Test Driven Development & Code Coverage

Marta Julia González Padrón – alu0101254487
Vanessa Valentina Villalba Pérez – alu0101265704

Table Of Contents
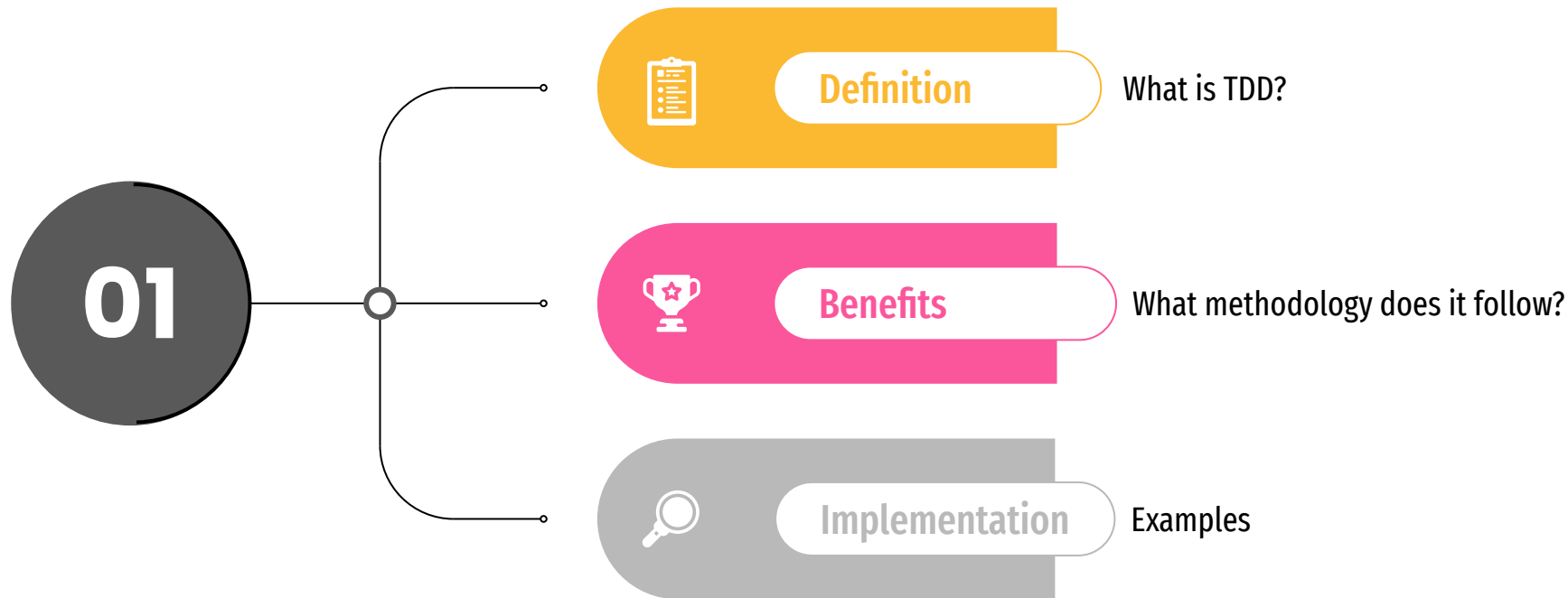
Test Driven Development

