Behaviour Driven Development :

roots

BDD : the gardener roots

- Introduction
- Full BDD example on a library
- Improve the process with the gardener
- Conclusion

Introduction

Goal : make you want to try or try the BDD again

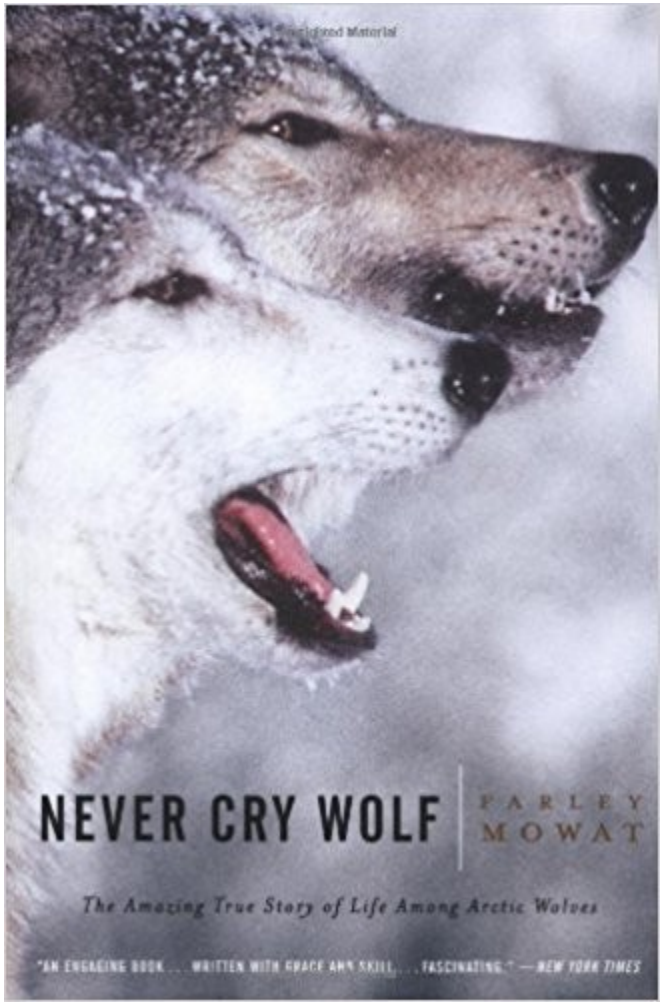
Introduction

A product owner during the demo of the product after an iteration

Introduction

Functional documentation
after many iterations
and readjustments of the need

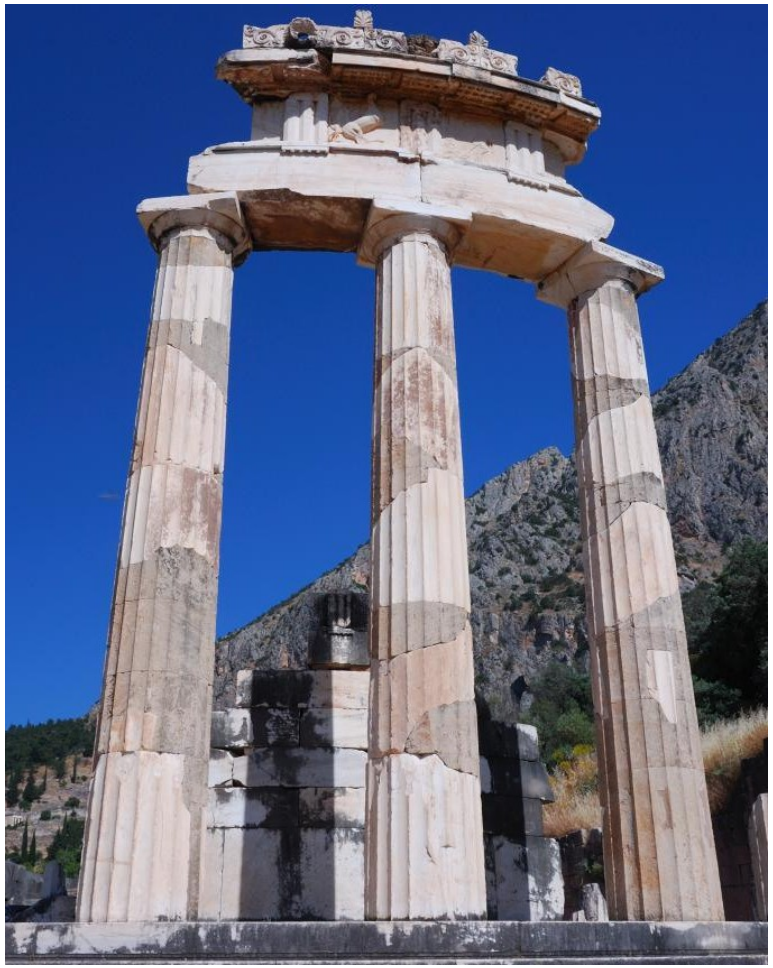
Introduction



Functional tests that flash

Non-exhaustive functional tests

Behavior Driven Development



- Specification by example
- Functional tests
- Executable documentation

Introduction

Specification by example

Scenario: suggested suggestions are popular, available and adapted to the age of the user

Given the user "Tim"
and he is "4" years old
and the popular categories for this age are

categoryId	name	
cat1	Walt Disney	
cat2	Bedtime stories	

and the available books for those categories are

bookId	bookTitle	categoryId	
lv11	Peter Pan	cat1	
lv21	The tortoise and the hare	cat2	

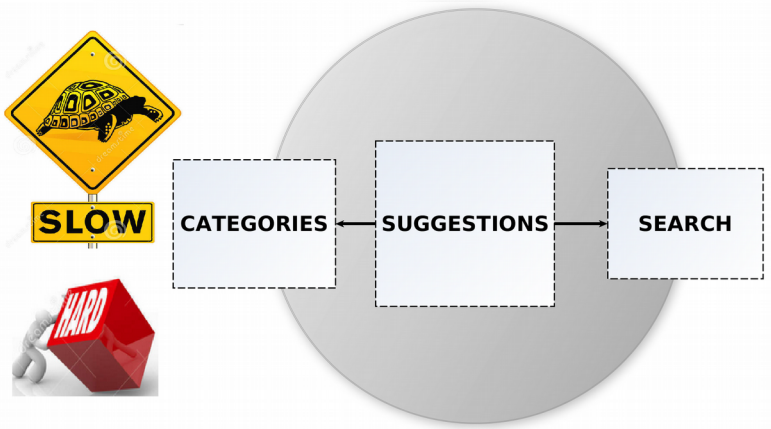
When we ask for "2" suggestions

Then the suggestions are

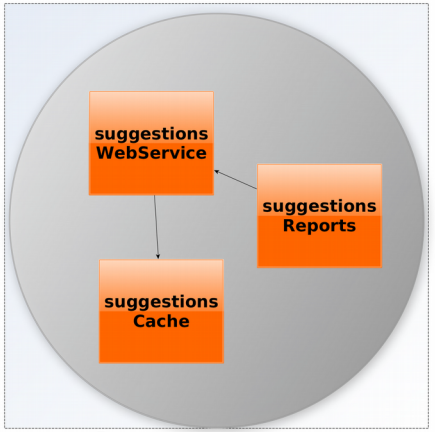
bookId	bookTitle	categoryId	
lv11	Peter Pan	cat1	
lv21	The tortoise and the hare	cat2	

