

Behavioral-Driven Development

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1. Tests

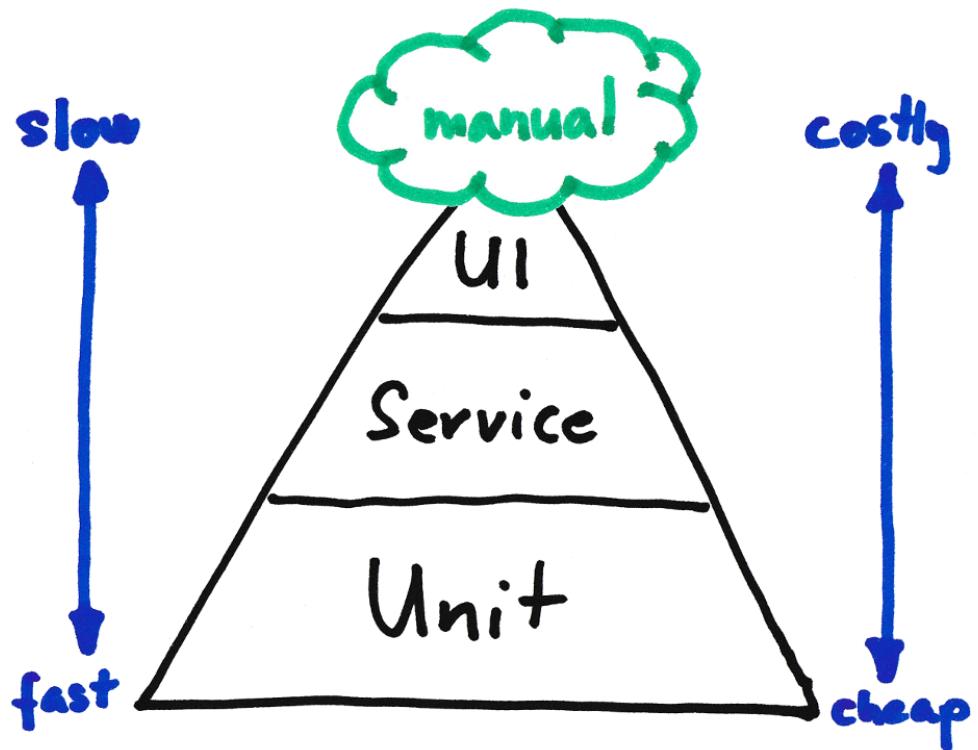


Figure 1. The testing pyramid (source [here](#))

