
consider
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Fowler
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look
know
useful
became
programmer
different
external
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fault
one
really
xunit
Intermediate Unit Tests
Bob Fornal and Luis Carmona

About Me

- Husband and Father
- Senior Solutions Developer at Leading EDJE, Inc.

- 1978 - Started Writing Code
- 1990 - Completed BS CPS

About Luis

- Software Engineer at #100Devs

- 2019 - Built my first PC
- 2022 - Started writing code
- 2022 - Co-host of The Boba and Cherry Cafe twitter space.

Unit Testing Goals

- To have **CONFIDENCE** in code being released without defects.
- And **PROOF** that it works.
- Be **PRACTICAL** about how we test;
- Be **PRUDENT** about what should be tested.
- To **DECREASE** defects (find BUGS earlier) getting to QA.
- And **FASTER**, **EASIER** deployments.

What is Unit Testing?

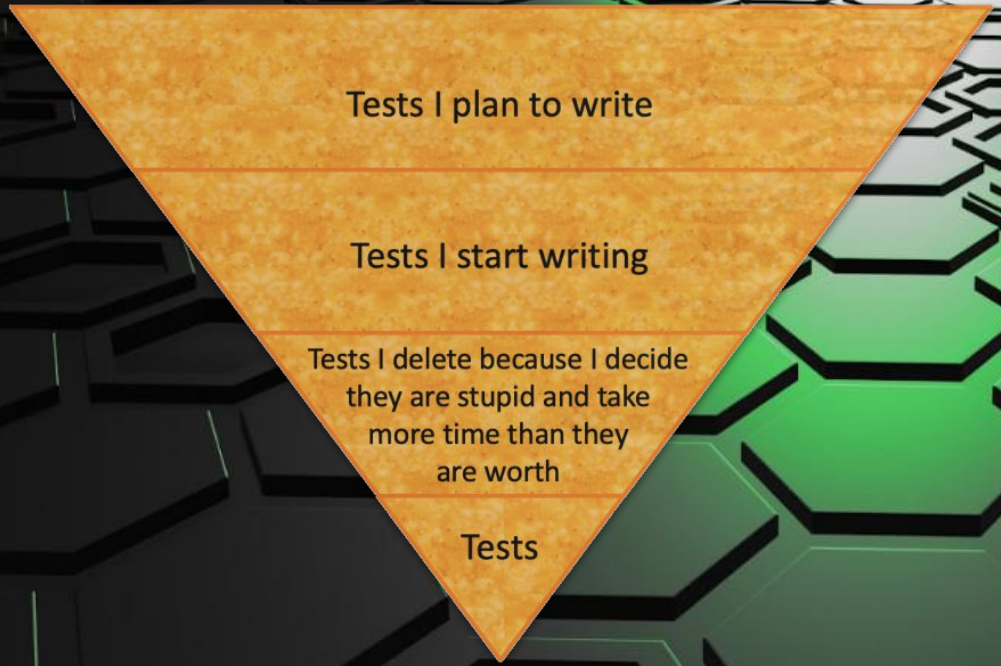
- ATOMIC, Lowest Level (small and fast).
- Single Responsibility Principle (SRP): “do one thing well.”
- Repeatable, Reliable, and Deterministic.
- Demonstrate concrete progress.
- Fails on a bug or changed requirements.
- Easy to understand why it fails.
- Reduce the cost of bugs.