Introduction

Functional tests

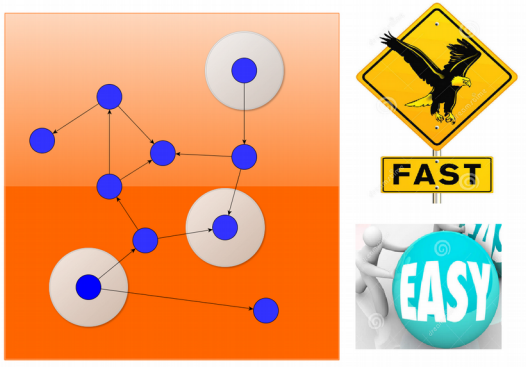


Between systems



On a system
Between components

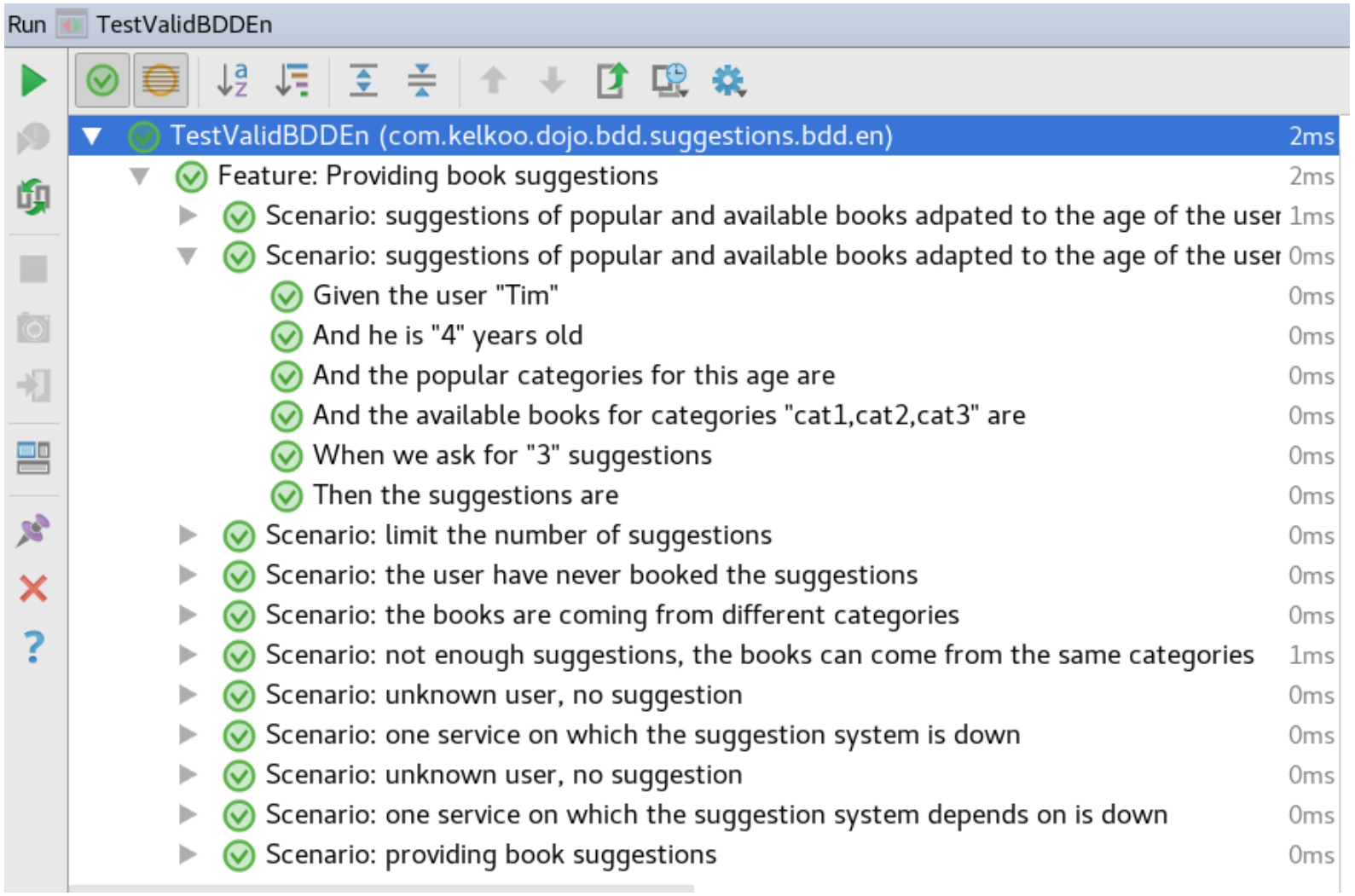
On a component



On a class

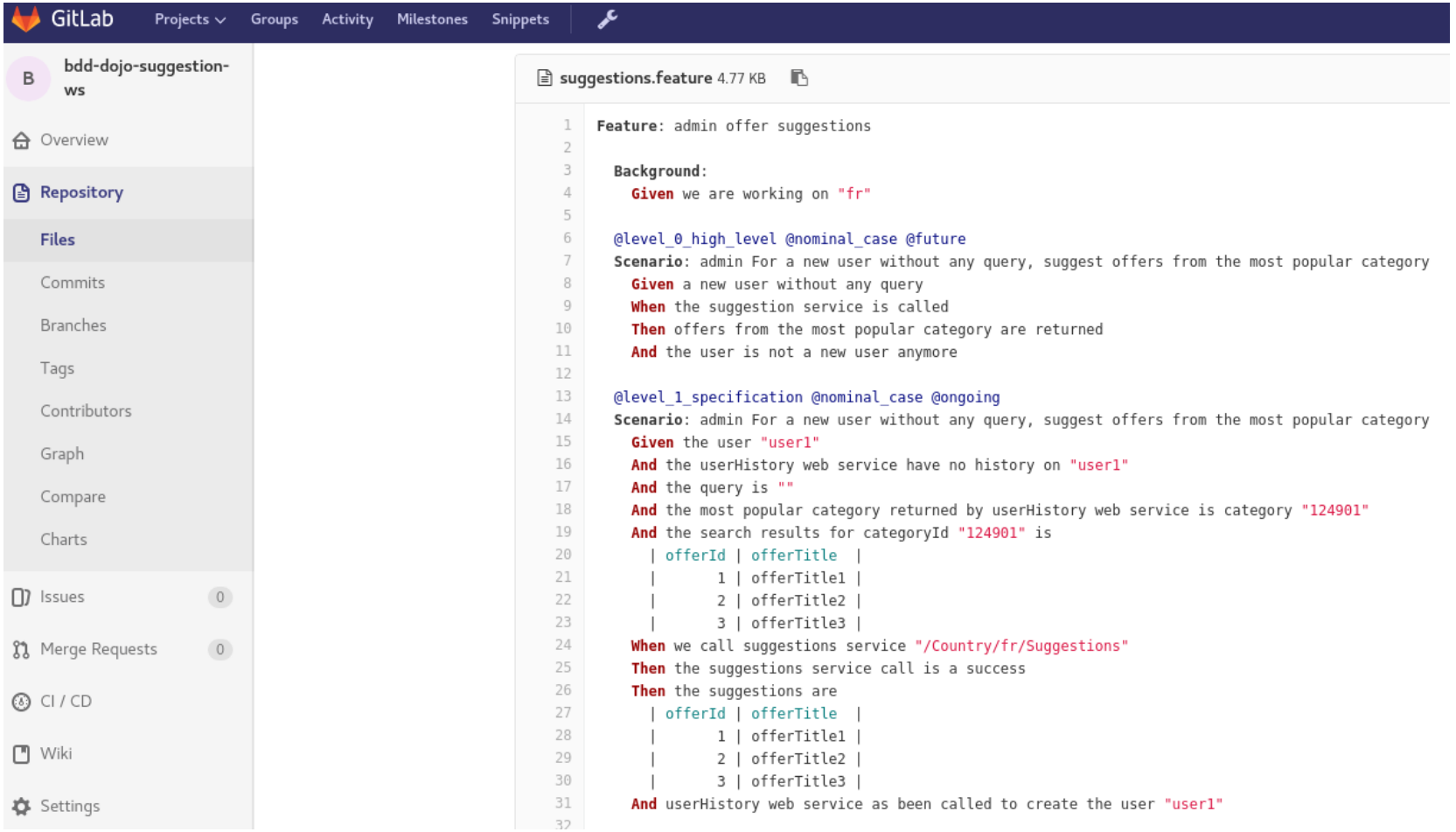
Introduction

Functional tests



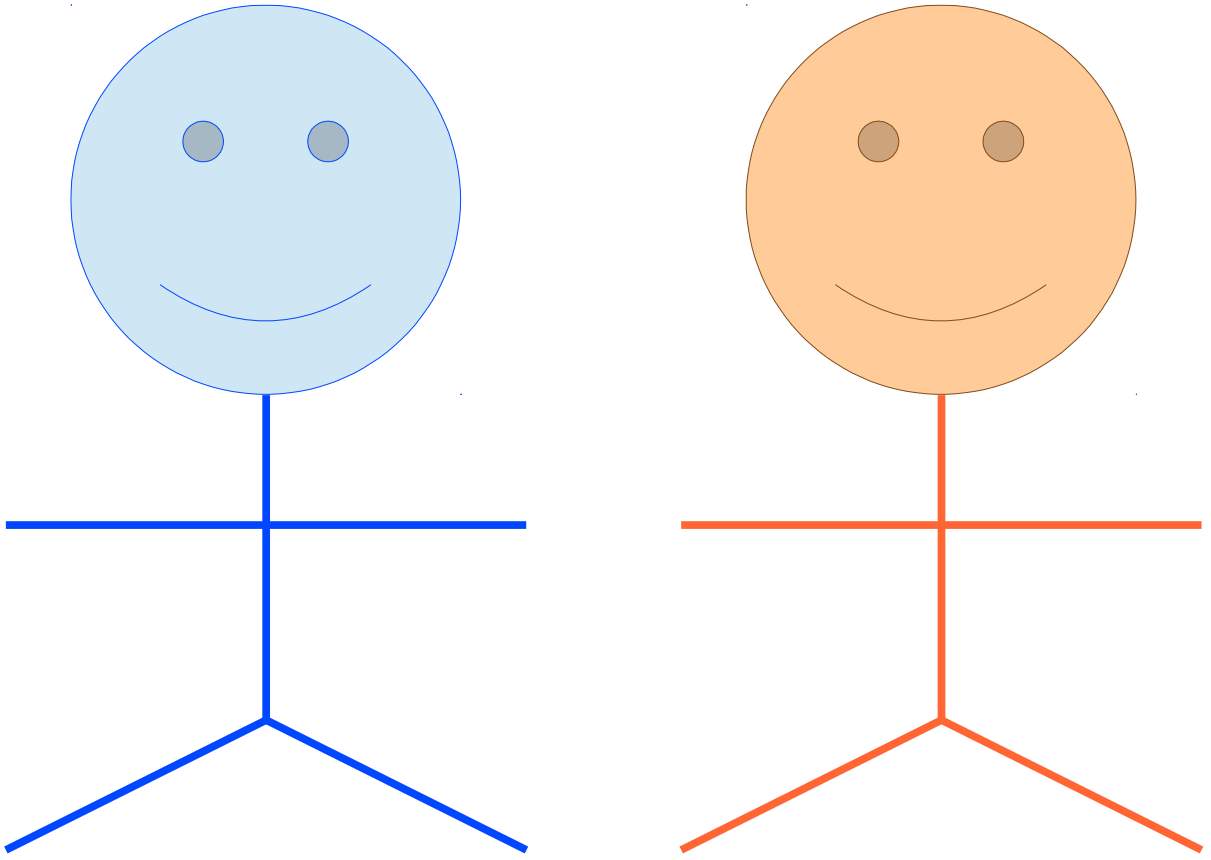
Introduction

Executable Documentation



Library

User Story to be implemented



PO

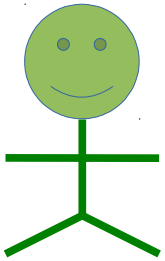
DEV

Library

User Story to be implemented

Categories

Categories of books, popular categories by age



User

Users

Users, ages, books already red...

Suggestions

Provides book suggestions

Search

Provides books,
textual search,
multi-criteria search
(category, popularity, availability ...)

Booking

Booking service,
Available books

Library

User Story to be implemented

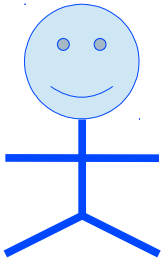
As a user of the library,
I wish to book suggestions
to make discoveries

Acceptance criteria :

- Book not read by the user
- Book available

Library

User Story to be implemented



PO

User Story

As a user of the library, I wish to book suggestions to make discoveries

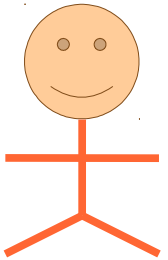
For a better discovery, the books must come from different categories

Suggestions must be appropriate to the age of the user

Library

User Story

User Story to be implemented



DEV

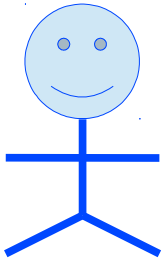
As a user of the library, I wish to book suggestions to make discoveries

Focus on how to recover books, forgets that the book must be unread by the user

The simplest way : research the popularity of books

Library

Write scenarios in collaboration



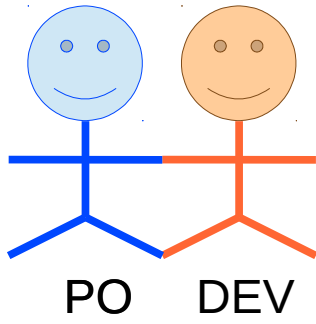
Scenario: provide book suggestions

Given a user
When we ask for suggestions
Then the suggestions are popular and
available books adapted to the age of the user

Missing examples !