Definition — What is TDD?
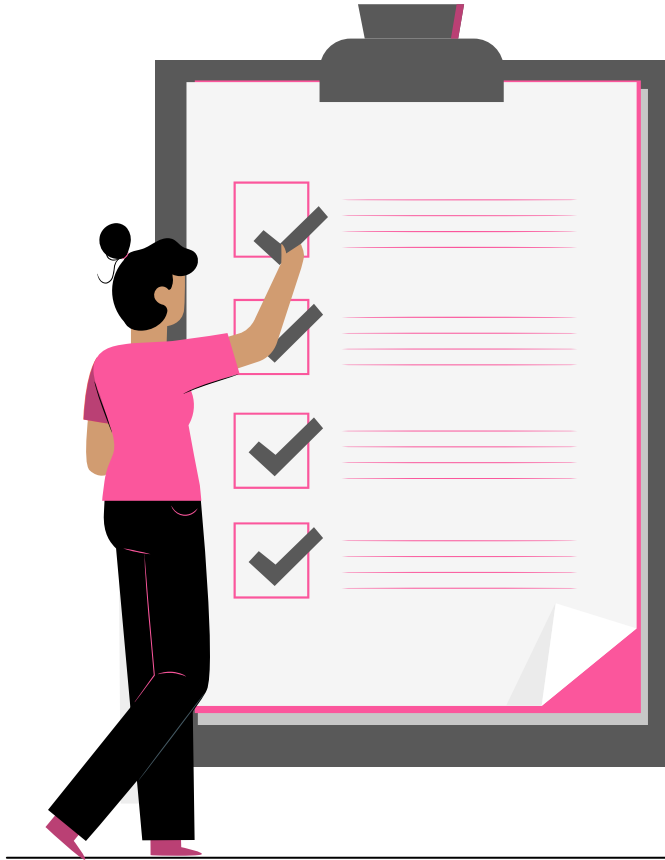
Benefits — What methodology does it follow?

Implementation — Examples

01

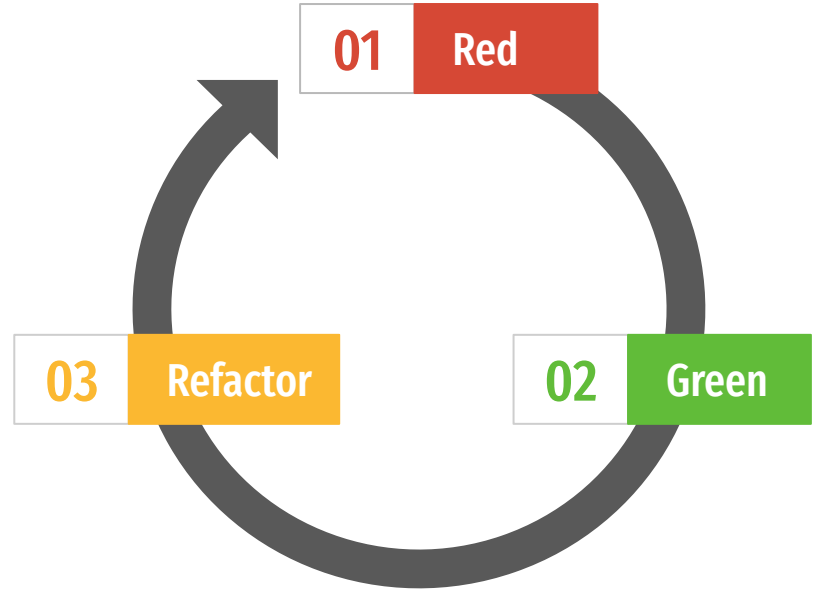# What is TDD?

Software development process which combines test-first development and refactoring

Methodology

01 Red

02 Green

03 Refactor

Implementation

```
describe('Yacht', () => {
  it('Yacht', () => {
    expect(score([5, 5, 5, 5, 5], 'yacht')).to.equal(50);
  });

  it('Not Yacht', () => {
    expect(score([1, 3, 3, 2, 5], 'yacht')).to.equal(0);
  });
});
```

```
Yacht
    1) Yacht
    2) Not Yacht


  0 passing (13ms)
  2 failing

  1) Yacht
      Yacht:
    AssertionError: expected undefined to equal 50
      at Context.<anonymous> (test/yatch.spec.js:9:48)
      at processImmediate (internal/timers.js:461:21)

  2) Yacht
      Not Yacht:
    AssertionError: expected undefined to equal 0
      at Context.<anonymous> (test/yatch.spec.js:13:48)
      at processImmediate (internal/timers.js:461:21)
```

