

Unit Testing in JavaScript

Dr. Abdelkarim Erradi

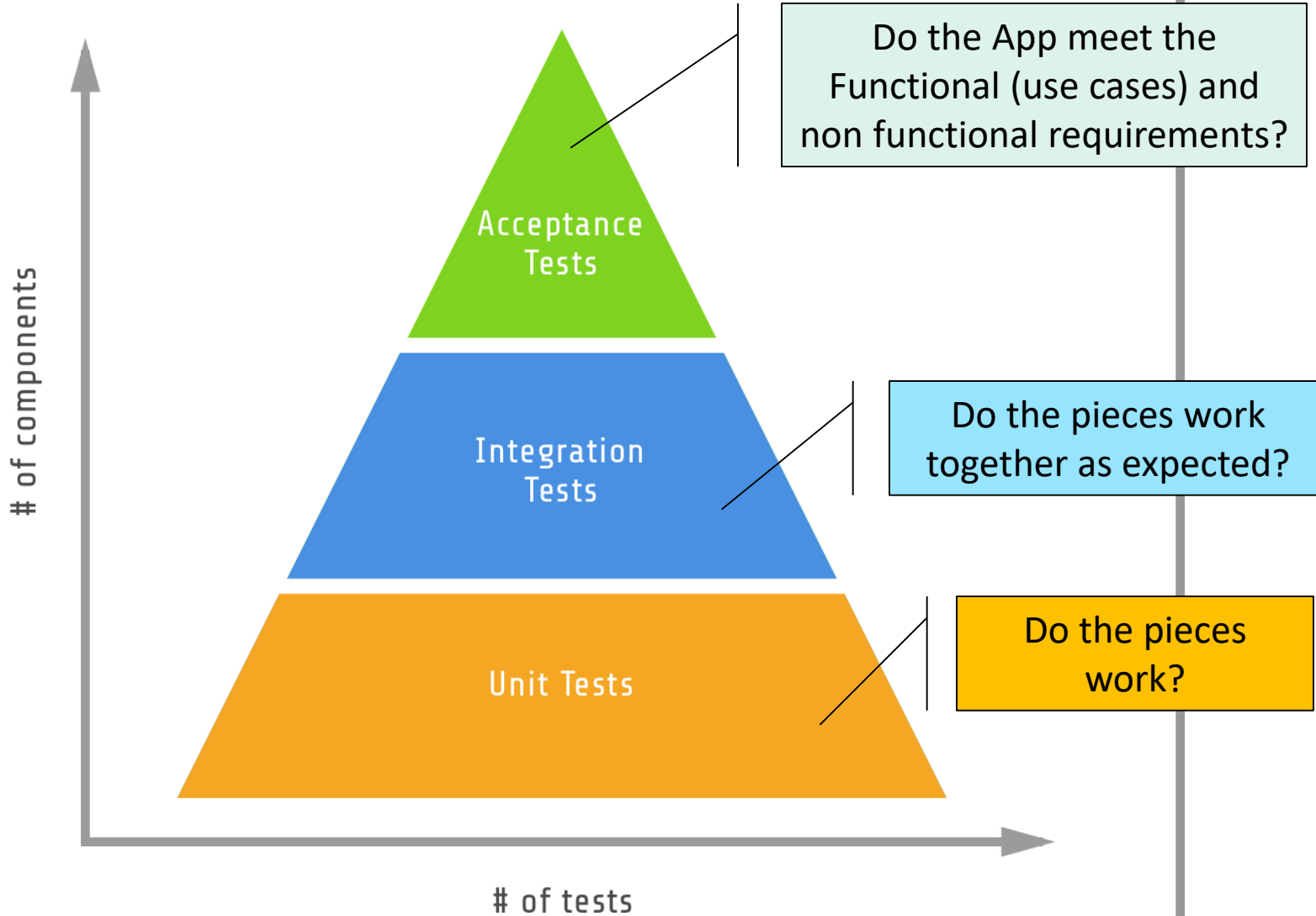
Dept. of Computer Science & Engineering

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Outline

- ① Unit Testing Overview
- ② Mocha & Chai
- ③ Creating a test suites and specs

THE PYRAMID OF TESTS



What is Unit Testing?