Library

Write scenarios in collaboration




```
Scenario: provide book suggestions

  Given the user "Tim"
  And he is "4" years old
  And the popular categories for this age are
    | categoryId  | name              |
    | cat1        | Walt Disney       |
    | cat2        | Picture books     |
    | cat3        | Bedtime stories   |
  And the available books for categories "cat1,cat2,cat3" are
    | bookId  | title                          | categoryId  |
    | lv11    | Peter Pan                      | cat1        |
    | lv21    | Picture book about farm        | cat2        |
    | lv31    | The tortoise and the hare      | cat3        |
  When we ask for "3" suggestions
  Then the suggestions are
    | bookId  | title                          | categoryId  |
    | lv11    | Peter Pan                      | cat1        |
    | lv21    | Picture book about farm        | cat2        |
    | lv31    | The tortoise and the hare      | cat3        |
```

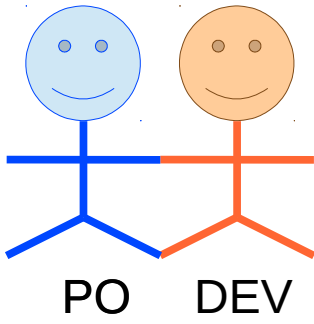
Missing limit number of suggestions

Missing : never read

Missing : different categories

Library

Write scenarios in collaboration




```
Scenario: provide book suggestions

  Given the user "Tim"
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    | categoryId  | name              |
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    | cat2        | Picture books     |
    | cat3        | Bedtime stories   |
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  Then the suggestions are
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    | lv11    | Peter Pan                      | cat1
    | lv21    | Picture book about farm        | cat2
```

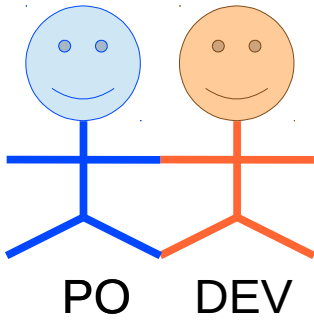
Missing : never read

Missing : different categories

limit number of suggestions

Library

Write scenarios in collaboration




```
Scenario: provide book suggestions

 Given the user "Tim"
And he is "4" years old
And the popular categories for this age are
   | categoryId  | name              |
   | cat1        | Walt Disney       |
   | cat2        | Picture books     |
   | cat3        | Bedtime stories   |
And the available books for categories "cat1,cat2,cat3" are
   | bookId  | title                          | categoryId  |
   | lv11    | Peter Pan                      | cat1        |
   | lv12    | Pinocchio                      | cat1        |
   | lv21    | Picture book about farm        | cat2        |
   | lv31    | The tortoise and the hare      | cat3        |
When we ask for "2" suggestions
Then the suggestions are
   | bookId  | title                          | categoryId  |
   | lv11    | Peter Pan                      | cat1        |
   |         |                                |             |
   | lv21    | Picture book about farm        | cat2        |
```

4

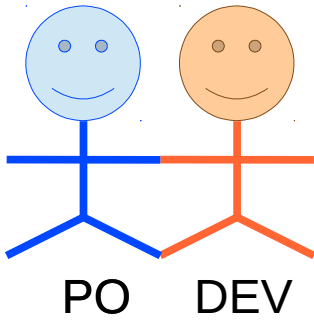
2

Missing : never read

different categories

Library

Write scenarios in collaboration

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Scenario: provide book suggestions

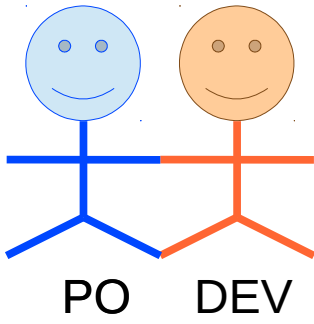
  Given the user "Tim"
  And he is "4" years old
  And the popular categories for this age are
    | categoryId  | name              |
    | cat1        | Walt Disney       |
    | cat2        | Picture books     |
    | cat3        | Bedtime stories   |
  And the available books for categories "cat1,cat2,cat3" are
    | bookId  | title                          | categoryId  |
    | lv11    | Peter Pan                      | cat1        |
    | lv12    | Pinocchio                      | cat1        |
  5 | lv13    | Bamby                          | cat1        |
    | lv21    | Picture book about farm        | cat2        |
    | lv31    | The tortoise and the hare      | cat3        |
  And the user has already booked the following books
    | bookId  | title                          | categoryId  |
    | lv11    | Peter Pan                      | cat1        |
  When we ask for "2" suggestions
  Then the suggestions are
    | bookId  | title                          | categoryId  |
    |         |                                |             |
  2 | lv12    | Pinocchio                      | cat1        |
    | lv21    | Picture book about farm        | cat2        |
```

What are we testing ?
Prefer several scenario

Never read

Library

Write scenarios in collaboration



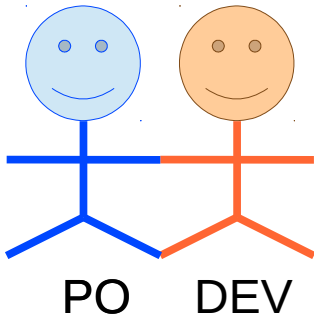
Scenario 1 : nominal case
=> minimal

```
Scenario: suggested suggestions are popular, available
            and adapted to the age of the user

  Given the user "Tim"
  And he is "4" years old
  And the popular categories for this age are
    | categoryId  | name              |
    | cat1        | Walt Disney       |
    | cat2        | Picture books     |
  And the available books for categories "cat1,cat2" are
    | bookId  | title                        | categoryId  |
    | lv11    | Peter Pan                    | cat1        |
    | lv21    | Picture book about farm      | cat2        |
  When we ask for "2" suggestions
  Then the suggestions are
    | bookId  | title                        | categoryId  |
    | lv11    | Peter Pan                    | cat1        |
    | lv21    | Picture book about farm      | cat2        |
```

Library

Write scenarios in collaboration




```
Scenario: limit number of suggestions

  Given the user "Tim"
  And he is "4" years old
  And the popular categories for this age are
    | categoryId  | name              |
    | cat1        | Walt Disney       |
    | cat2        | Picture books     |
  And the available books for categories "cat1,cat2" are
    | bookId  | title                          | categoryId  |
    | lv11    | Peter Pan                      | cat1        |
    | lv21    | Picture book about farm        | cat2        |
  When we ask for "1" suggestions
  Then the suggestions are
    | bookId  | title                          | categoryId  |
    | lv11    | Peter Pan                      | cat1        |
```

2

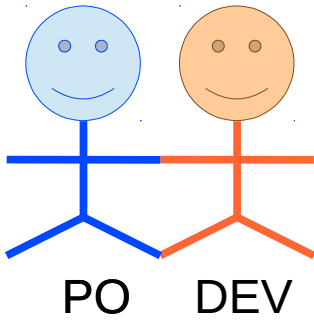
1

Scenario 2 : nominal case

Simplify it again !

Library

Write scenarios in collaboration




```
Scenario: limit number of suggestions

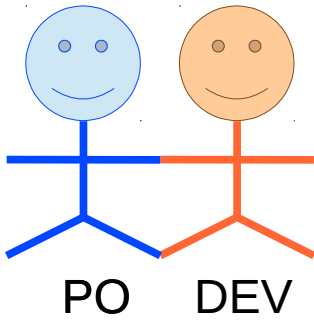
  Given a user
  And "3" books are available in popular categories
        adapted to his age

  When we ask for "2" suggestions
  Then "2" suggestions are proposed
         among the previous books
```

Scenario 2 : nominal case

Library

Write scenarios in collaboration



Scenario 3 : nominal case

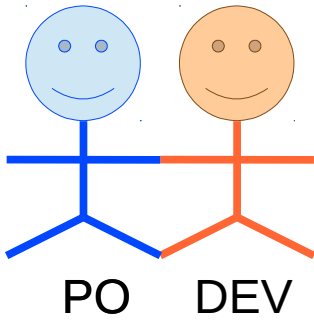
```
  Scenario: the user has never red the books that are suggested

    Given the user "Tim"
    And he is "4" years old
    And the popular categories for this age are
      | categoryId  | name              |
      | cat1        | Walt Disney       |
      | cat3        | Bedtime stories   |
    And the available books for categories "cat1,cat3" are
      | bookId  | title                        | categoryId  |
      | lv11    | Peter Pan                    | cat1        |
      | lv31    | The tortoise and the hare    | cat3        |
    And the user has already booked the following books
      | bookId  | title                        | categoryId  |
      | lv11    | Peter Pan                    | cat1        |
    When we ask for "1" suggestions
    Then the suggestions are
      | bookId  | title                        | categoryId  |
      |         |                              |             |
      | lv31    | The tortoise and the hare    | cat3        |
```

Roll out the algorithm

Library

Write scenarios in collaboration




```
Scenario: suggested books come from different categories

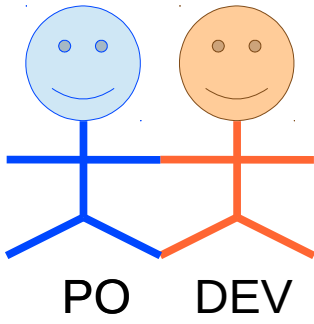
  Given the user "Tim"
  And he is "4" years old
  And the popular categories for this age are
    | categoryId  | name              |
    | cat1        | Walt Disney       |
    | cat3        | Bedtime stories   |
  And the available books for categories "cat1,cat3 are
    | bookId  | title                          | categoryId  |
    | lv11    | Peter Pan                      | cat1        |
    | lv12    | Pinocchio                      | cat1        |
    | lv31    | The tortoise and the hare      | cat3        |
  When we ask for "2" suggestions
  Then the suggestions are
    | bookId  | title                          | categoryId  |
    | lv11    | Peter Pan                      | cat1        |
    |         |                                |             |
    | lv31    | The tortoise and the hare      | cat3        |
```

Scenario 4 : nominal case

Roll out the algorithm

Library

Write scenarios in collaboration




```
Scenario: if there is not enough suggestions,
          we can propose books from the same categories

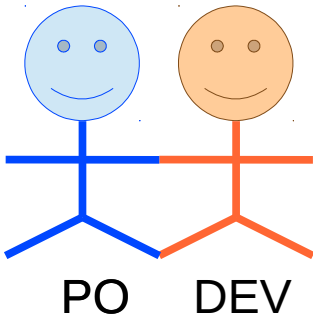
  Given the user "Tim"
  And he is "4" years old
  And the popular categories for this age are
    | categoryId  | name              |
    | cat1        | Walt Disney       |
  And the available books for categories "cat1,cat3 are
    | bookId  | title                      | categoryId  |
    | lv11    | Peter Pan                  | cat1        |
    | lv12    | Pinocchio                  | cat1        |
  When we ask for "2" suggestions
  Then the suggestions are
    | bookId  | title                      | categoryId  |
    | lv11    | Peter Pan                  | cat1        |
    | lv12    | Pinocchio                  | cat1        |
```

Scenario 5 : limit case

Roll out the algorithm

Library

Write scenarios in collaboration



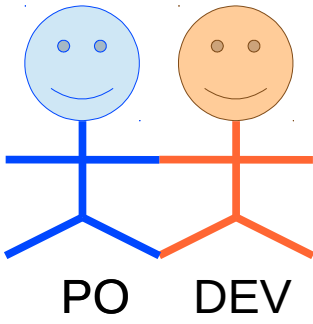
Scenario: unknown user, no suggestion

Given the user "Lise"
And the user is unknown
When we ask for "3" suggestions
Then there is non suggestions

Scenario 6 : limit case

Library

Write scenarios in collaboration



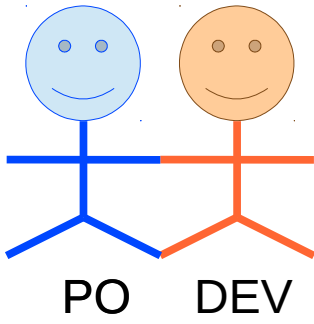
Scenario: one service on which the suggestion system depends on is down

Given the use "Tim"
And impossible to get information on the user
When we ask for "3" suggestions
Then the system is temporary not available

Scenario 7 : error case

Library

Write scenarios in collaboration



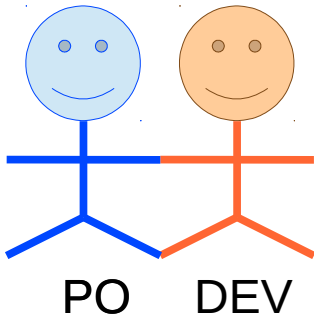

```
Scenario: suggested suggestions are popular, available
            and adapted to the age of the user