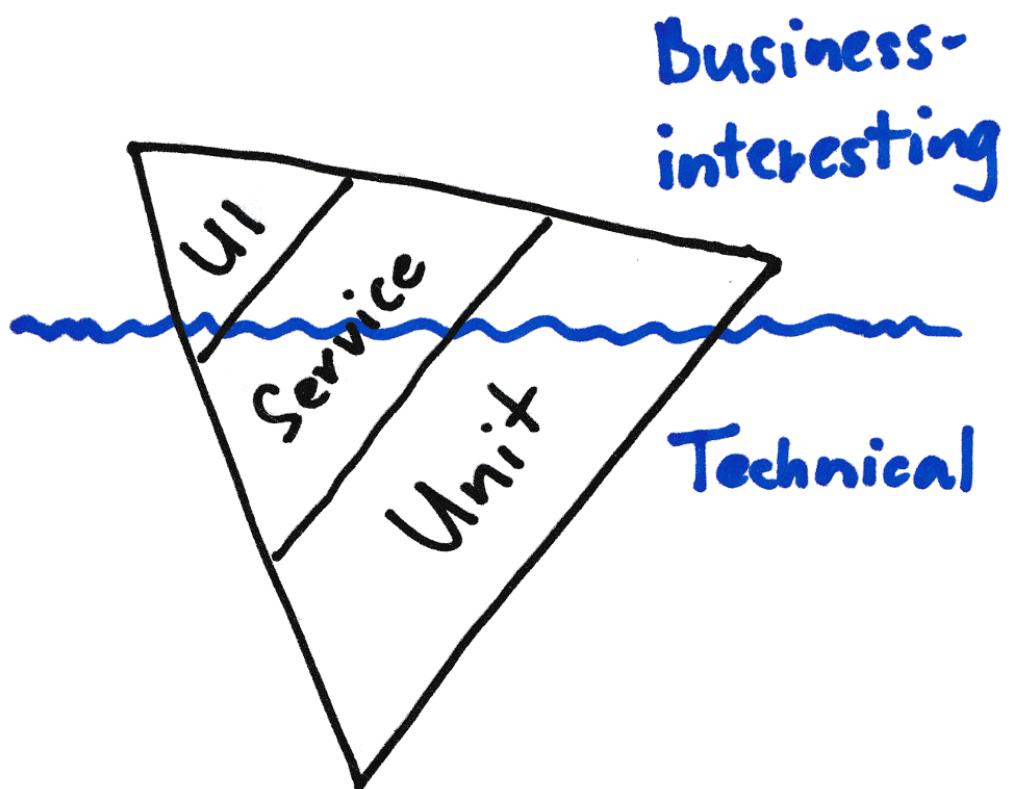


Figure 2. The testing pyramid at work (source [here](#))

2. Features

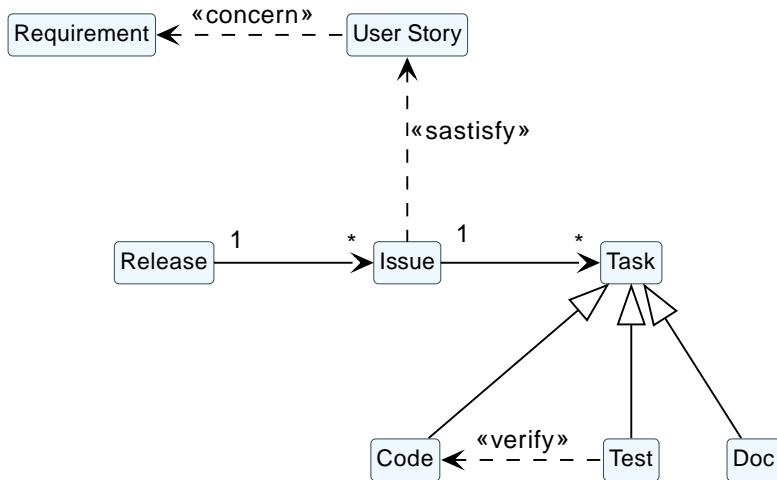


Figure 3. Artifacts traceability (Inspired from [here](#))

