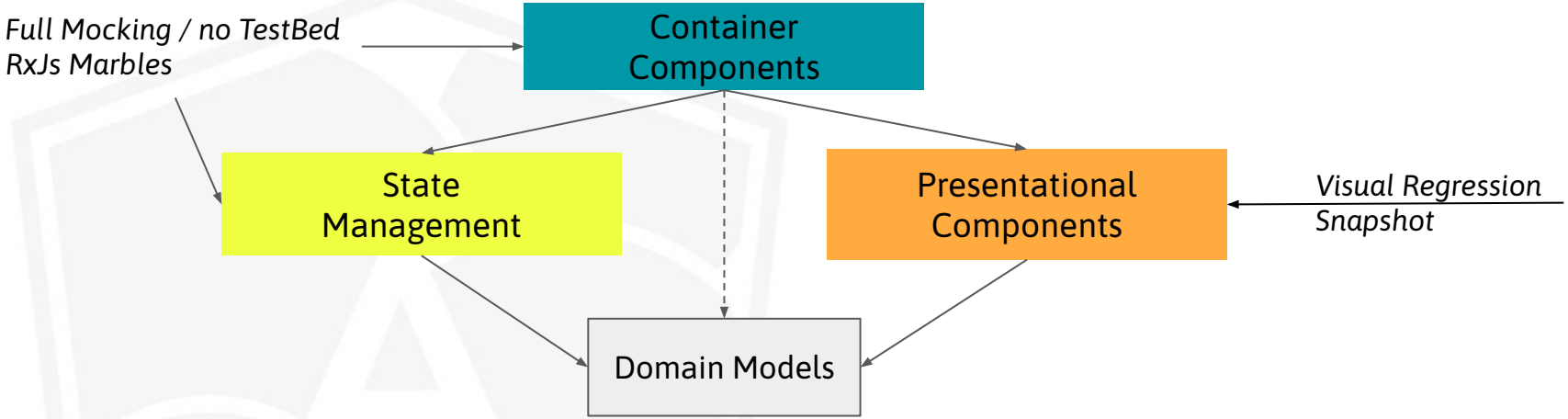
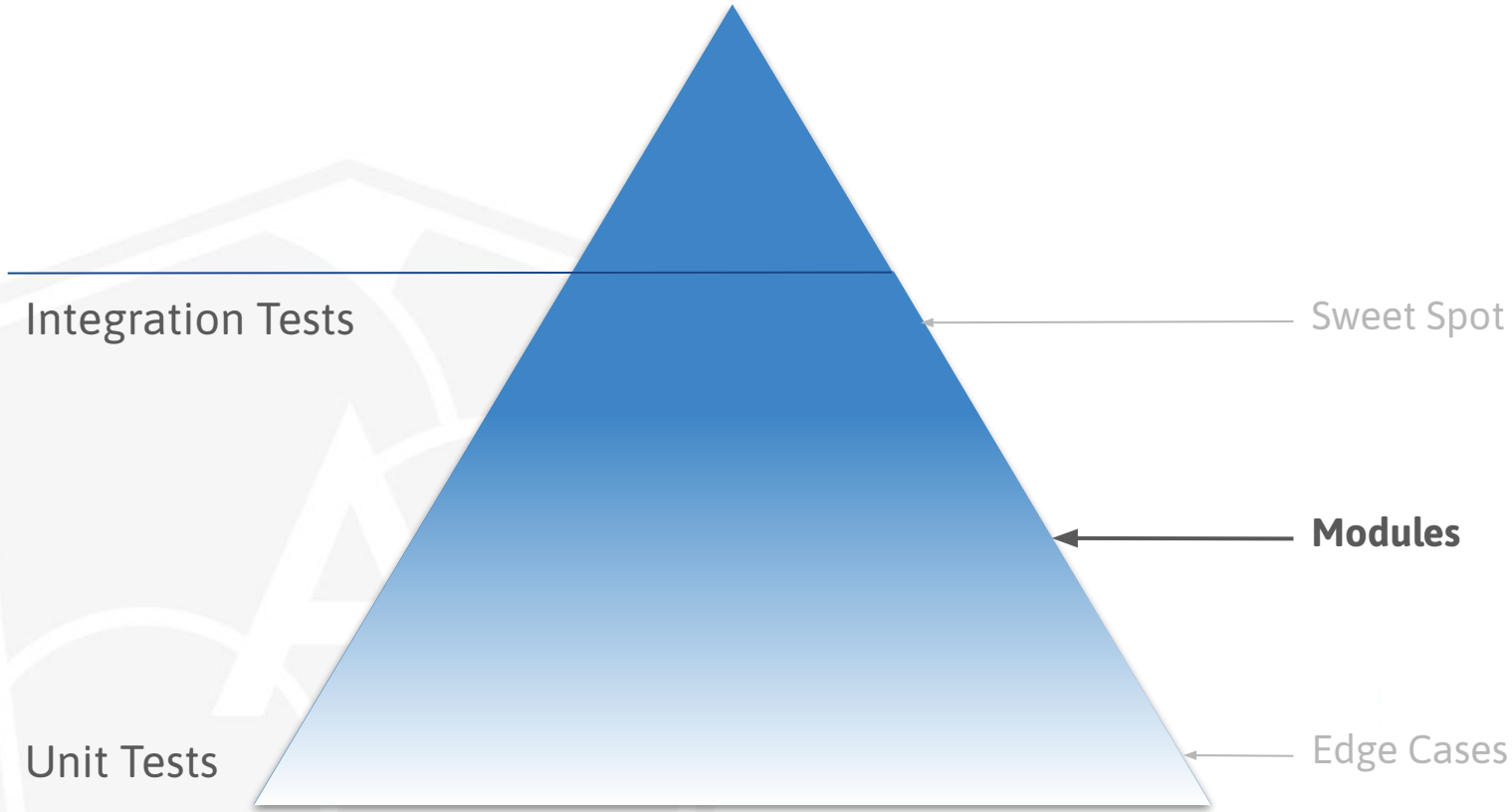
Edge Cases