Overview

- Stubs
- Spies
- Mocks
- Dummies

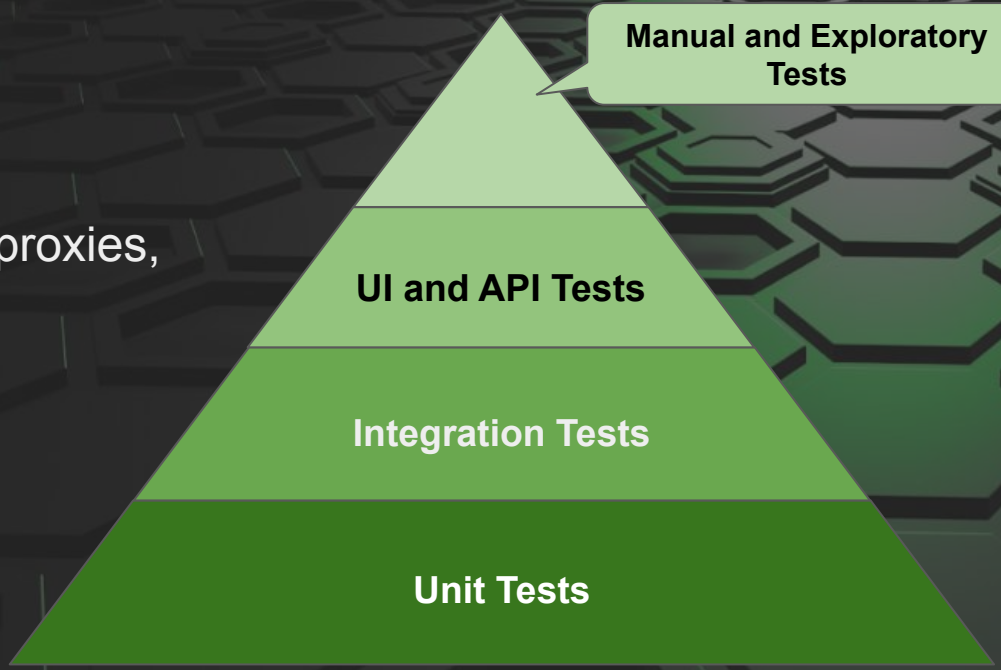
- Code Coverage

- Asynchronous Activity
- Dates

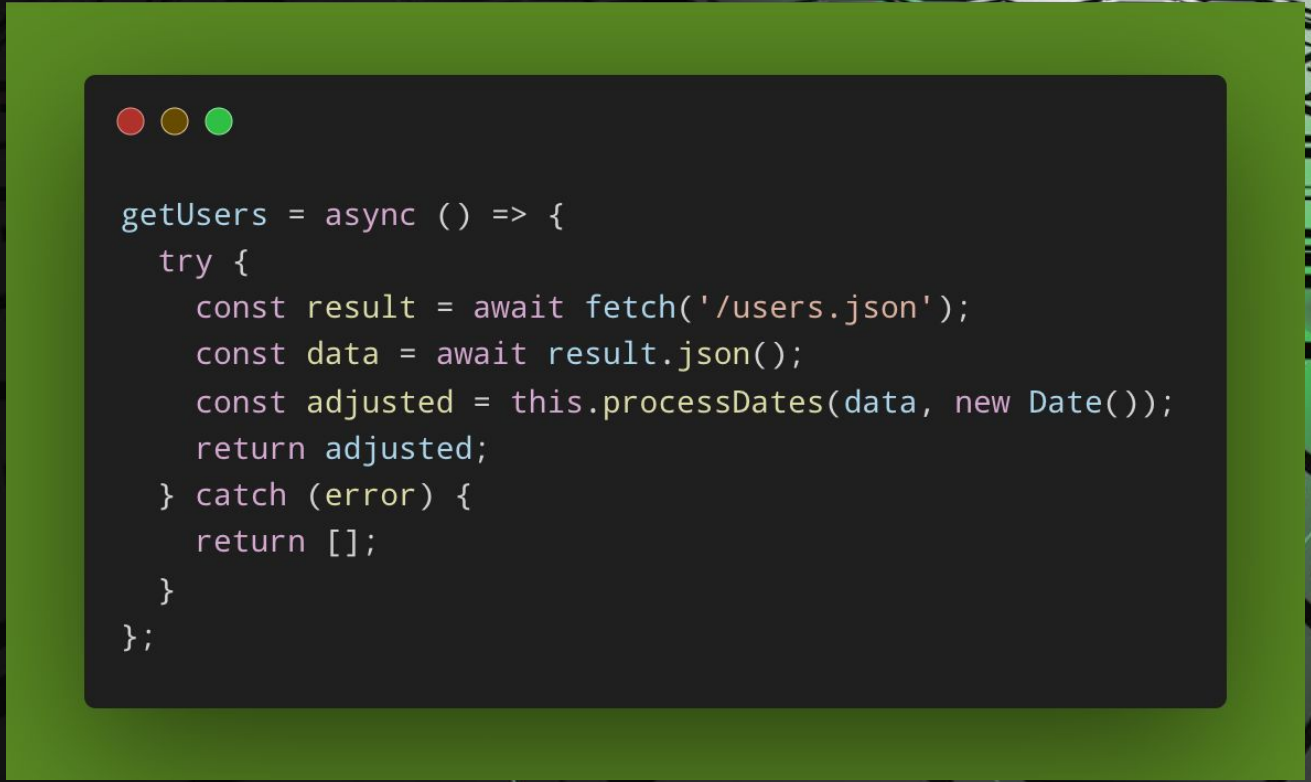


Definitions

- System Under Test:
  - Subject Under Test (SUT)
  - Code Under Test (CUT)
- Dependency
- Mocking: test double, stubs, proxies, mocks, or spies.