Given the user from http://my.library.com/user/Tim
  | field  | value |
  | userId | Tim   |
  | age    | 4     |
And the categories from http://my.library.com/category?popular=true&age=4
  | categoryId | categoryName    |
  | cat1       | Walt Disney     |
  | cat2       | Picture books   |
  | cat3       | Bedtime stories |
And the books from http://my.library.com/search?
categories=cat1,cat2,cat3&available=true
  | bookId | bookTitle                | categoryId |
  | b11    | Peter Pan                | cat1       |
  | b21    | Picture book about farm  | cat2       |
  | b31    | The tortoise and the hare | cat3       |
And the books from http://my.library.com/user/Tim/books
  | bookId | bookTitle | categoryId |
  | b11    | Peter Pan | cat1       |
When we call http://localhost:9998/suggestions?userId=Tim&maxResults=3
Then the http code is "200"
Then the suggestions are
  | bookId | bookTitle                | categoryId |
  | b21    | Picture book about farm  | cat2       |
  | b31    | The tortoise and the hare | cat3       |
```

Scenario 1 technical version

Library

Organize scenarios



As a user of the library,
I wish to book suggestions
to make discoveries

Scenario 1

Scenario 2

Scenario 7

Scenario 5

Scenario 0

Scenario 4

Scenario 3

Scenario 6

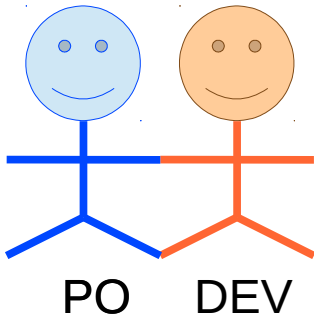
Scenario 7

Scenario 1

Scenario 6

Library

Organize scenarios



As a user of the library,
I wish to book suggestions
to make discoveries

	`@nominal_case`	`@limit_case`	`@error_case`
`@level_0_ high_level`	*Scenario 0*		
`@level_1_ specification`	*Scenario 1*, *Scenario 2*, *Scenario 3*, *Scenario 4*	*Scenario 5*, *Scenario 6*	*Scenario 7*
`@level_2_ technical`	*Scenario 1*	*Scenario 6*	*Scenario 7*

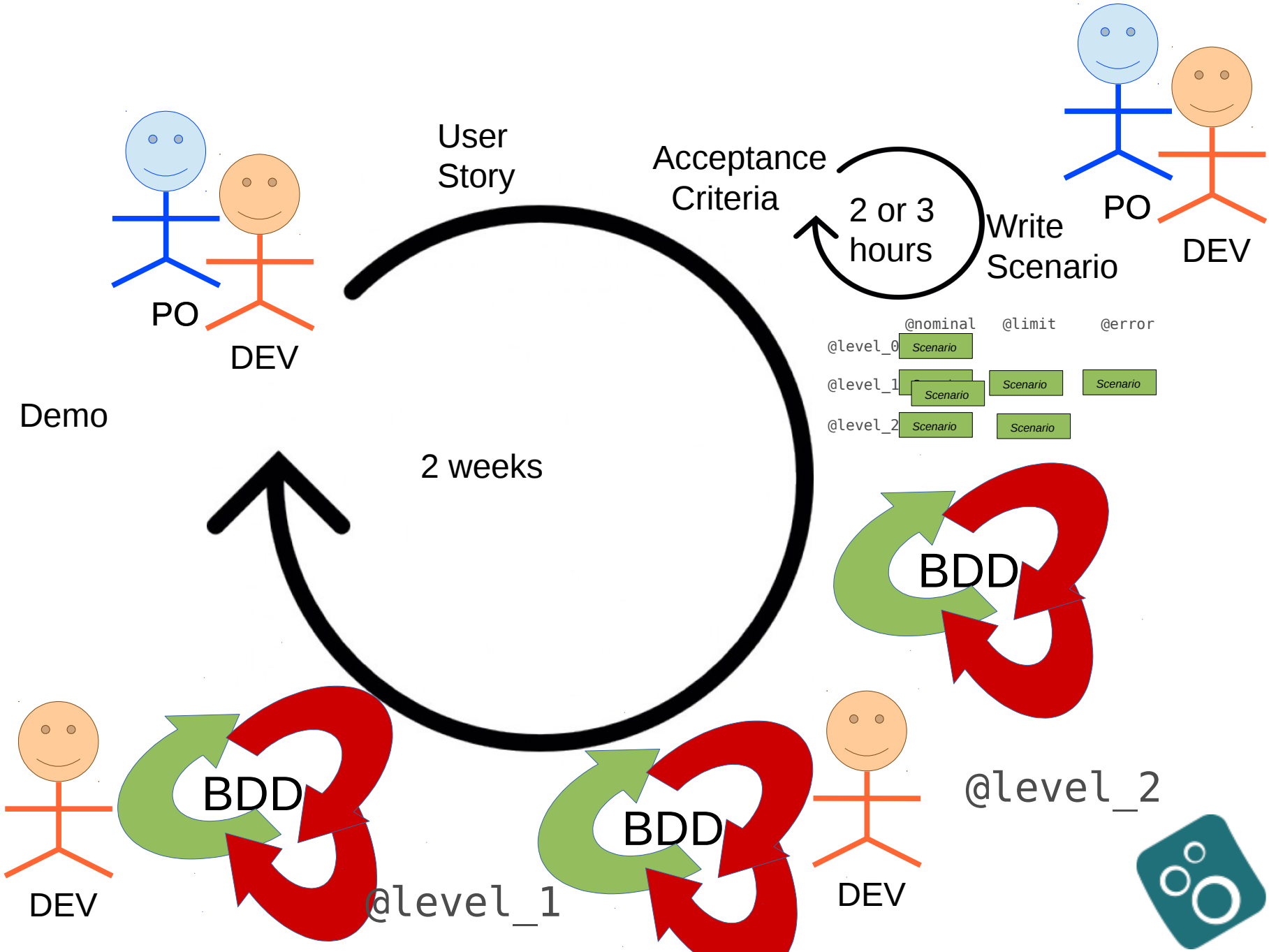
Library

Without specification by example

Suggestions should be linked to the user !

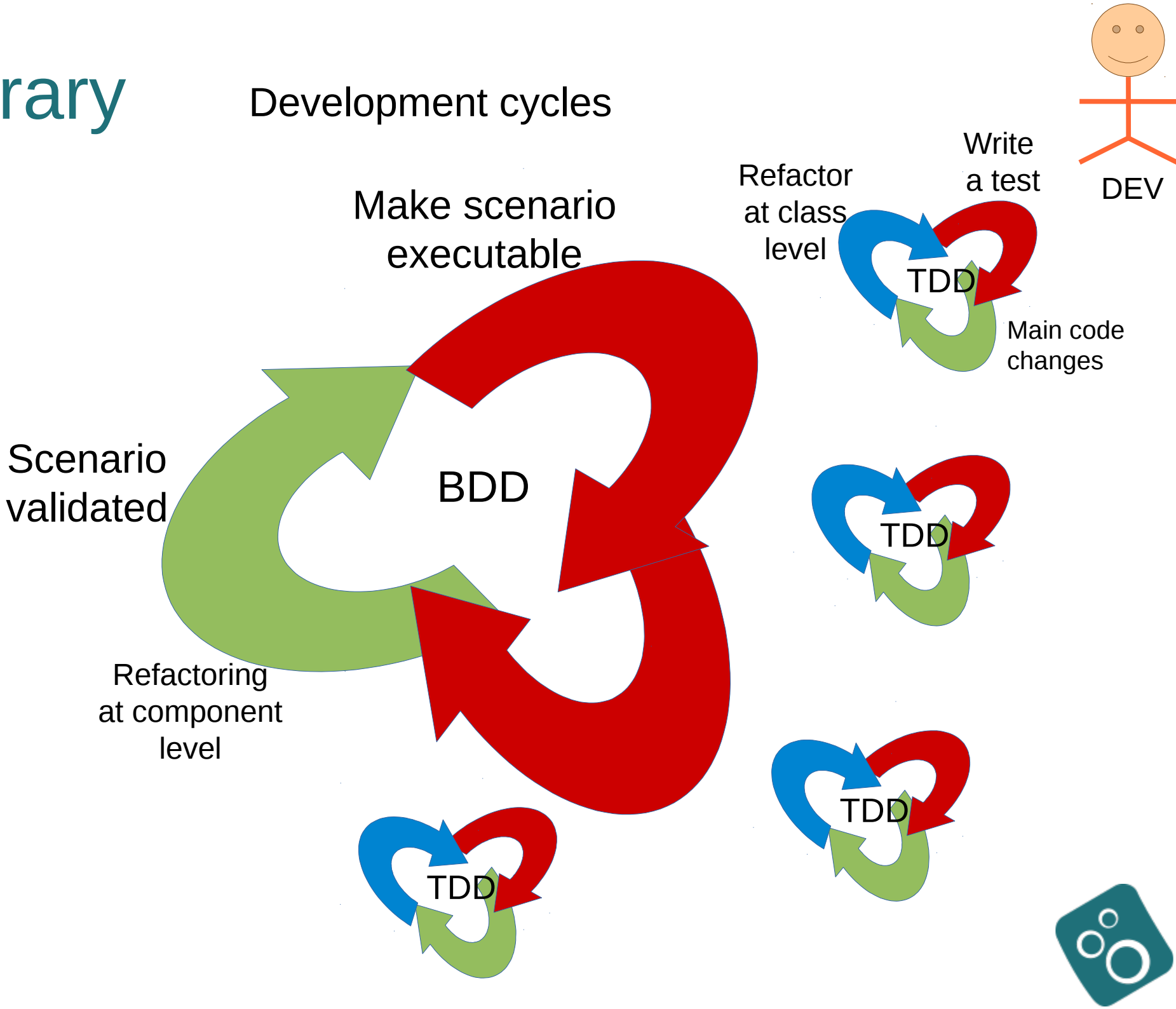
Library

Sprint roadmap



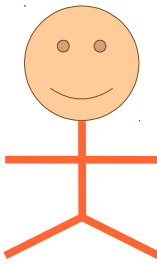
Library

Development cycles

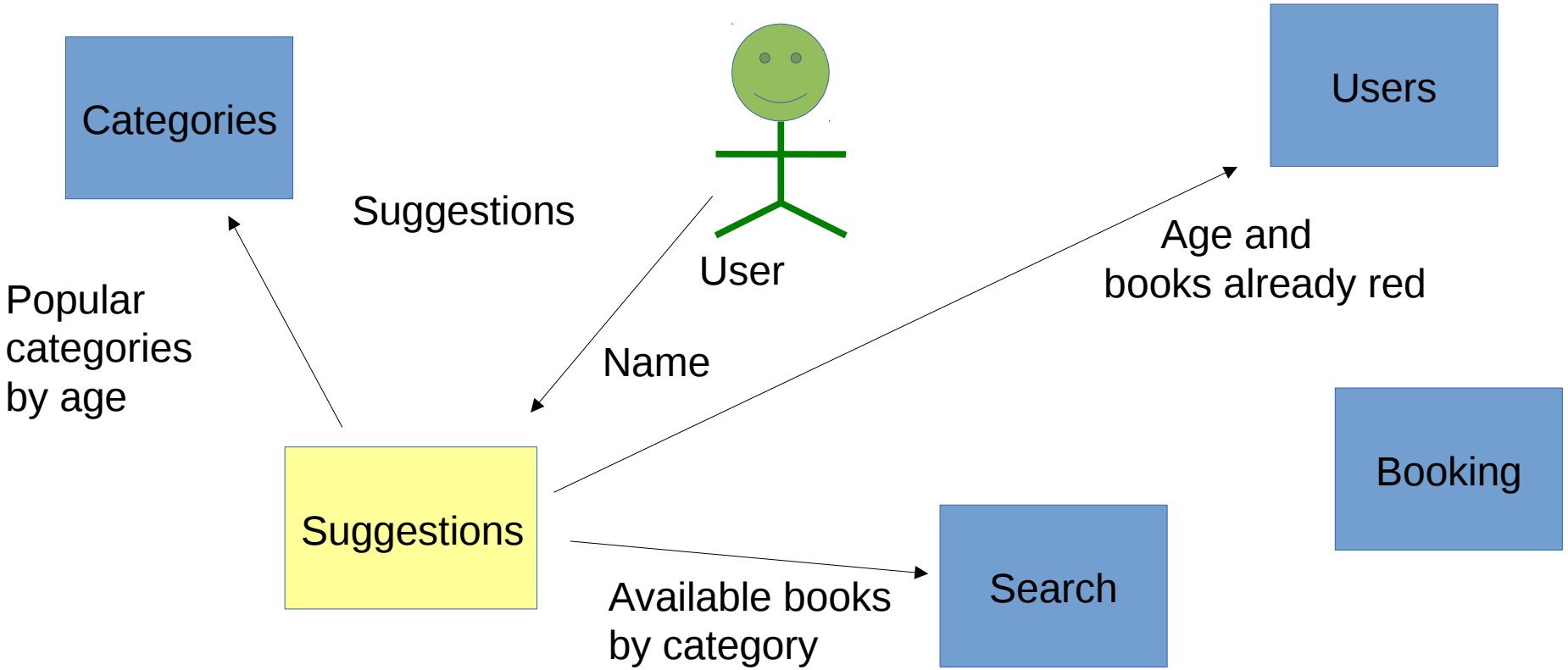


Library

Make scenario executable

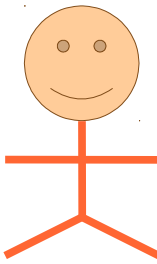


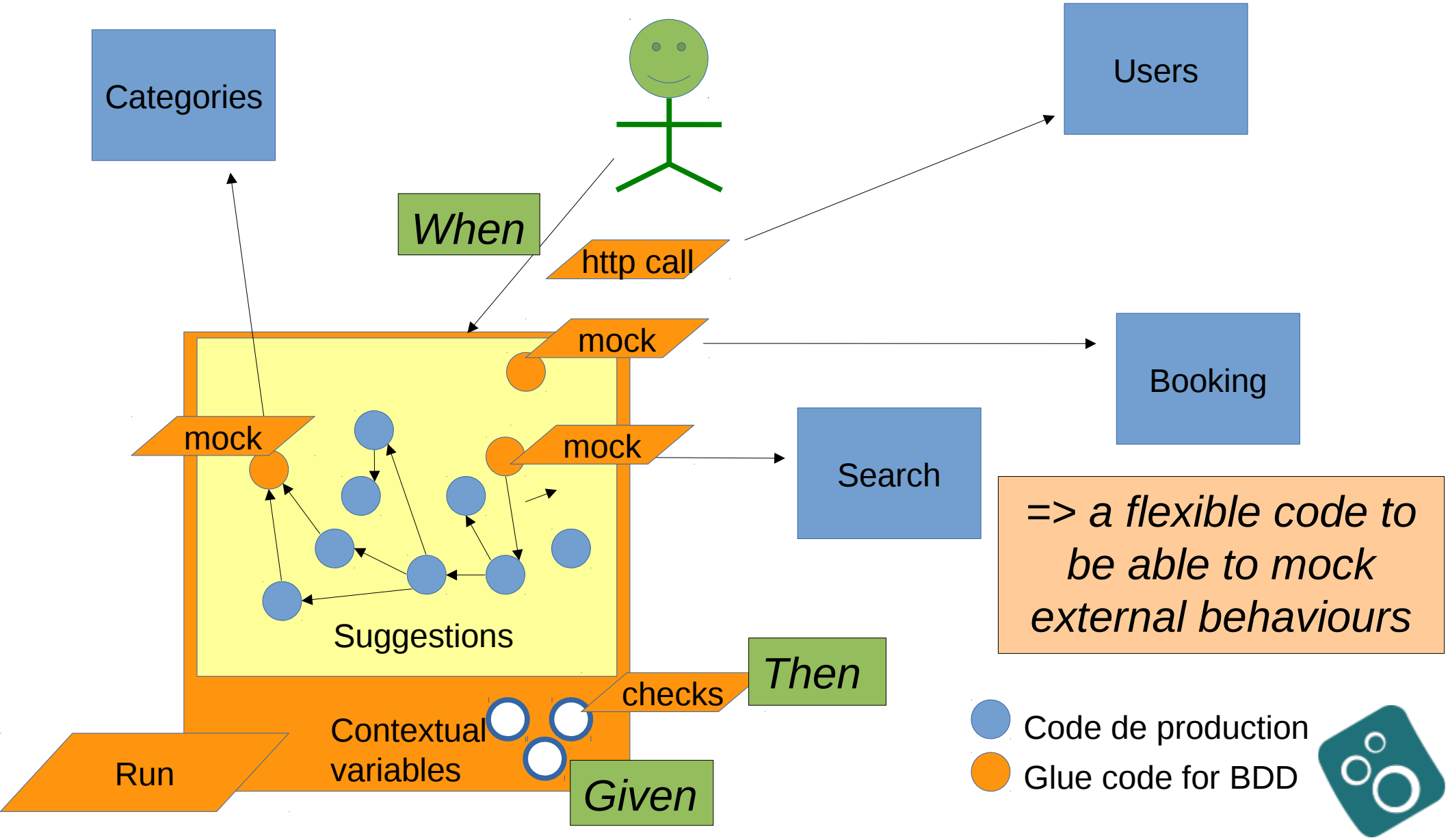
DEV



Library

Make scenario runnable

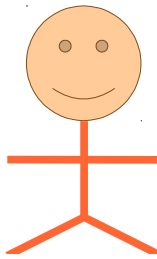




=> a flexible code to be able to mock external behaviours

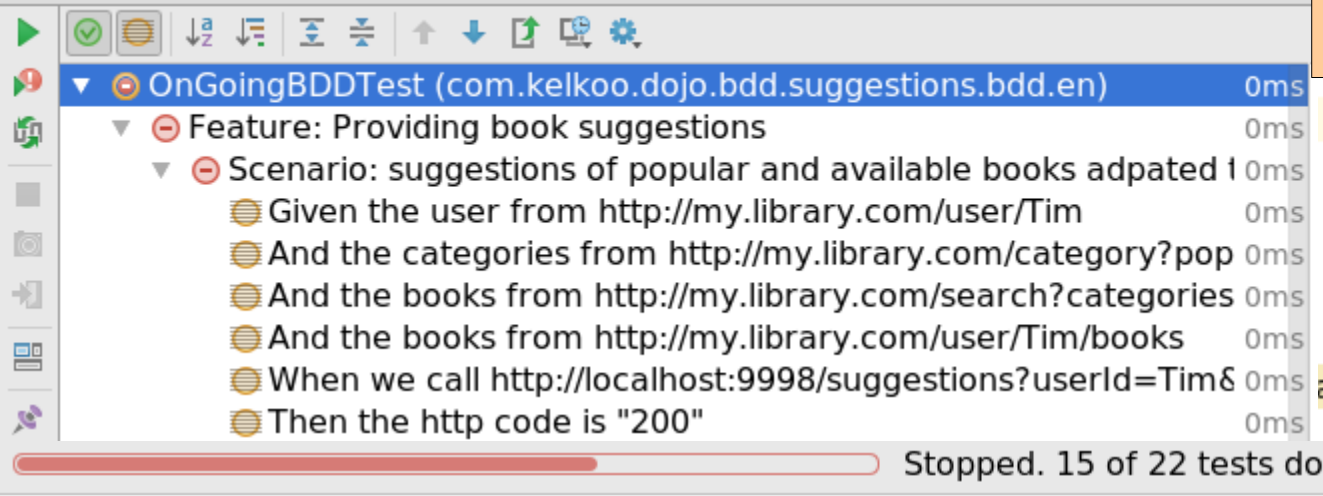
Library

Make scenario runnable