- A unit test **tests one unit of work** to verify that it works **as expected**
- A unit test should be:
 - Isolated and Independent from other tests
 - Repeatable
 - Predictable
- Unit tests are added to the code repository along with the code they test
- A unit testing framework is needed
 - e.g., QUnit, Jasmine, **Mocha**
 - We'll use Mocha <https://mochajs.org/>

Manual Testing

- You may have already done unit testing by without using a Unit Testing framework
- **Manual tests** are less efficient
 - Not structured
 - Not repeatable
 - Not all code covered
 - Not easy to run automatically
- A Unit Testing framework enables better structure of the testing code

Why Unit Tests?

- Help to detect bugs in early stages of the project => **improve code quality**
- Can expose high coupling => encourage refactoring to produce testable code
- Serve as live documentation
- Reduce the cost of change
- Allow change and refactoring with confidence (refactoring = change the code structure without changing its functionality)
- Decrease the defect-injection rate due to refactoring / changes

Mocha Overview

- Mocha is a feature-rich framework that helps us write and run unit tests
 - Run in both the browser and on Node.js
 - Can test async code
 - Often used with Chai.js for writing **test assertions**
<http://chaijs.com/>

```
describe('#sum', () => {  
  it('when empty array, expect to return 0', () => {  
    let actual = sum([])  
    expect(actual).to.equal(0)  
  })  
  it('when with single number, expect the number', () => {  
    let number = 6;  
    let actual = sum([number]);  
    let expected = number;  
    expect(actual).to.equal(expected);  
  })  
})
```

Test Suite & Test Spec

- Test suite describes the functionality to test
 - Using a **describe()** function
 - **xdescribe** to disable a test suite
- Test spec tests the functionality
 - Using an **it()** function to tell the test what **it** should **expect** from running a unit of code
 - Contain one or more expectations (compare **actual** with **expected** results)
 - **xit** to disable a spec

Example

- Test suite is created with the **describe**(name, callbackFunction)
- Test Spec is created with the **it** (name, callbackFunction)

```
describe ('Person Test Suite', () => {  
  it('with valid names, expect ok', () => {  
    let person = new Person('Ali', 'Faleh');  
    expect(person.firstname()).to.equal('Ali');  
    expect(person.lastname()).to.equal('Faleh');  
  })  
})
```

Chai Expect Assertion

- Expectations are assertions that can be either true or false
- Use the **expect** function within a spec to declare an expectation
 - Receives the actual value as parameter
 - A Matcher is a comparison between the actual and the expected values

```
expect(person.getName()).to.equal('Ali')
```

```
expect(person).to.be.a('Person')
```

```
expect(person).to.not.be.undefined
```

```
expect(person).not.to.be.null
```

```
expect(person).to.be.ok
```

```
expect(person).not.to.be.ok
```

Matchers

- Used to verify expectations
 - `expect(1 === 1).to.be.true`
 - `expect('b' + 'a' + 'r').to.not.equal('bar')`
 - `expect(10 / 0).to.throw(Error)`
 - `expect({ foo: 'bar' })`
`.to.have.property('foo').and.equal('bar')`
 - `expect(() => x.y.z).to.throw()`
- More examples @ <http://chaijs.com/api/bdd/>

Setup and Teardown

- **before** – runs before each test suite
- **after** – runs before each test suite
- **beforeEach** – runs before each test
- **afterEach** – runs after each test

```
before( async () => {  
    await mongoose.connect('mongodb://localhost/books')  
    await mongoose.connection.db.dropDatabase()  
})
```

```
beforeEach(() => { ... })
```

```
afterEach( () => { ... })
```

```
after( async () => {  
    await mongoose.disconnect()  
})
```

Good Unit Tests

- Test one thing at a time (1 focus per test)
- Test results, not internals
- Test your code for different scenarios
- You want to write positive tests and negative tests
 - Positive tests are ones that should pass
 - Negative tests involve values that are outside acceptable ranges
 - You're testing to make sure that they do fail

Summary

- Unit Tests are an important part of any development process
- Mocha library can help you test your JavaScript code
- Mocha uses test suites to organize the tests
 - Tests suites are created with the **describe**
- Specs (tests) are contained in a test suites
 - Tests specs are created with the **it**
- Key guideline for testable code = **Modular code**:
simple, single-purpose functions

Resources

- Mocha

<https://mochajs.org/>

- Chai

<http://chaijs.com/>