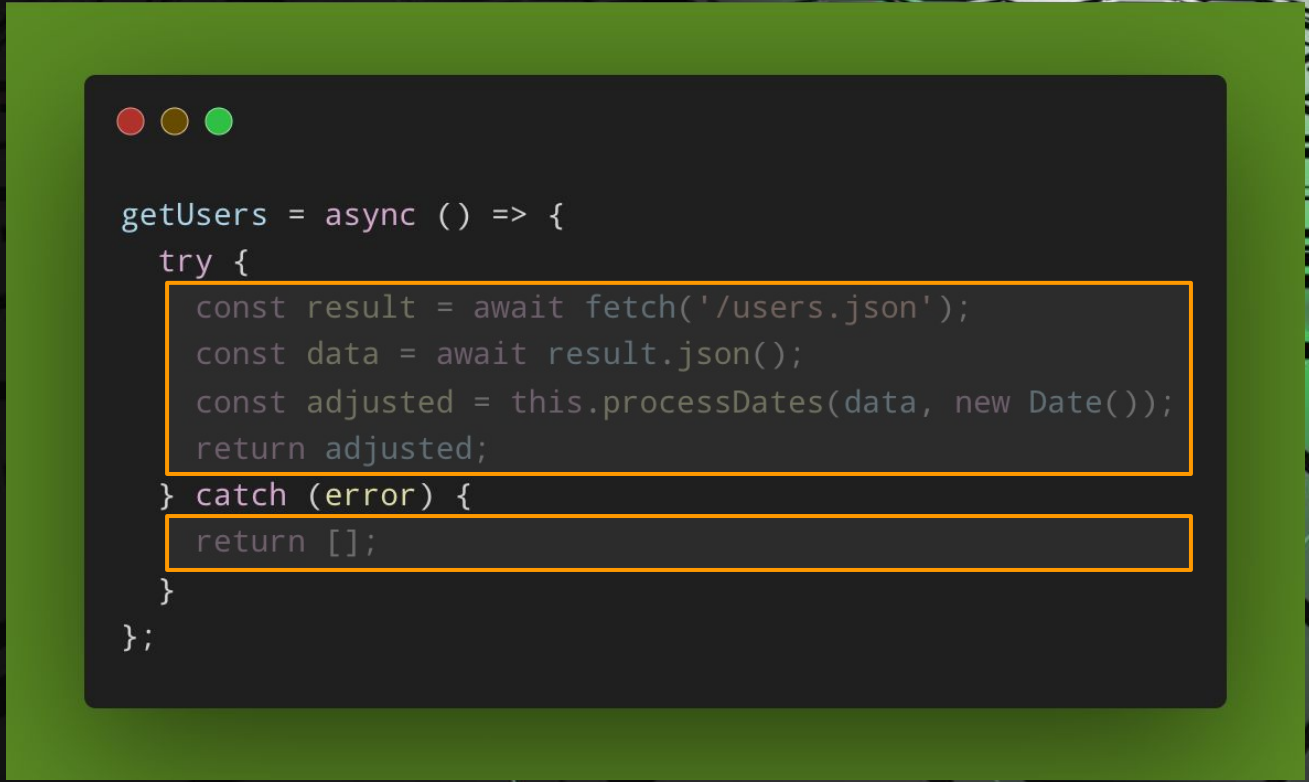


Anatomy of Code Under Test



```
getUsers = async () => {
  try {
    const result = await fetch('/users.json');
    const data = await result.json();
    const adjusted = this.processDates(data, new Date());
    return adjusted;
  } catch (error) {
    return [];
  }
};
```