```
@level_2_technical_details @nominal_case @ongoing
Scenario: suggestions of popular and available books adpated to the age of the user, he have never l
  Given the user from http://my.library.com/user/Tim
    | field  | value |
    | userId | Tim   |
    | age    | 4     |
  And the categories from http://my.library.com/category?popular=true&age=4
    | categoryId | categoryName    |
    | cat1       | Walt Disney     |
    | cat2       | Picture books   |
```

Run OnGoingBDDTest



The dev is guided

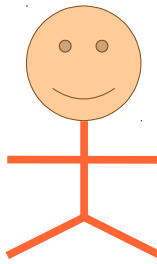
```
axResults=3
```

```
You can implement missing steps with the snippets below:

@Given("^the user from http://my.library.com/user/Tim$")
public void the_user_from_http_my_library_com_user_Tim(DataTable arg1) throws Throwable {
    // Express the Regexp above with the code you wish you had
    // For automatic conversion, change DataTable to List<YourType>
    throw new PendingException();
}
```

Library

Make scenario runnable



Glue code between steps and main code

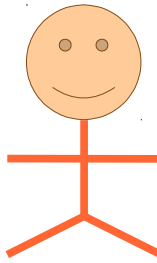
```
@Given("^the user from http://my.library.com/user/([^\"]*)$")
public void given_the_user_from_user_ws(String userId, List<FieldValue> values) th
    FieldValues fieldsValues = new FieldValues(values);
    user.setUserId(userId);
    user.setAge(fieldsValues.getAsInteger( field: "age"));
    when(usersWSClientMock.retrieveUser(user.getUserId())).thenReturn(user);
}
```

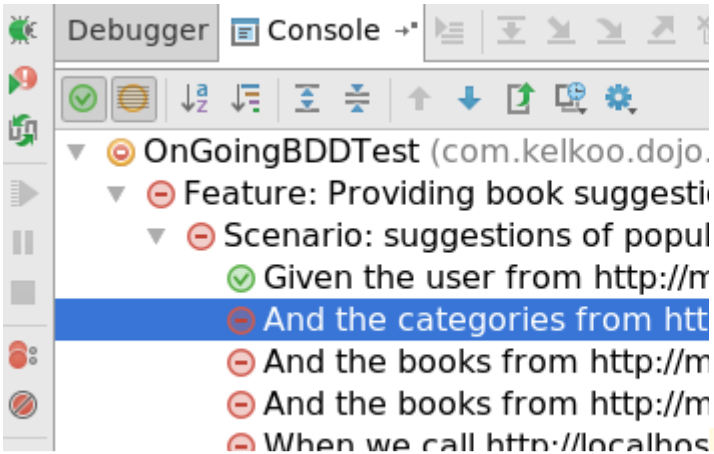
Contextual variable