Implementation

```
const calculatePointsYacht = function(points) {
  let repetitions = 0;
  for (const element of points) {
    if (element === points[0]) {
      repetitions++;
    }
  }
  if (repetitions === 5) {
    return 50;
  }
  return 0;
};
```

```
> mocha test/yatch.spec.js



  Yacht
    ✓ Yacht
    ✓ Not Yacht


  2 passing (9ms)
```

Implementation

```
const calculatePointsYacht = function(points) {
  if (points.every((score) => score === points[0])) {
    return 50;
  }
  return 0
};
```
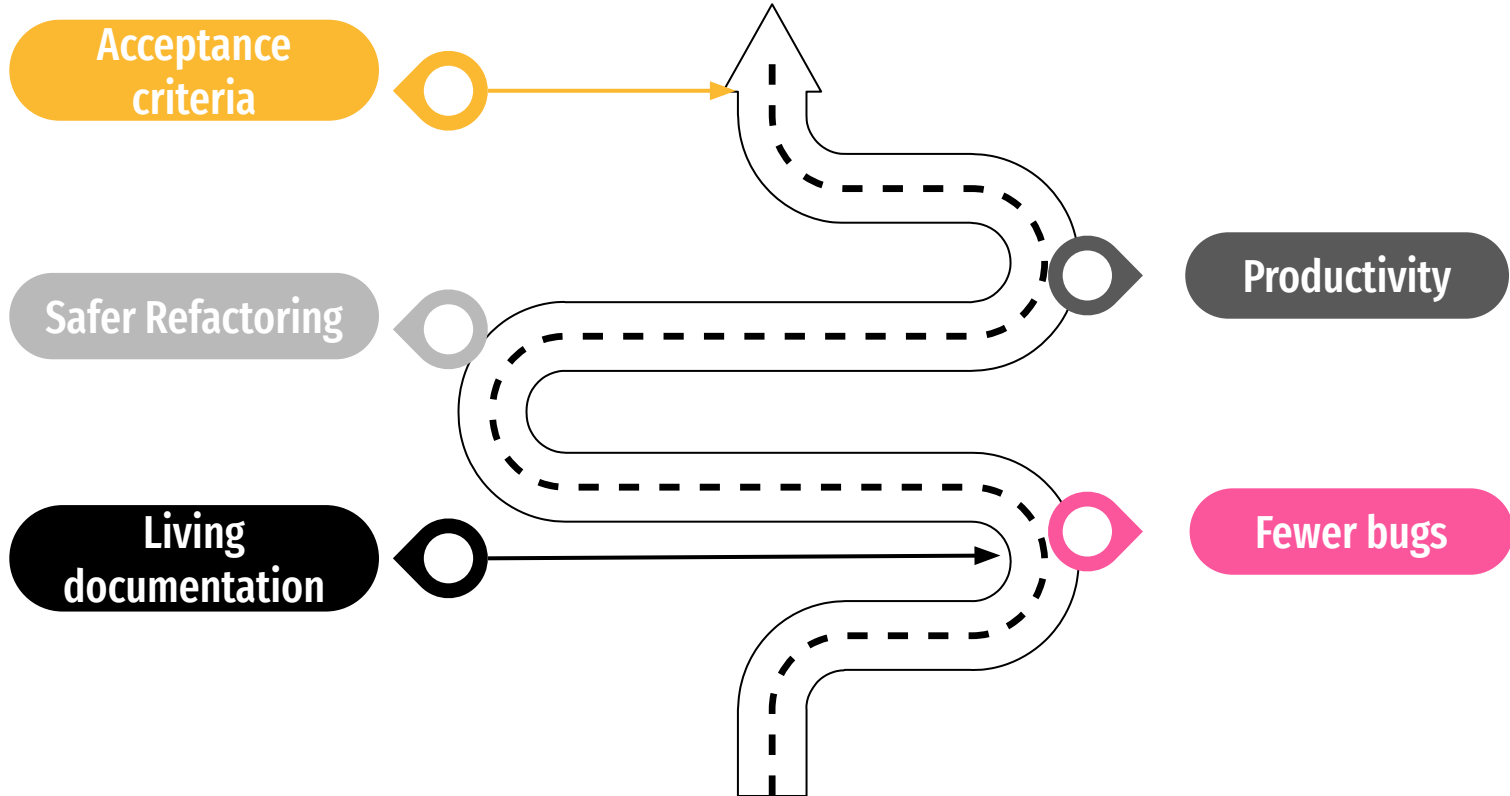
```
> mocha test/yatch.spec.js


  Yacht
    ✓ Yacht
    ✓ Not Yacht


  2 passing (10ms)
```