Anatomy of Code Under Test



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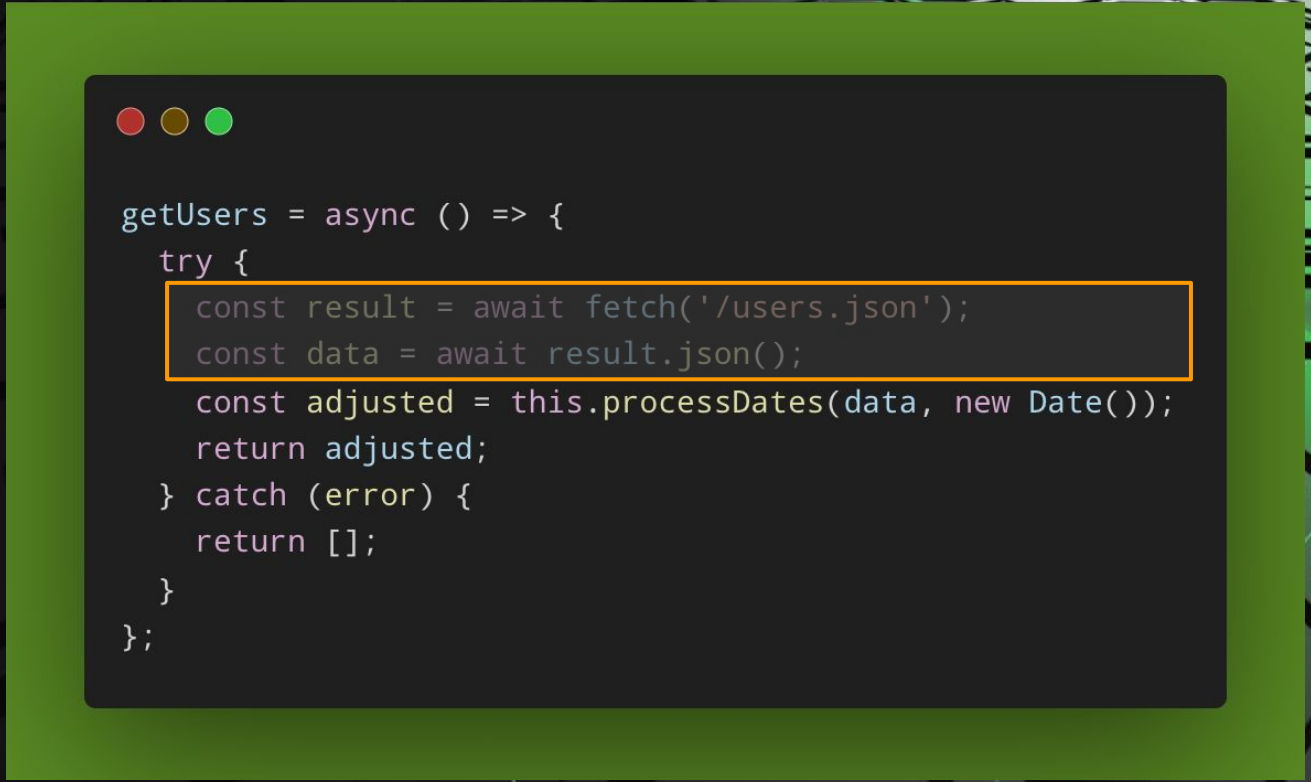