Modules


Integration Tests
Sweet Spot
Modules
Unit Tests
Edge Cases

Modules Examples

- Interplay between Container & Presentational Components
- Complex Components (DataGrid)
- State Management
- Tests with Browser support (LocalStorage,...)

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Modules: Testing Techniques

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    a. Full mocking, no TestBed
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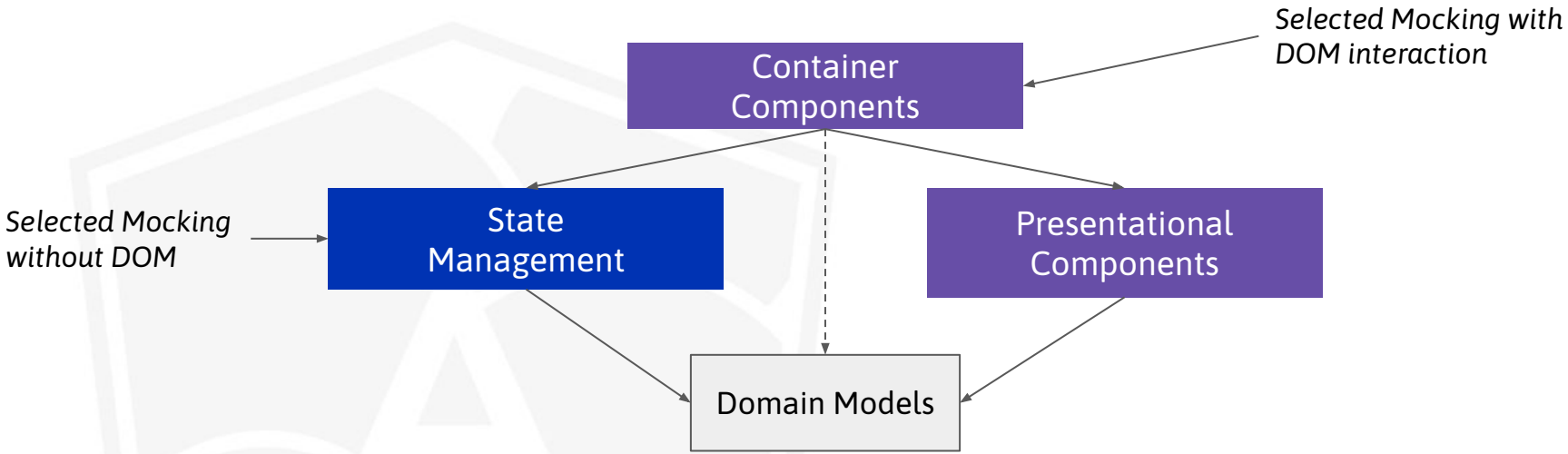
Logical Groups



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Summary

- Try to go for Integration Tests
- Use Code Coverage as Analysis Tool
  - Leave the edge cases for Unit Tests with full mocking
  - Rest with "Modules" Tests
- Apply the right Techniques:
  - Visual Regression: Presentational Components
  - RxJs Marbles: NgRx Effect
  - Storybook/Cypress: Component Groups

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Lab Time