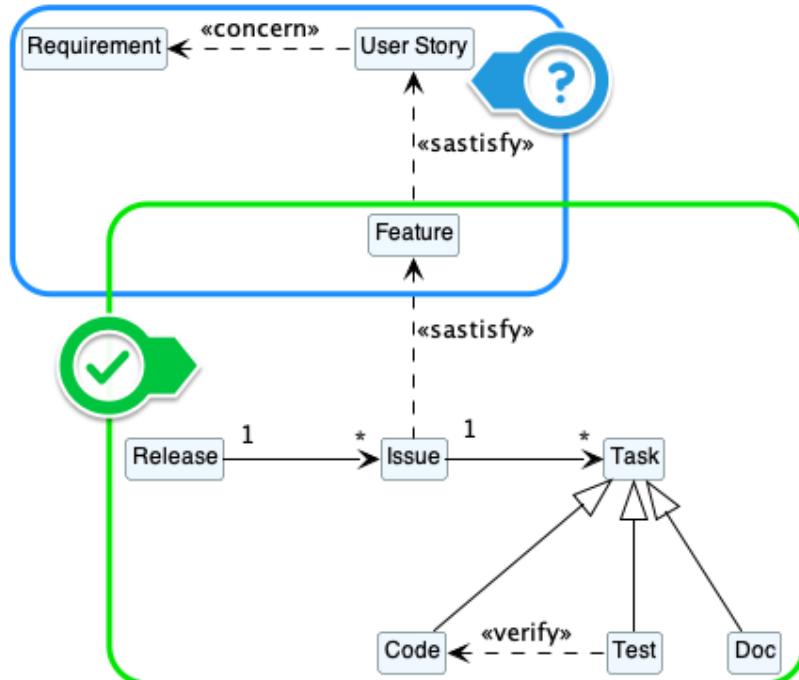


Figure 4. One more artifact

3. Principles

- Given
- When
- Then
- And

4. Examples

4.1. Some review activity (No code)

```
Feature: Reviewing a Ph.D. Thesis
  Every PhD thesis review has some recurrent steps

Scenario: A reviewer, being an expert on the field, should be cited somewhere
  Given A PhD thesis to review
  And a reviewer John Smith
  Then The thesis should cite John Smith's work

Scenario: A Ph.D. thesis should be an original work
  Given A PhD thesis to review
  And a reviewer John Smith
  Then The PhD.pdf should be checked against plagiarism
```

Figure 5. Review PhD feature

4.2. This course materials! (No code)

```
#-----
# Checking URLs
# JMB - 2020
#-----
# language: en
Feature: Teaching Materials Quality Assessment
  Every material should have correct links

Scenario: The URLs mentioned in an AsciiDoc document should be verified (non 404)
  Given An AsciiDoc file
  Then All the URLs should be active
```

Figure 6. Check URLs feature

4.3. Android example

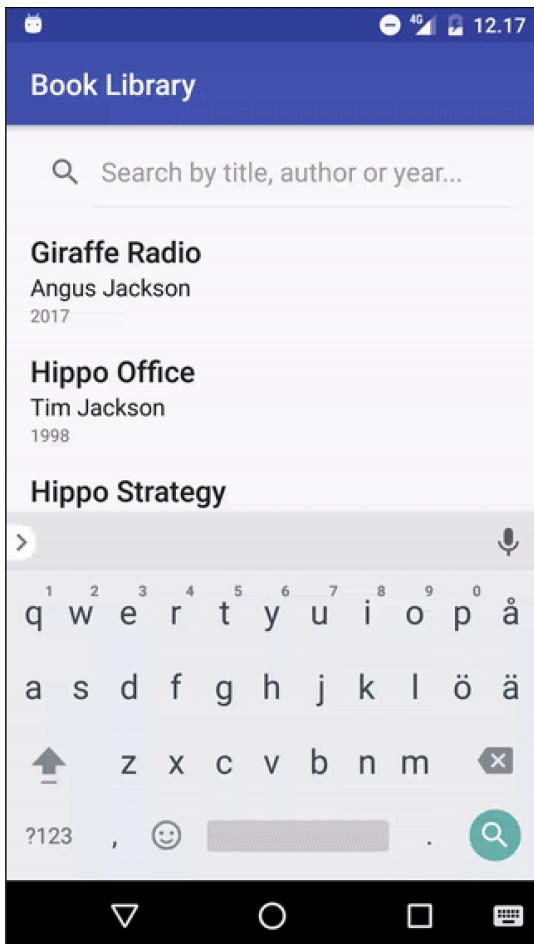


Figure 7. An Android app (source [here](#))

A feature for this app (source [here](#))

Feature: Book Search

Scenario: Search books by author

Given there's a book called "Tips for job interviews" written by "John Smith"

And there's a book called "Bananas and their many colors" written by "James Doe"

And there's a book called "Mama look I'm a rock star" written by "John Smith"

When an employee searches by author "John Smith"

Then 2 books should be found

And Book 1 has the title "Tips for job interviews"

And Book 2 has the title "Mama look I'm a rock star"

4.4. Angular example

A "Getting Started" app

<https://github.com/petermorlion/angular-getting-started>

My Store

Products

Phone XL

Description: A large phone with one of the best screens

[Share](#)

[Notify Me](#)