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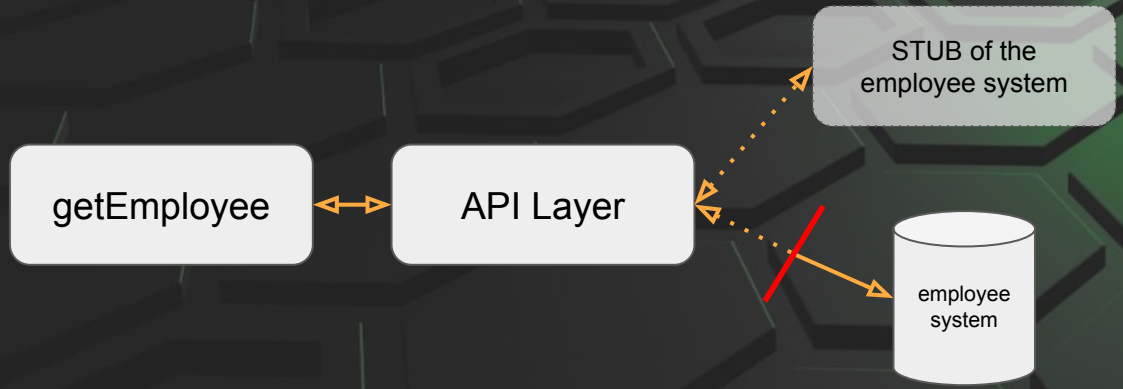
```

Stubs

The STUB returns a known and controlled value.

- Replace or redefine a function or method.
- Helps deal with interaction with outside code.



Stubs: Code

```
let count = 0;
const counter = {
  increment: () => count += 1,
  getCount: () => count
};
const app = counter => counter.increment();

describe('Counter Stubs', () => {
  it('expects app with mock counter .toHaveBeenCalledTimes', () => {
    const mockCounter = {
      increment: jest.fn()
    };

    app(mockCounter); // count does not get incremented
    expect(mockCounter.increment).toHaveBeenCalledTimes(1);
    expect(counter.getCount()).toEqual(0);
  });
});
```

Stubs: Code

```
let count = 0;
const counter = {
  increment: () => count += 1,
  getCount: () => count
};
const app = counter => counter.increment();

describe('Counter Stubs', () => {
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    app(mockCounter); // count does not get incremented
    expect(mockCounter.increment).toHaveBeenCalledTimes(1);
    expect(counter.getCount()).toEqual(0);
  });
});
```


CODE

Spies

The **SPY** are Stubs that gather execution information.

- Did the spied on method/function get called, how many times, when, and with what parameters.
- Unlike Stubs, a **SPY** wraps the target method/function instead of replacing it, so the original code of the target can also be executed.

Spies: Code

```
class MethodClass {
  instanceMethod = () => 'output from instance method';
}

describe('Spying 001', () => {
  let service;

  beforeEach(() => {
    service = new MethodClass();
    jest.clearAllMocks();
  });

  it('expects to spy on instance method and change implementation', () => {
    jest.spyOn(service, 'instanceMethod').mockImplementation(() => 'spy triggered');

    const result = service.instanceMethod();
    expect(service.instanceMethod).toHaveBeenCalledTimes(1);
    expect(result).toEqual('spy triggered');
  });
});
```

Spies: Code

```
class MethodClass {
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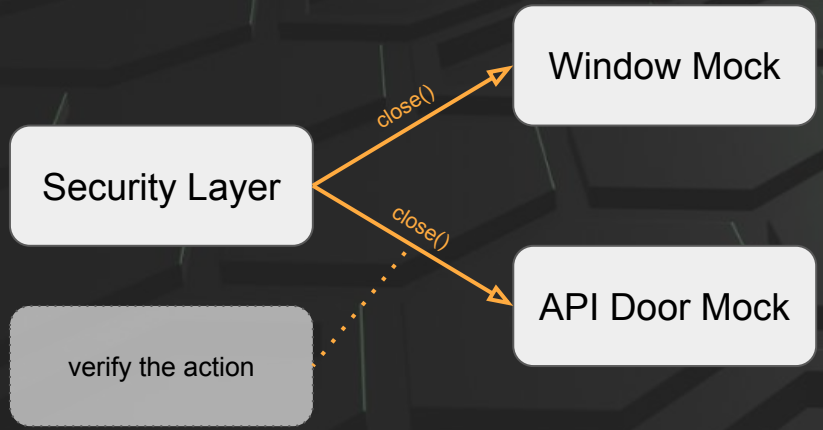
    const result = service.instanceMethod();
    expect(service.instanceMethod).toHaveBeenCalledTimes(1);
    expect(result).toEqual('spy triggered');
  });
});
```


CODE

Mocks

The MOCK sets the expected behavior(s) on real objects or functions.

- *Like the twin brother to Stubs.*
- This does not replace functionality, just changing its behavior in specific cases.



Mocks: Code