```
▼ user = {User@3760} "User [userId=Tim, age=4, alreadyBookedBooks=[]]"
  ▶ f userId = "Tim"
  ▶ f age = {Integer@3820} 4
    f alreadyBookedBooks = {ArrayList@3821}  size = 0
```

Library

Make scenario runnable

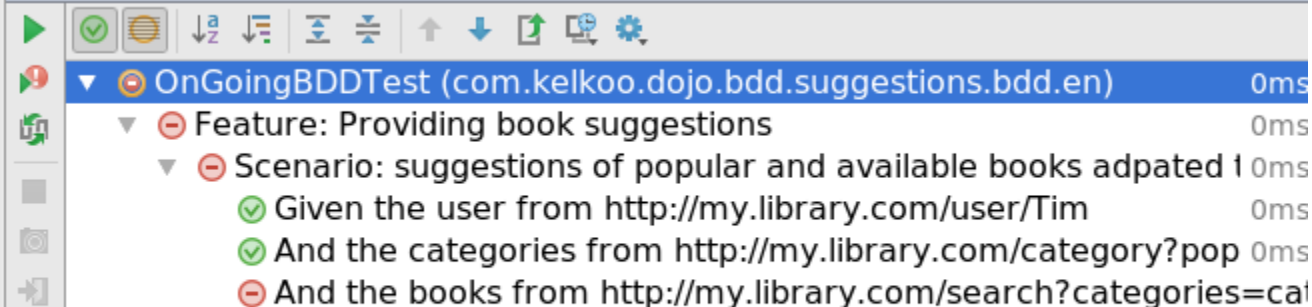





```
@level_2_technical_details @nominal_case @ongoing
Scenario: suggestions of popular and available books adpated to the age of the user, he h
  Given the user from http://my.library.com/user/Tim
    | field  | value |
    | userId | Tim   |
    | age    | 4     |
  And the categories from http://my.library.com/category?popular=true&age=4
    | categoryId | categoryName    |
    | cat1       | Walt Disney     |
    | cat2       | Picture books   |
    | cat3       | Bedtime stories |
  And the books from http://my.library.com/search?categories=cat1,cat2,cat3&available=tru
    | bookId | bookTitle                | categoryId |
    | b11    | Peter Pan                | cat1       |
```

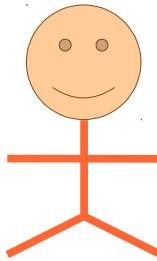
Define mocks behavior

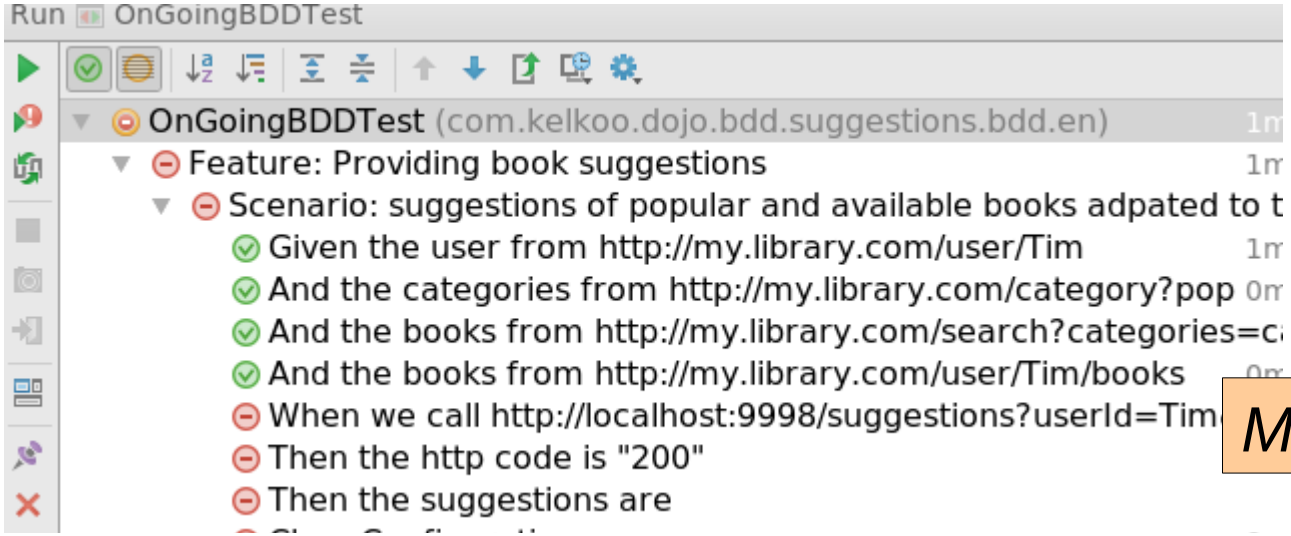
```
@Given("^the categories from http://my.library.com/category\\?popular=([^\"]*)&age=
public void given_the_categories_from_categories_ws(Boolean popular , Integer age,
    when(categoriesWSClientMock.retrieveCategories( popular, user.getAge())).thenRe
}
```



Library

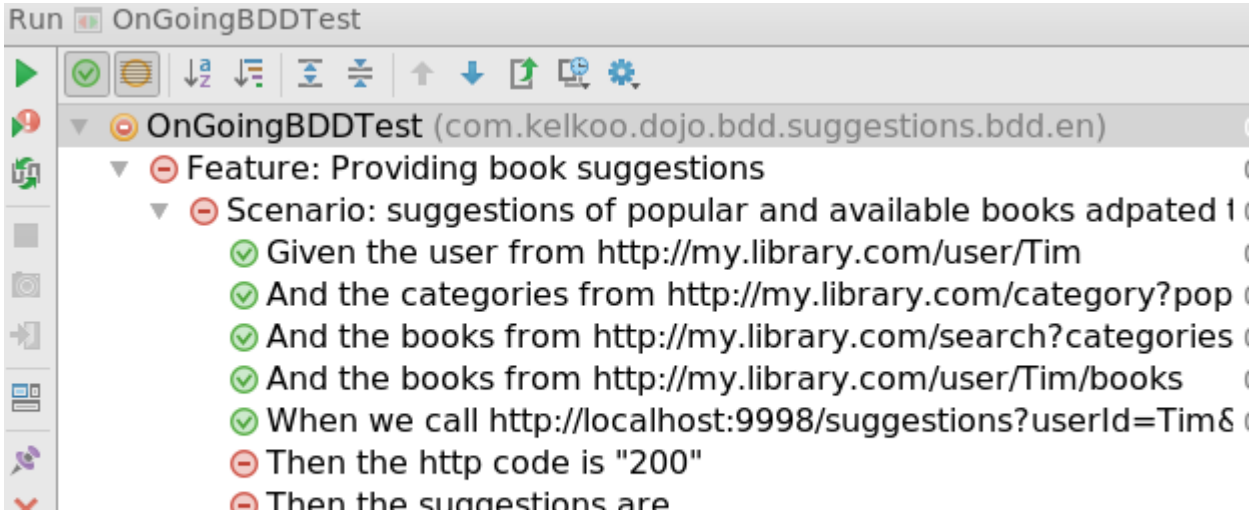
Make scenario runnable





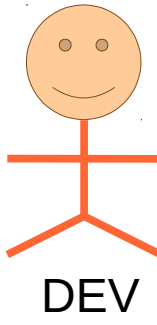
Main code call

```
@When("^we call ([^\"]*)$")
public void when_we_call_suggestions_ws(String suggestionsUrl) throws Throwable {
    wsSuggestionsResponse = client.resource(suggestionsUrl).accept( ...types: "application/xml").get(C
}
```

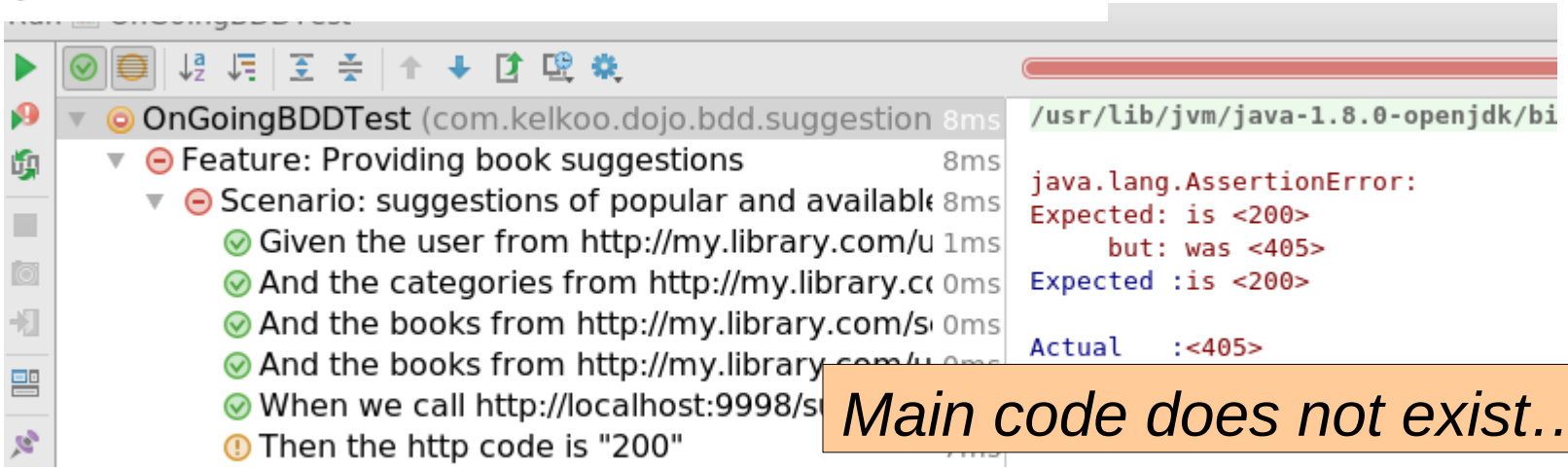


Library

Make scenario runnable

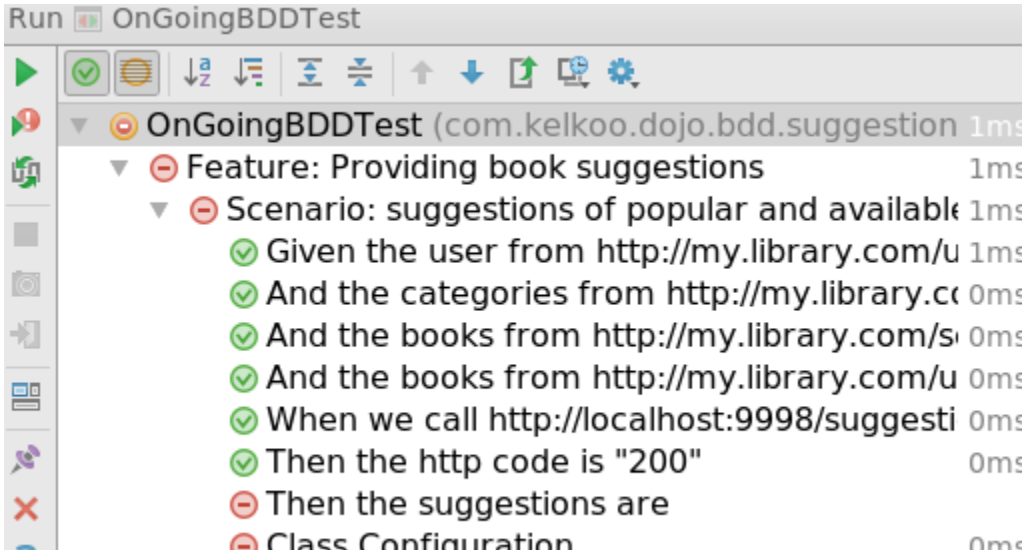