Benefits

Acceptance criteria

Safer Refactoring

Living documentation

Productivity

Fewer bugs

Code Coverage

02
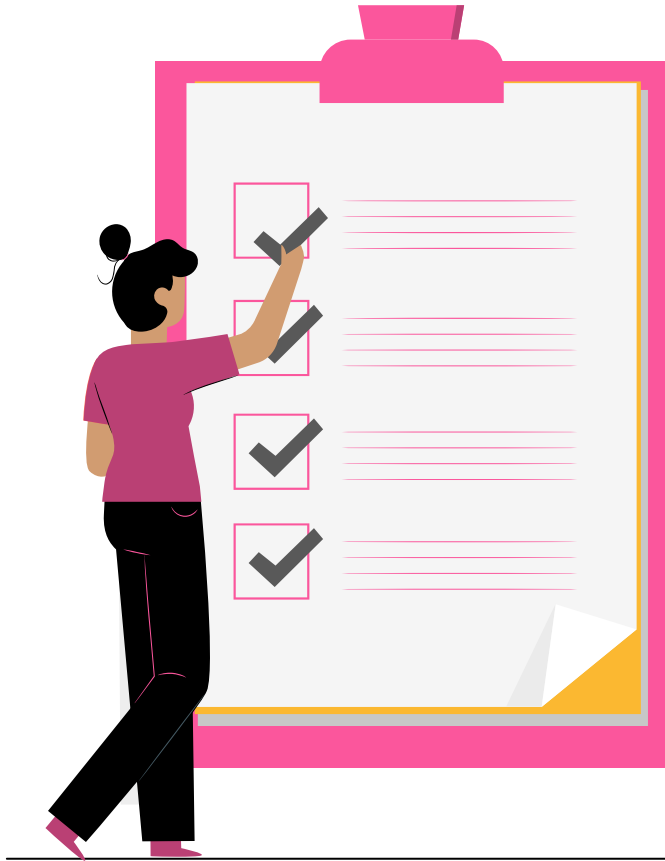
Definition
What is code coverage?

Benefits
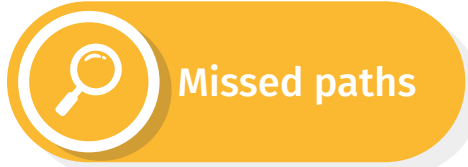What does code coverage provide?
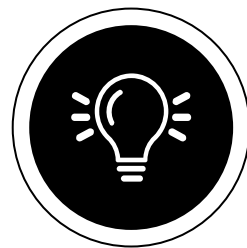
Criteria
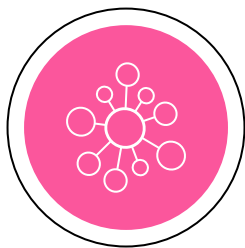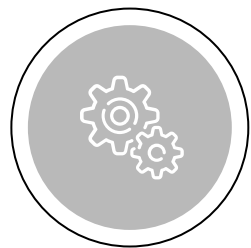Which criteria does code coverage have?