```
function forEach(items, callback) {
  for (let data of items) {
    callback(data);
  }
}

describe('Testing Mocks 003', () => {
  it('expects the use of the .mock property', () => {
    const mockCallback = jest.fn(x => 42 + x);

    forEach([0, 1], mockCallback);
    expect(mockCallback.mock.calls.length).toBe(2);
    expect(mockCallback.mock.calls[0][0]).toBe(0);
    expect(mockCallback.mock.calls[1][0]).toBe(1);
    expect(mockCallback.mock.results[0].value).toBe(42);
  });
});
```

Mocks: Code

```
function forEach(items, callback) {
  for (let data of items) {
    callback(data);
  }
}

describe('Testing Mocks 003', () => {
  it('expects the use of the .mock property', () => {
    const mockCallback = jest.fn(x => 42 + x);

    forEach([0, 1], mockCallback);
    expect(mockCallback.mock.calls.length).toBe(2);
    expect(mockCallback.mock.calls[0][0]).toBe(0);
    expect(mockCallback.mock.calls[1][0]).toBe(1);
    expect(mockCallback.mock.results[0].value).toBe(42);
  });
});
```


CODE

Dummies

The **DUMMY** is a simple object that serve no real purpose other than being available when the syntax requires it.

- Strongly typed languages.


CODE

Code Coverage

- Statements
- Branches
- Functions
- Lines

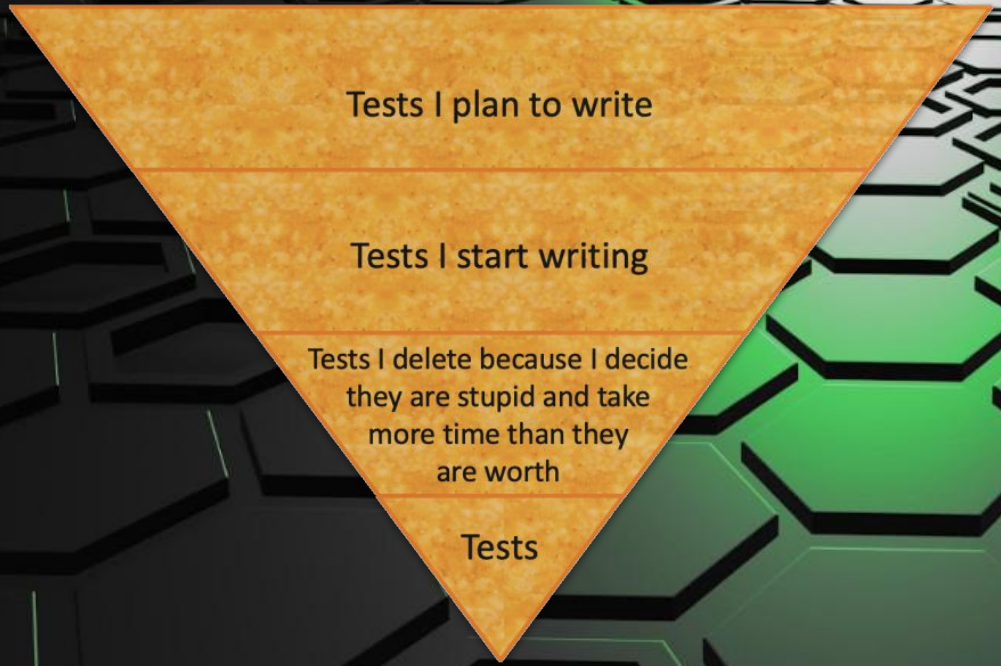
DEMO

Summary

- Stubs
- Spies
- Mocks
- Dummies

- Code Coverage

- Asynchronous Activity
- Dates

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