```
@Then("^the http code is \"([^\"]*)\"$")
public void the_http_code_is(Integer httpCode) throws Throwable {
    assertThat(wsSuggestionsResponse.getStatus(), is(httpCode));
}
```



Main code does not exist….

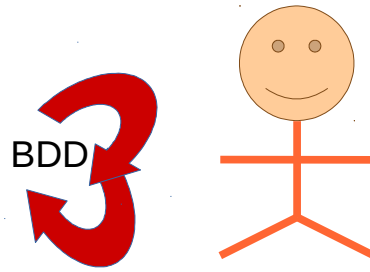
```
@GET
@Produces("application/xml")
public Suggestions getSuggestions(@QueryParam("userId") String userId, @QueryParam("maxResults") Integer maxResults) {
        return new Suggestions();
}
```



Check results

Library

Make scenario runnable




```
@Then("^the suggestions are$")
public void then_the_suggestions_are(List<Suggestion> expectedSuggestions) throws Throwable {
        SuggestionsMarshaller suggestionsMarshaller = new SuggestionsMarshaller();
        Suggestions actualSuggestions = suggestionsMarshaller.deserialize(wsSuggestionsResponse.getEntity(String.class));
        checkSameSuggestions(actualSuggestions, expectedSuggestions);
}
```

```
java.lang.AssertionError:
Expected: <2>
     but: was <0>
Expected :<2>

Actual   :<0>
```

Let's write the real code

```
@GET
@Produces("application/xml")
public Suggestions getSuggestions(@QueryParam("userId") String userId) {

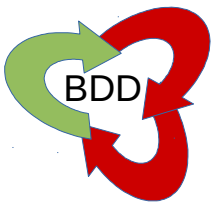
        Suggestions suggestions = new Suggestions();

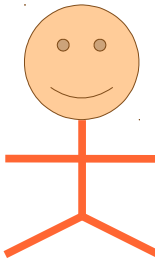
        User user = userWSClient.retrieveUser(userId);
        Boolean isPopular = true;
        List<Category> popularCategories = categoriesWSClient.retrieveCategories(isPopular, user.getAge());
        Boolean bookAvailable = true;
        List<Book> books = searchWSClient.searchBooks(bookAvailable, extractCategoryIds(popularCategories));

        suggestions.addSuggestionsAsBooks(books);
        return suggestions;
}
```

Library

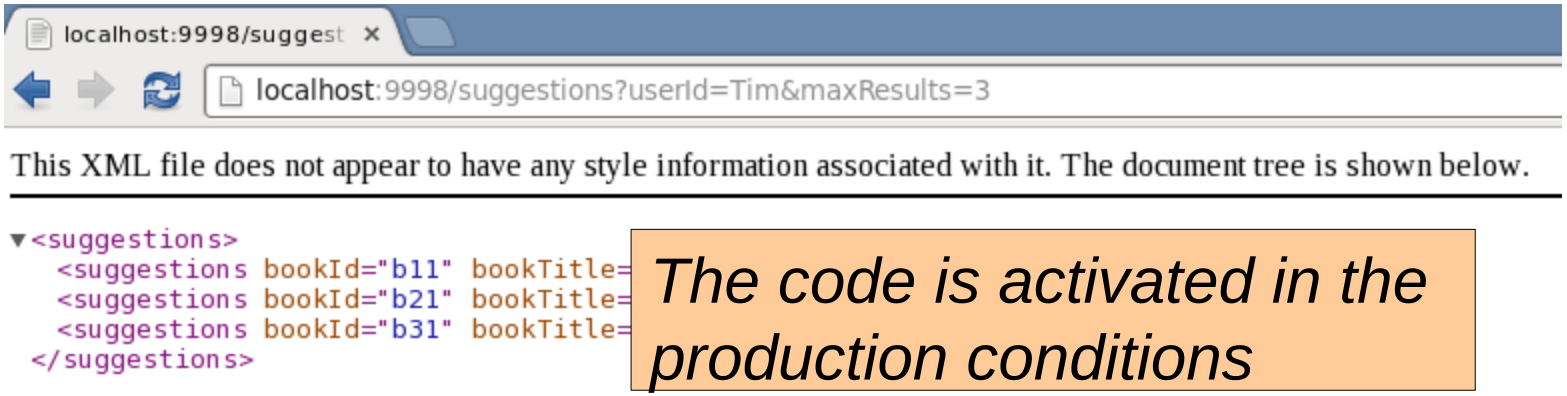
Make scenario runnable





- OnGoingBDDTest (com.kelkoo.dojo.bdd.suggestions.bdd.en) 7 ms
  - Feature: Providing book suggestions 7 ms
    - Scenario: suggestions of popular and available books adapted to the age of the user 7 ms
      - Given the user from http://my.library.com/user/Tim 7 ms
      - And the categories from http://my.library.com/category?popular=true&age=4 0 ms
      - And the books from http://my.library.com/search?categories=cat1,cat2,cat3&avai 0 ms
      - And the books from http://my.library.com/user/Tim/books 0 ms
      - When we call http://localhost:9998/suggestions?userId=Tim&maxResults=3 0 ms
      - Then the http code is "200" 0 ms
      - Then the suggestions are 0 ms

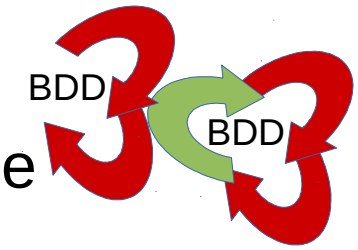
First implemented scenario !

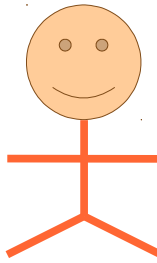


The code is activated in the production conditions

Library

Make scenario runnable






```
@level_1_specification @nominal_case @ongoing
Scenario: suggestions of popular and available books adapted to the age of the user
  Given the user "Tim"
  And he is "4" years old
  And the popular categories for this age are
    | categoryId | categoryName    |
    | cat1       | Walt Disney     |
    | cat2       | Picture books   |
    | cat3       | Bedtime stories |
  And the available books for categories "cat1,cat2,cat3"
    | bookId | bookTitle                | categoryId |
    | b11    | Peter Pan                | cat1       |
    | b21    | Picture book about farm  | cat2       |
    | b31    | The tortoise and the hare | cat3       |
  When we ask for "3" suggestions
  Then the suggestions are
    | bookId | bookTitle                | categoryId |
    | b11    | Peter Pan                | cat1       |
    | b21    | Picture book about farm  | cat2       |
    | b31    | The tortoise and the hare | cat3       |
```

```
▼ OnGoingBDDTest (com.kelkoo.dojo.bdd.suggestions.bdd.en)
  ▼ Feature: Providing book suggestions
    ▼ Scenario: suggestions of popular and available books adapted to the age of th
        Given the user "Tim"
        And he is "4" years old
        And the popular categories for this age are
        And the available books for categories "cat1,cat2,cat3" are
        When we ask for "3" suggestions
        Then the suggestions are

You can implement missing steps with the snippets below:

@Given("^the user \"([^\"]*)\"$")
public void the_user(String arg1) throws Throwable {
    // Express the Regexp above with the code you wish you had
    throw new PendingException();
```

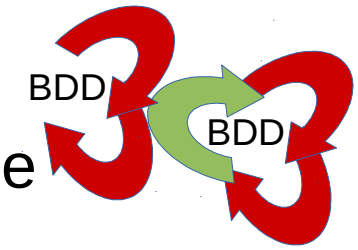
```
@Given("^the user \"([^\"]*)\"$")
public void given_the_user(String userId) throws Throwable {
    user.setUserId(userId);
    given_the_user_from_user_ws( this.user.getUserId(), new
}

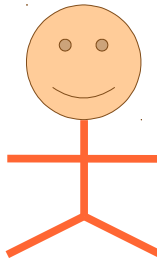
@Given("^he is \"([^\"]*)\" years old$")
public void given_he_is_years_old(Integer age) throws Throwable {
    user.setAge(age);
    given_the_user_from_user_ws( user.getUserId(), new UserStep(user).fields   );
}
@Given("^the popular categories for this age are$")
public void given_the_popular_categories_for_this_age_are(List<Category> popularCategoriesGivenAgeUser)
        throws Throwable {
    Boolean isPopular = true ;
    given_the_categories_from_categories_ws(isPopular, user.getAge(), popularCategoriesGivenAgeUser);
}
```

Reusing executable steps with a lower level of abstraction

Library

Make scenario runnable






```
@level_1_specification @nominal_case @ongoing
Scenario: limit the number of suggestions
  Given the user "Tim"
  And he is "4" years old
  And the popular categories for this age are
    | categoryId | categoryName    |
    | cat1       | Walt Disney     |
    | cat2       | Picture books   |
    | cat3       | Bedtime stories |
  And the available books for categories "cat1,cat2,cat3" are
    | bookId | bookTitle                | categoryId |
    | b11    | Peter Pan                | cat1       |
    | b21    | Picture book about farm  | cat2       |
    | b31    | The tortoise and the hare | cat3      |
  When we ask for "2" suggestions
  Then the suggestions are
    | bookId | bookTitle               | categoryId |
    | b11    | Peter Pan               | cat1       |
    | b21    | Picture book about farm | cat2       |
```

- OnGoingBDDTest (com.kelkoo.dojo.bdd.suggestions.bdd.en)
  - Feature: Providing book suggestions
    - Scenario: suggestions of popular and available books adapted to the age
      - Given the user "Tim"
      - And he is "4" years old
      - And the popular categories for this age are
      - And the available books for categories "cat1,cat2,cat3" are
      - When we ask for "3" suggestions
      - Then the suggestions are
    - Scenario: limit the number of suggestions
      - Given the user "Tim"
      - And he is "4" years old
      - And the popular categories for this age are
      - And the available books for categories "cat1,cat2,cat3" are
      - When we ask for "2" suggestions
      - Then the suggestions are
      - Class Configuration

Reusing steps

```
@GET
@Produces("application/xml")
public Suggestions getSuggestions(@QueryParam("userId") String userId, @QueryParam("maxResults") Integer maxResults) {

        Suggestions suggestions = new Suggestions();
        maxResults = maxResults == null ? DEFAULT_MAX_RESULT : maxResu

        User user = userWSClient.retrieveUser(userId);
        Boolean isPopular = true;
        List<Category> popularCategories = categoriesWSClient.retriev
        Boolean bookAvailable = true;
        List<Book> booksForSuggestions = searchWSClient.searchBooks(bookAvailable, extractCategoryIds(popularCategories));

        // Reduce number of results
        if (booksForSuggestions.size() > maxResults) {
            booksForSuggestions = booksForSuggestions.subList( i: 0, maxResults);
        }

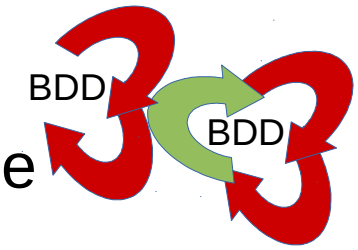
        suggestions.addSuggestionsAsBooks(booksForSuggestions);
        return suggestions;
}
```

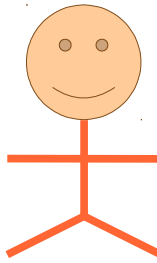
```
java.lang.AssertionError:
Expected: <2>
     but: was <3>
Expected :<2>