What is it?

Percentage of the code that has been tested.

Benefits

Missed paths

Untested code

Reliable code

Add tests

Refactor

Confidence

Coverage Criteria
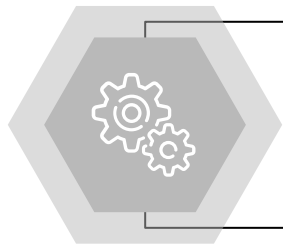

Function   Statement   Edge   Branch   Condition

Function Coverage

```
const uselessFunction = function(x, y) {
    let z = 0;
    if ((x > 0) || (y > 0)) {
        z = x;
    }
    return z;
};
```
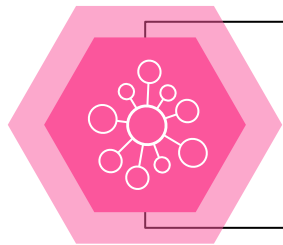
```
it('Function is being called', () => {
    expect(uselessFunction(1, 1)).to.eql(1);
});
```

Statement Coverage

```
const uselessFunction = function(x, y) {
    let z = 0;
    if ((x > 0) || (y > 0)) {
        z = x;
    }
    return z;
};
```

```
it('A statement is not being executed', () => {
    expect(uselessFunction(-1, -1)).to.eql(0);
});
```

Edge Coverage

```javascript
const uselessFunction = function(x, y) {
    let z = 0;
    if ((x > 0) || (y > 0)) {
        z = x;
    }
    return z;
};
```

```javascript
it('A path is not being executed', () => {
    expect(uselessFunction(-1, 1)).to.eql(1);
});
```

Branch Coverage

```javascript
const uselessFunction = function(x, y) {
    let z = 0;
    if ((x > 0) || (y > 0)) {
        z = x;
    }
    return z;
};
```

```javascript
it('A branch is not being executed', () => {
    expect(uselessFunction(1, 1)).to.eql(1);
});
```

Condition Coverage

```
const uselessFunction = function(x, y) {
    let z = 0;
    if ((x > 0) || (y > 0)) {
        z = x;
    }
    return z;
};
```
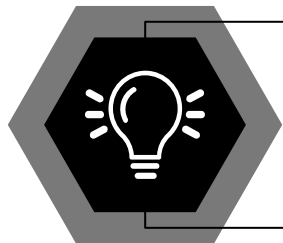
```
it('Boolean sub-expressions evaluated both to true and false', () => {
    expect(uselessFunction(-1, 1)).to.eql(1);
    expect(uselessFunction(1, -1)).to.eql(1);
});
```

Branch Coverage VS Condition Coverage

```javascript
const anotherUselessFunction = function(a, b) {
  if ((a > 0) && (b > 0)) {
      ...
    }
};
```

```javascript
it('Condition satisfied but Branch unsatisfied', () => {
    expect(anotherUselessFunction(-1, 1)).to.eql(undefined);
    expect(anotherUselessFunction(1, -1)).to.eql(undefined);
});
```