Phone Mini

Description: A great phone with one of the best cameras

[Share](#)

Phone Standard

Description: A standard phone, nothing fancy

[Share](#)

Figure 8. An Angular example app

Some feature description

```
Feature: Automatic discounts for premium customers
    Premium customers should automatically get a
    discount of 10% on purchases over $100.

Scenario: Purchase over $100
    Given a premium customer
    And an order containing
        | item   | amount | price |
        | pencil | 100   | 1      |
        | paper  | 1      | 35    |
    When the customer checks out
    Then the total price should be 121.5
```

Figure 9. Some feature example

Running Cucumber (fail)

```
[→ /tmp/angular-getting-started git:(master) ✘ cucumber features/products-list.feature
Feature: Products List

  Scenario: Load the products list    # features/products-list.feature:3
    When we request the products list # features/products-list.feature:4
    Then we should receive         # features/products-list.feature:5
      | name           | description |
      | Phone XL       | A large phone with one of the best screens |
      | Phone Mini     | A great phone with one of the best cameras |
      | Phone Standard | A standard phone, nothing fancy |

1 scenario (1 undefined)
2 steps (2 undefined)
0m0.051s
```

You can implement step definitions for undefined steps with these snippets:

```
When('we request the products list') do
  pending # Write code here that turns the phrase above into concrete actions
end

Then('we should receive') do |table|
  # table is a Cucumber::MultilineArgument::DataTable
  pending # Write code here that turns the phrase above into concrete actions
end
```

Share your Cucumber Report with your team at <https://reports.cucumber.io>

Command line option: --publish
 Environment variable: CUCUMBER_PUBLISH_ENABLED=true
 cucumber.yml: default: --publish

More information at <https://reports.cucumber.io/docs/cucumber-ruby>

To disable this message, specify CUCUMBER_PUBLISH_QUIET=true or use the --publish-quiet option. You can also add this to your cucumber.yml:
 default: --publish-quiet

Figure 10. First run of the tests

Write Steps definitions

This is code linking the assertions with the running code.

Steps definition

```
import { When, Then } from 'cucumber';

When('we request the products list', function () {
  // Write code here that turns the phrase above into concrete actions
  return 'pending';
});

Then('we should receive', function (dataTable) {
  // Write code here that turns the phrase above into concrete actions
  return 'pending';
});
```

Running Cucumber (pass)

```
...
1 scenario (1 passed)
2 steps (2 passed)
0m05.270s
```

Figure 11. New run of the tests

5. Supported languages

Ruby (origin), Java, JavaScript,

- [IntelliJ Cucumber for Java plugin](#)
- [Cucumber Eclipse plugin](#)

6. Build

Make sure to integrate BDD in your build.

For maven/gradle, see <https://cucumber.io/docs/tools/java/#build-tools>

7. Find a plugin for your IDE

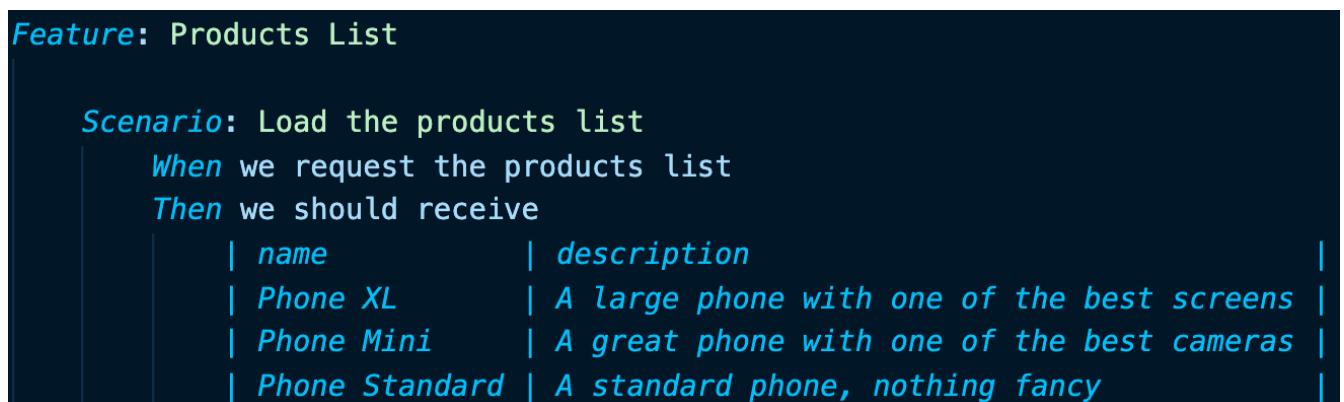


Figure 12. Cucumber plugin in use in VS Code

Example for VS Code: <https://github.com/alexkretchik/VSCucumberAutoComplete>



8. Gherkin tips

8.1. Avoid duplication

Scenario: Bad steps definition

Given I go to the home page

Given I check the about page of the website

Given I get the contact details

Scenario: Good steps definition

Given I go to the {} page

Sometimes you want to relax your language, to make it flow better.

Scenario: Alternative text

Given I have {int} cucumber(s) in my belly/stomach
Would match all these expressions:
I have 1 cucumber in my belly
I have 1 cucumber in my stomach
I have 42 cucumbers in my stomach
I have 42 cucumbers in my belly

Generic Step definition

```
@Given("I go to the {string} page")
public void i_want_to_open_page(String webpage) {
    webpageFactory.openPage(webpage);
}
```

8.2. Grouping step definitions

One file for each major domain object.

Example of step definition files

```
EmployeeStepDefinitions.java
EducationStepDefinitions.java
ExperienceStepDefinitions.java
AuthenticationStepDefinitions.java
```

8.3. Scenario outline (template)

Scenario Outline: `eating`

Given there are `<start>` cucumbers

When I eat `<eat>` cucumbers

Then I should have `<left>` cucumbers

Examples:

<code>start</code>	<code>eat</code>	<code>left</code>
12	5	7
20	5	15

8.4. Language support

Over 70 languages!



Don't forget the `# language: fr`!

```
# language: fr
Fonctionnalité: Servir du café
Afin de gagner de l'argent
Les clients doivent être capables
d'acheter du café à toutes heures

Scénario: Acheter le dernier café
Etant donné qu'il reste 1 café dans la machine
Et que j'ai mis 1 dollar
Quand j'appuie sur le bouton de la machine
Alors je devrai recevoir un café
```

Figure 13. Example of feature in French ([source](#))

9. How-to

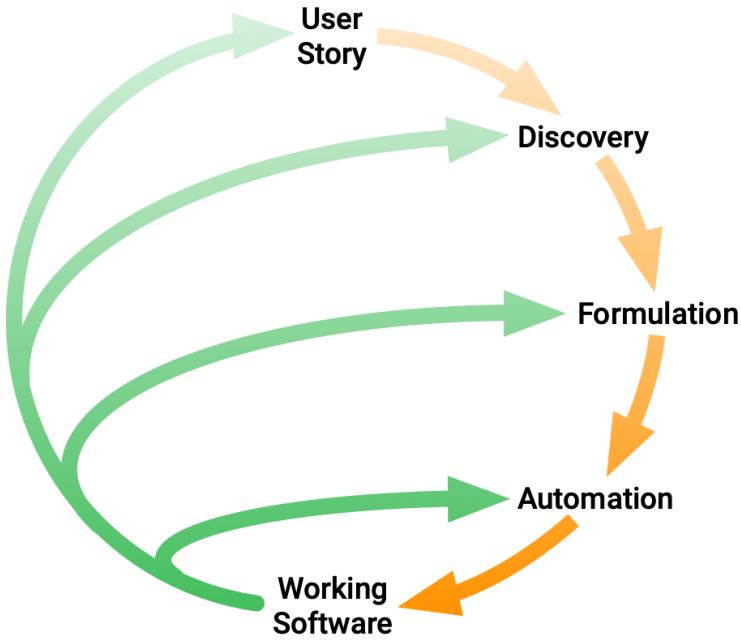


Figure 14. Discovery, Formulation and Automation (Source [here](#))

10. Concepts

10.1. Feature

What follows is a basic description or name of the feature being tested or documented.