CodeCov

03

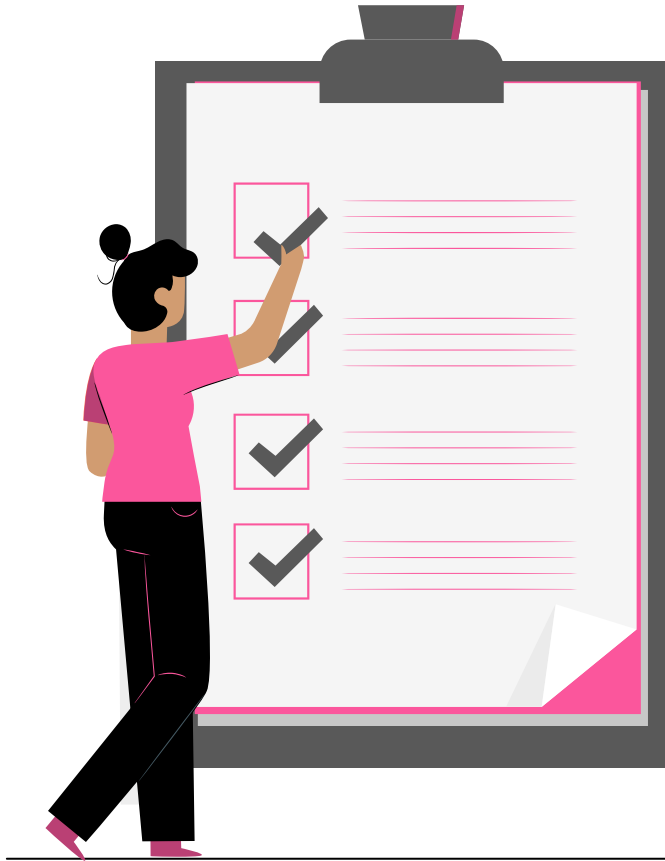**Definition** — What is CodeCov.io?

Features — What does this tool provide?

Live Demo — What do we need?

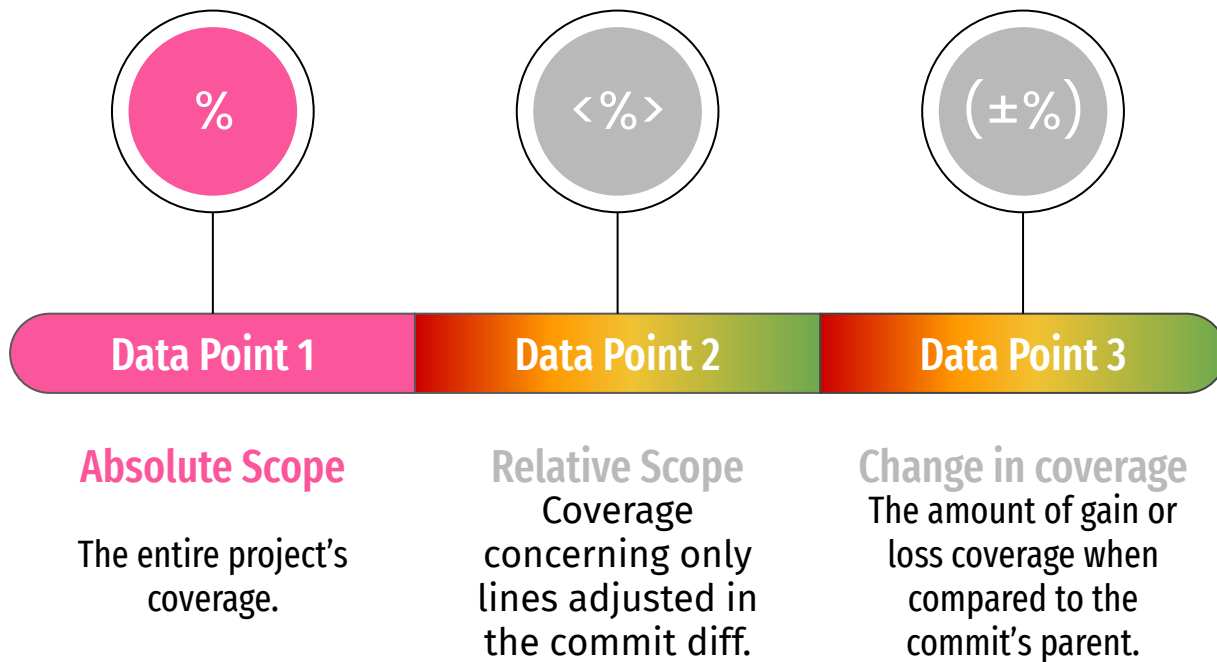# What is CodeCov?

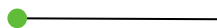Tool used to measure the test coverage of a codebase.