10.2. Rule

- represent a business rule that should be implemented
- used to group together several scenarios



New concept (since Gherkin v6)

10.3. Background

Steps that will be ran before every scenario in the feature.

10.4. Scenario

Name or basic description of a particular scenario testing the feature.

10.5. Scenario Outline

The scenario will run N times for every argument listed in examples explicitly passed by column name wrapped in angled brackets.



A Scenario Outline must contain one or more Examples

10.6. Examples

The list of static arguments that will be passed into a scenario outline.

10.7. The AAA pattern

```
// arrange
var component = ComponentFixture<UserUploadComponent>;
var user = new User(component);
// act
user.Save();
// assert
mock.Received.SomeMethod();
```

10.8. Given

A given step, or precondition that is assumed before continuing.



In the Arrange, Act, Assert paradigm, given represents "Arrange".

10.9. When

A when step, or the behavior that is to be asserted against.



In the Arrange, Act, Assert paradigm, given represents "Act".

10.10. Then

A then step, or in other words, the step in which a behavior's result is validated.



In the Arrange, Act, Assert paradigm, given represents "Assert".

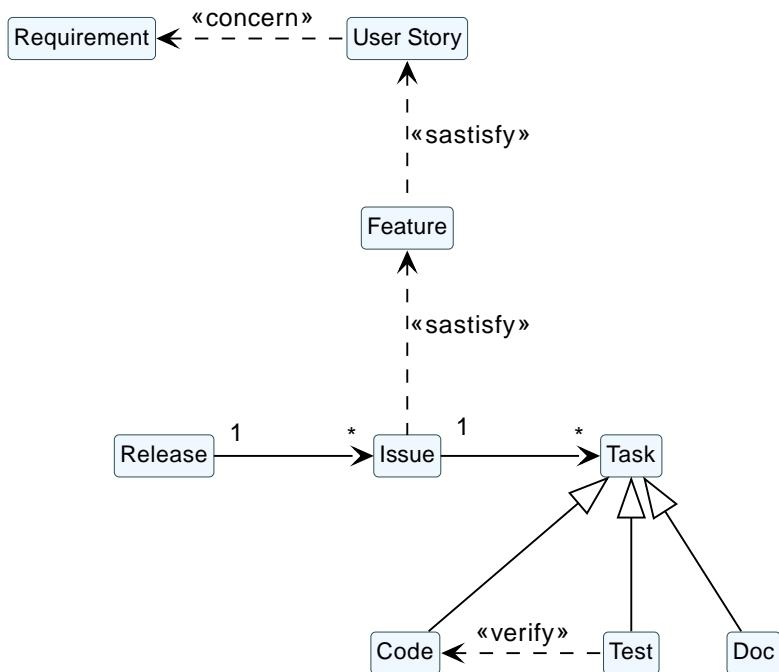
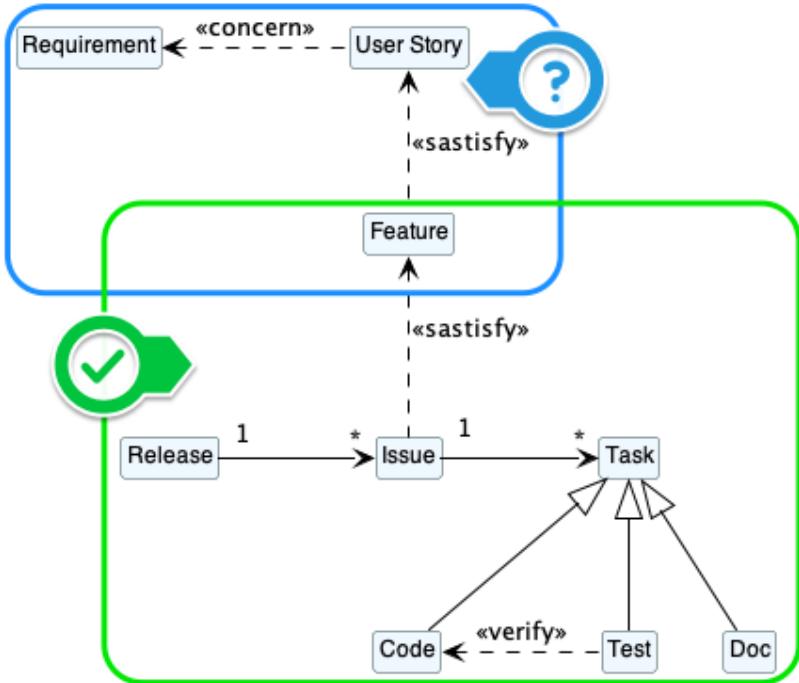
10.11. And