Coverage increase after 30 days
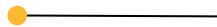
(for repositories starting below 70% coverage)

Day 30: 74.96%

Increase after 30 days

⬆ **32.69%**

Day 1: 42.27%

CodeCov Delta

%

<%>

(±%)

Data Point 1

Data Point 2

Data Point 3

Absolute Scope

The entire project's coverage.

Relative Scope

Coverage concerning only lines adjusted in the commit diff.

Change in coverage

The amount of gain or loss coverage when compared to the commit's parent.
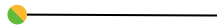
Viewing Source Code

Hits → Line covered and executed
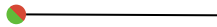
Partial → Branches that do not have all their paths covered or executed
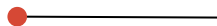
Missed → Line not covered nor executed

✓ → ! Line was covered before the current commit but it is now partially hit

✓ → ✗ Line was covered before the current commit but it is now missed

Coverage ratio

hits / (sum of hit + partial + miss)

"Codecov delivers or "injects" coverage metrics directly into the modern workflow to promote more code coverage, especially in pull requests where new features and bug fixes commonly occur."

Top 5 Features

01
Pull requests comments

02
Commit status
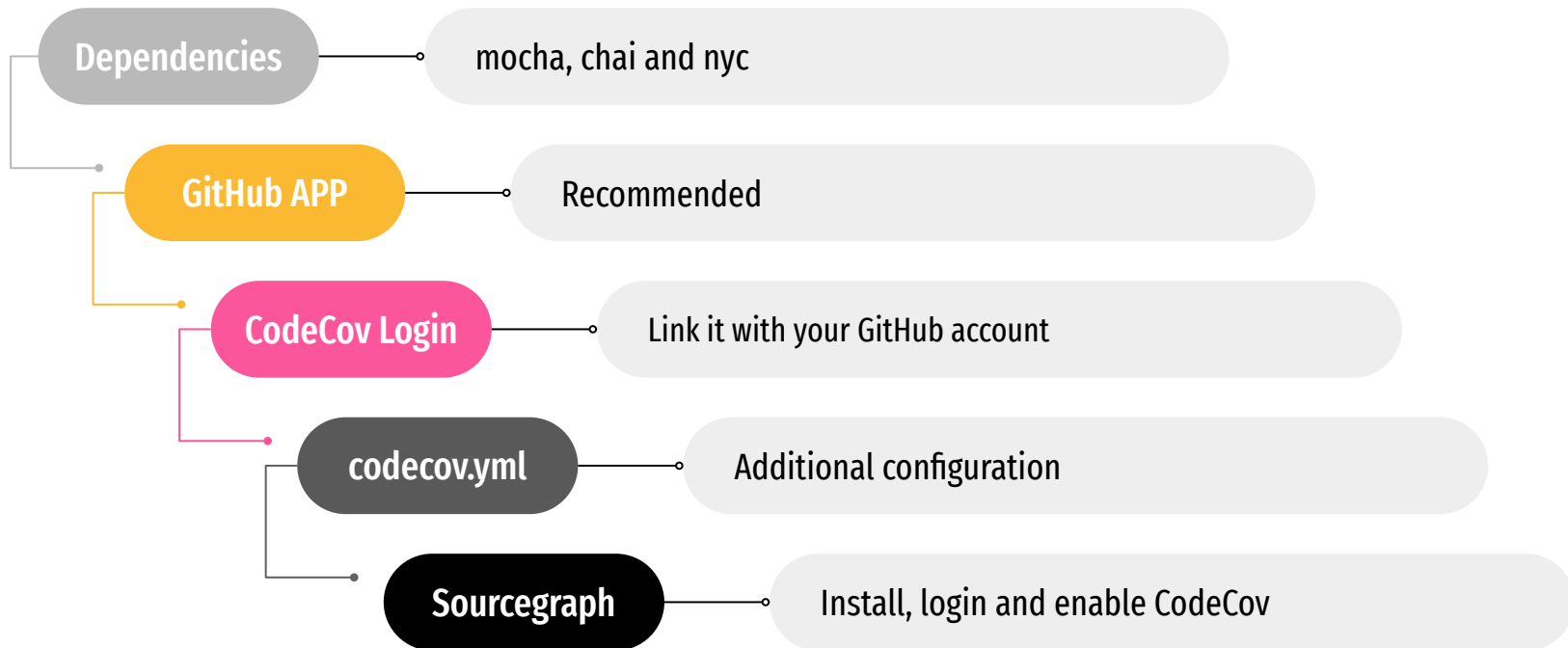
03
Merging reports

04
Flags

05
Path Manipulation

Sourcegraph