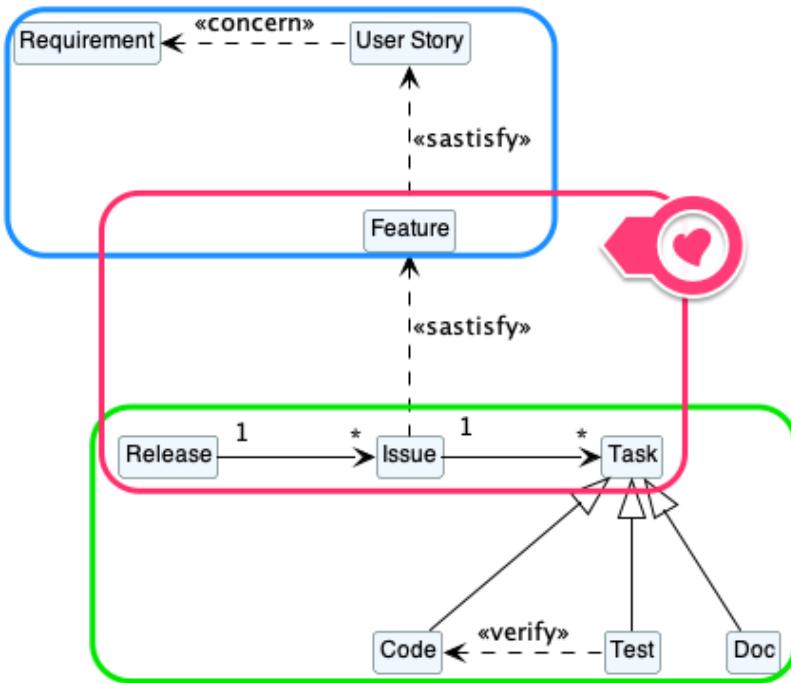
Used in conjunction with any of the keywords above.



If you have two given statements, instead of explicitly calling Given twice, you can say, " Given A And B".

11. Links between US and feature





12. Links between Features and their implementation

[Releases / v0.1](#)

Initial draft Latest

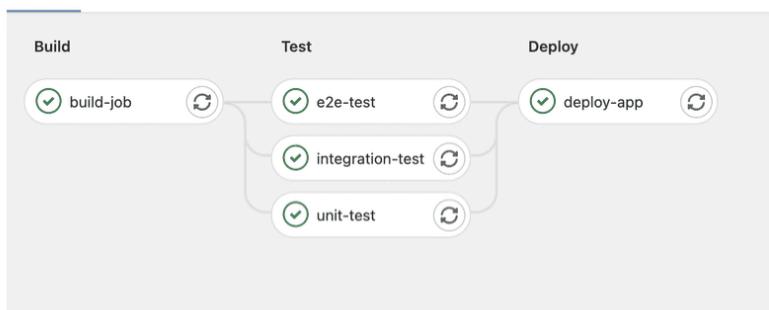
jnbruel released this 1 minute ago v0.1 310a280

Initial draft for exercise templates.

▼Assets 2

- [Source code \(zip\)](#)
- [Source code \(tar.gz\)](#)

13. CI/CD and BDD



14. BDD vs. TDD

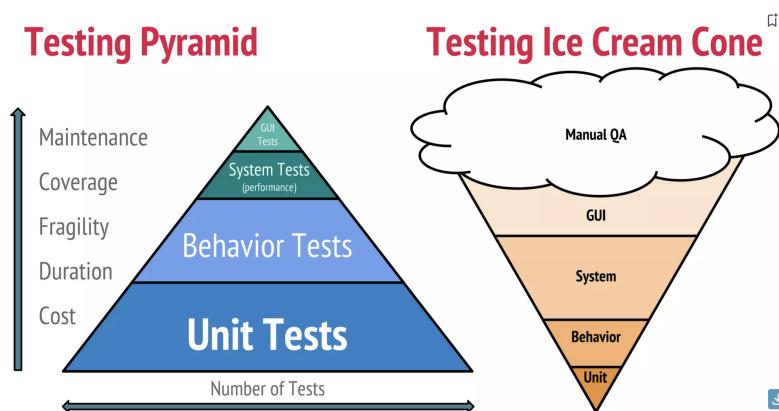
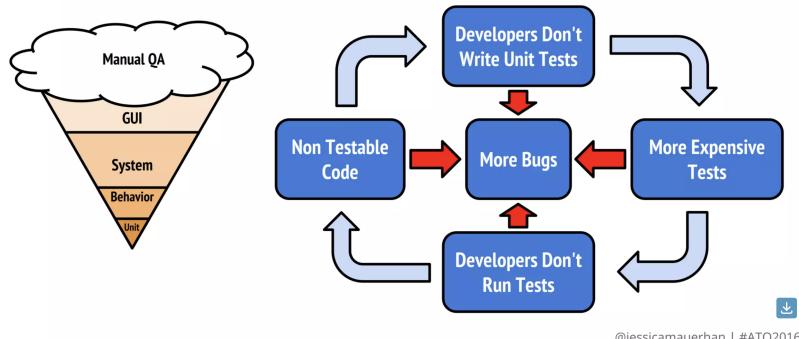


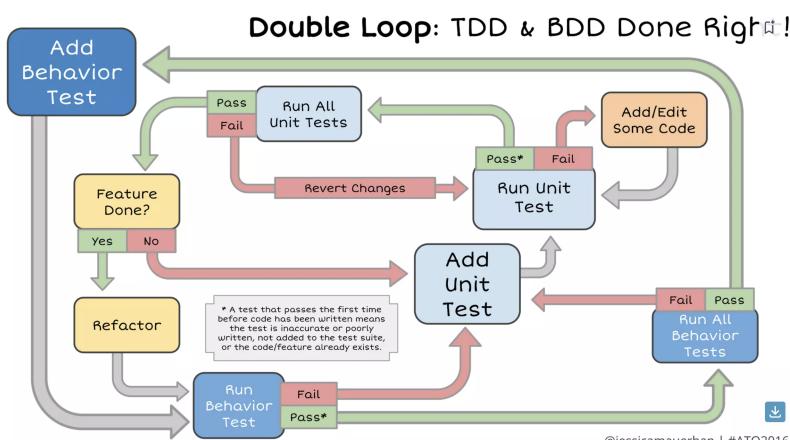
Figure 15. (source [here](#))

The Vicious Cycle of the Testing Ice Cream Cone



@jessicamauerhan | #ATO2016

Figure 16. (source [here](#))



@jessicamauerhan | #ATO2016

Figure 17. (source [here](#))

Appendix A: Useful links

- [Cucumber reference site](#)
- [Plein d'astuces pour les expressions](#)
- [A 10' tutorial](#)
- [Un très bon tutoriel en français](#)
- [An Android example](#)
- [An Angular example](#)
- [Clean Code](#)