Overlay reports directly in the user's
code host of choice

Quick Start

Dependencies — mocha, chai and nyc

GitHub APP — Recommended

CodeCov Login — Link it with your GitHub account

codecov.yml — Additional configuration
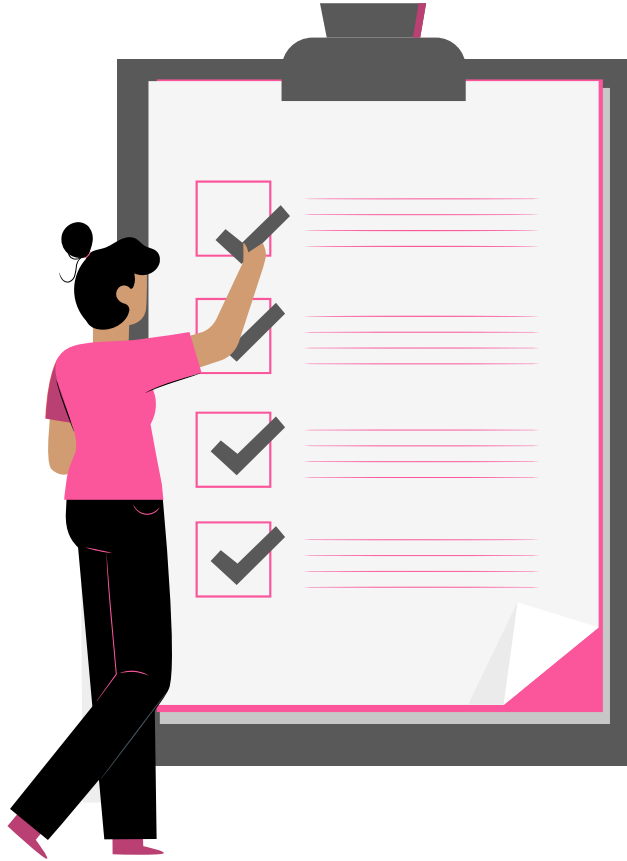
Sourcegraph — Install, login and enable CodeCov

Live Demonstration

Conclusions

- Get used to the TDD methodology.
- Improve your code coverage.
- Always report your test coverage.
- Practice makes perfect.

Bibliography

Test Driven Development
- Introduction to Test Driven Development
- Learn Test Driven Development
- Introduction to Test Driven Development in JavaScript
- Refactoring JavaScript
- 9 Benefits of Test Driven Development
- Testing - Mocha and Chai presentation repository. Adal Diaz, Oscar Moreira

Code Coverage
- Code Coverage
- Everything you need to know about Code Coverage
- Chai Assertion Library Documentation
- Istanbul Test Coverage Tool Documentation
- Mocha Documentation

CodeCov.io
- CodeCov Documentation
- Quick Start
- Codecov Github APP
- 2020 State of Open Source Coverage
- 13 CodeCov alternatives

SourceGraph
- CodeCov Sourcegraph extension
- CodeCov's additional information

FreePik

Slidesgo

Thanks for your attention

Any Questions?

Vanessa Valentina Villalba Pérez
Email
GitHub

Marta Julia González Padrón
Email
GitHub