Actual   :<3>
                    .getAge());
```

Library

Make scenario runnable






```
@level_1_specification @nominal_case @ongoing
Scenario:  limit the number of suggestions
  Given the user "Tim"
  And he is "4" years old
  And "3" books are available on popular categories for his age
  When we ask for "2" suggestions
  Then "2" suggestions are proposed from the previous books
```

```
OnGoingBDDTest (com.kelkoo.dojo.bdd.suggestions.bdd.en)
  Feature: Providing book suggestions
    Scenario: limit the number of suggestions
      Given the user "Tim"
      And he is "4" years old
      And "3" books are available on popular categories for his age
      When we ask for "2" suggestions
      Then "2" suggestions are proposed from the previous books
```

Generate data to make a scenario easier to read

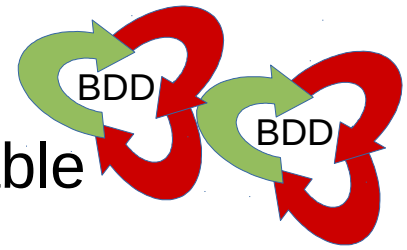
```
@Given("^\"([^\"]*)\" books are available on popular categories for his age$")
public void books_are_available_on_popular_categories_for_his_age(int nbBooks) throws Throwable {
    given_the_popular_categories_for_this_age_are(asList( new Category( categoryId: "cat1", categoryName: "category1") )) ;
    List<Book> books = new ArrayList<~>();
    for (int i = 0; i < nbBooks; i++) {
        books.add( new Book( bookId: "b1"+i, bookTitle: "book1"+i, categoryId: "cat1" ) ) ;
    }
    given_the_search_results_for_categories_are( categoryIds: "cat1", books) ;
}

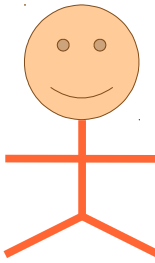
@Then("^\"([^\"]*)\" suggestions are proposed from the previous books$")
public void suggestions_are_proposed_from_the_previous_books(Integer nbSuggestions) throws Throwable {
    Suggestions suggestions = Suggestions.suggestionsFromBooks(  searchResult.subList( i: 0, nbSuggestions) ) ;
    then_the_suggestions_are(suggestions.getSuggestions()) ;
}
```

```
OnGoingBDDTest (com.kelkoo.dojo.bdd.suggestions.bdd.en)
  Feature: Providing book suggestions
    Scenario: limit the number of suggestions
      Given the user "Tim"
      And he is "4" years old
      And "3" books are available on popular categories for his age
      When we ask for "2" suggestions
      Then "2" suggestions are proposed from the previous books
```

Library

Make scenario runnable






```
@level_0_high_level @nominal_case @ongoing
Scenario: providing book suggestions
  Given a user
  When we ask for suggestions
  Then the suggestions are popular and available books adapted to the age of the user
```

Implement a high level scenario

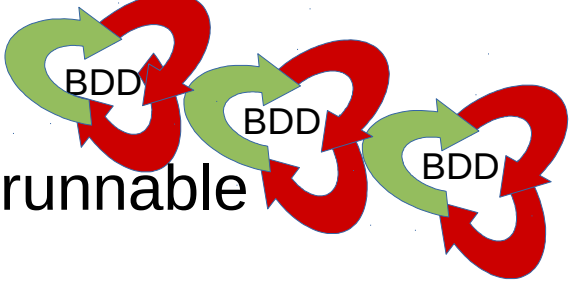
```
@Given("^a user$")
public void given_a_user() throws Throwable {
    given_the_user( userId: "userId1");
    given_he_is_years_old( age: 4);
    given_the_popular_categories_for_this_age_are(asList( new Category( categoryId: "cat1", categoryName: "category1"), new Catego
    given_the_search_results_for_categories_are( categoryIds: "cat1,cat2",
                                                 asList( new Book( bookId: "b11", bookTitle: "book11", categoryId: "cat1" ),
                                                         new Book( bookId: "b21", bookTitle: "book21", categoryId: "cat2" ),
                                                         new Book( bookId: "b31", bookTitle: "book31", categoryId: "cat3" )));
}

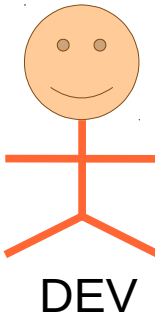
@When("^we ask for suggestions$")
public void when_we_ask_for_suggestions() throws Throwable {
    when_we_ask_for_suggestions( maxResults: 3);
}

@Then("^the suggestions are popular and available books adapted to the age of the user$")
public void then_the_suggestions_are_popular_and_available_books_adpated_to_the_age_of_the_user() throws Throwable {
    then_the_suggestions_are(asList( new Suggestion( bookId: "b11", bookTitle: "book11", categoryId: "cat1" ),
                                     new Suggestion( bookId: "b21", bookTitle: "book21", categoryId: "cat2" ),
                                     new Suggestion( bookId: "b31", bookTitle: "book31", categoryId: "cat3" )));
}
```

Library

Make scenario runnable



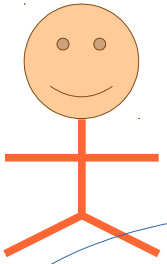


- TestValidBDDEn (com.kelkoo.dojo.bdd.suggestions.bdd.en)
  - Feature: Providing book suggestions
    - Scenario: suggestions of popular and available books adapted to the age of the user, he have never booked the suggestions
    - Scenario: suggestions of popular and available books adapted to the age of the user
    - Scenario: limit the number of suggestions
    - Scenario: limit the number of suggestions
    - Scenario: the user have never booked the suggestions
    - Scenario: the books are coming from different categories
    - Scenario: not enough suggestions, the books can come from the same categories
    - Scenario: unknown user, no suggestion
    - Scenario: one service on which the suggestion system is down
    - Scenario: unknown user, no suggestion
    - Scenario: one service on which the suggestion system depends on is down
    - Scenario: providing book suggestions

All scenarios are implemented

Library

Regression tests



Regular regression tests

DEV

@nominal @limit @error

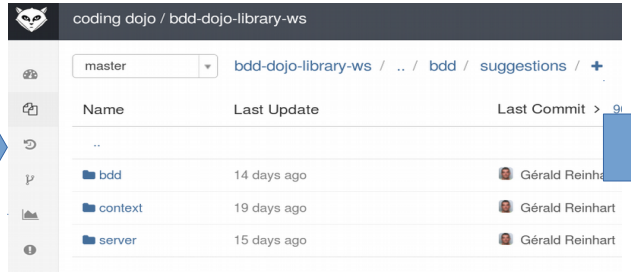
@level_0 Scenario

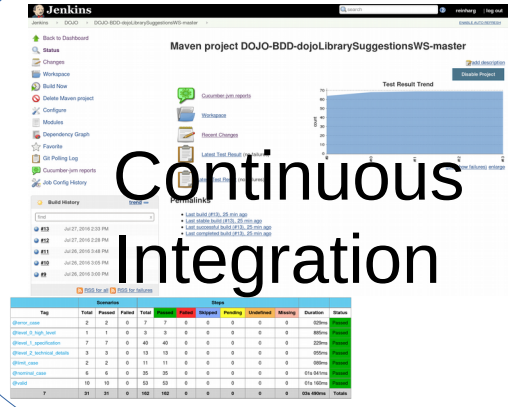
@level_1 Scenario Scenario Scenario

@level_2 Scenario Scenario

Scenarios BDD

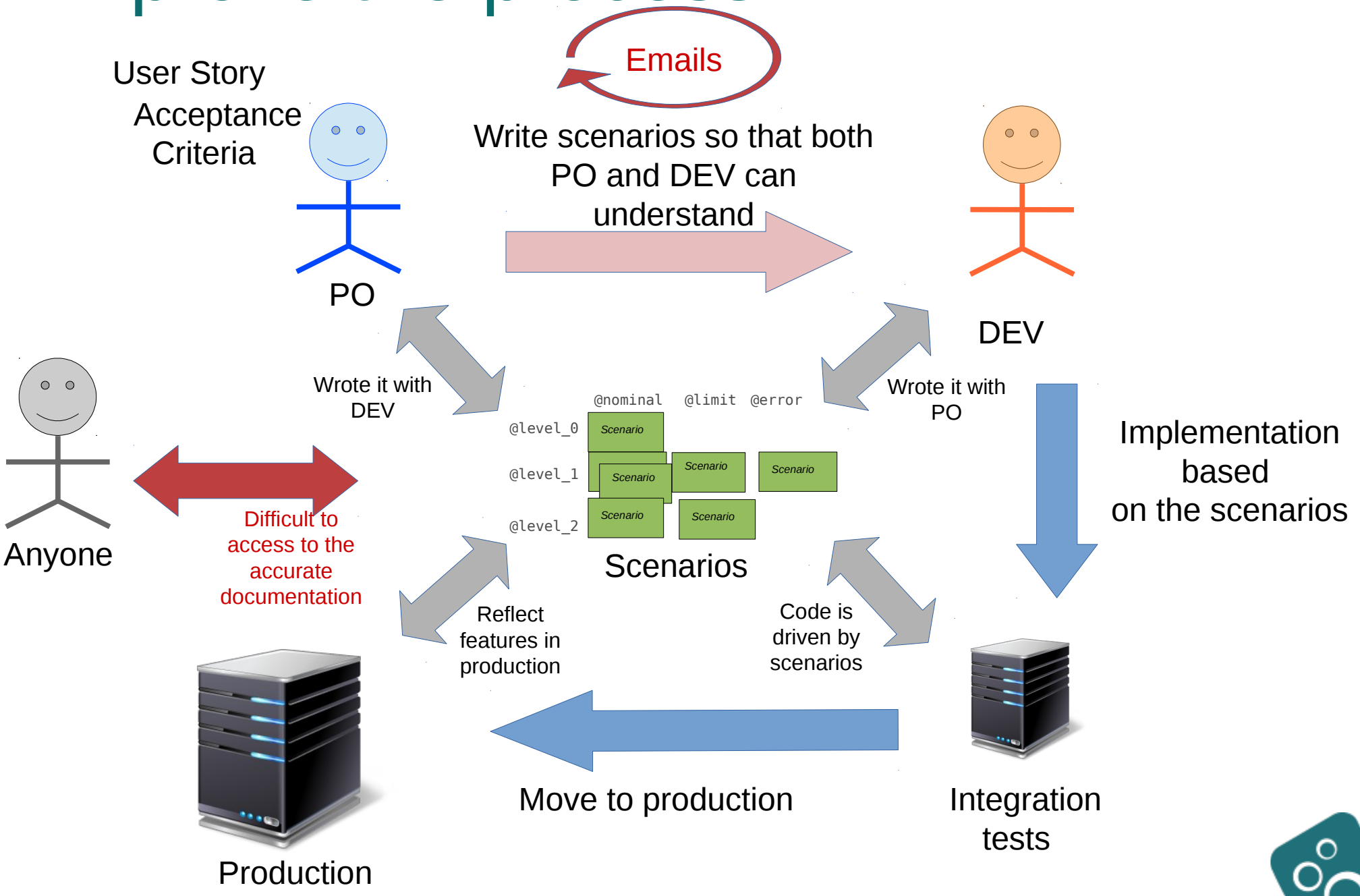
Source code



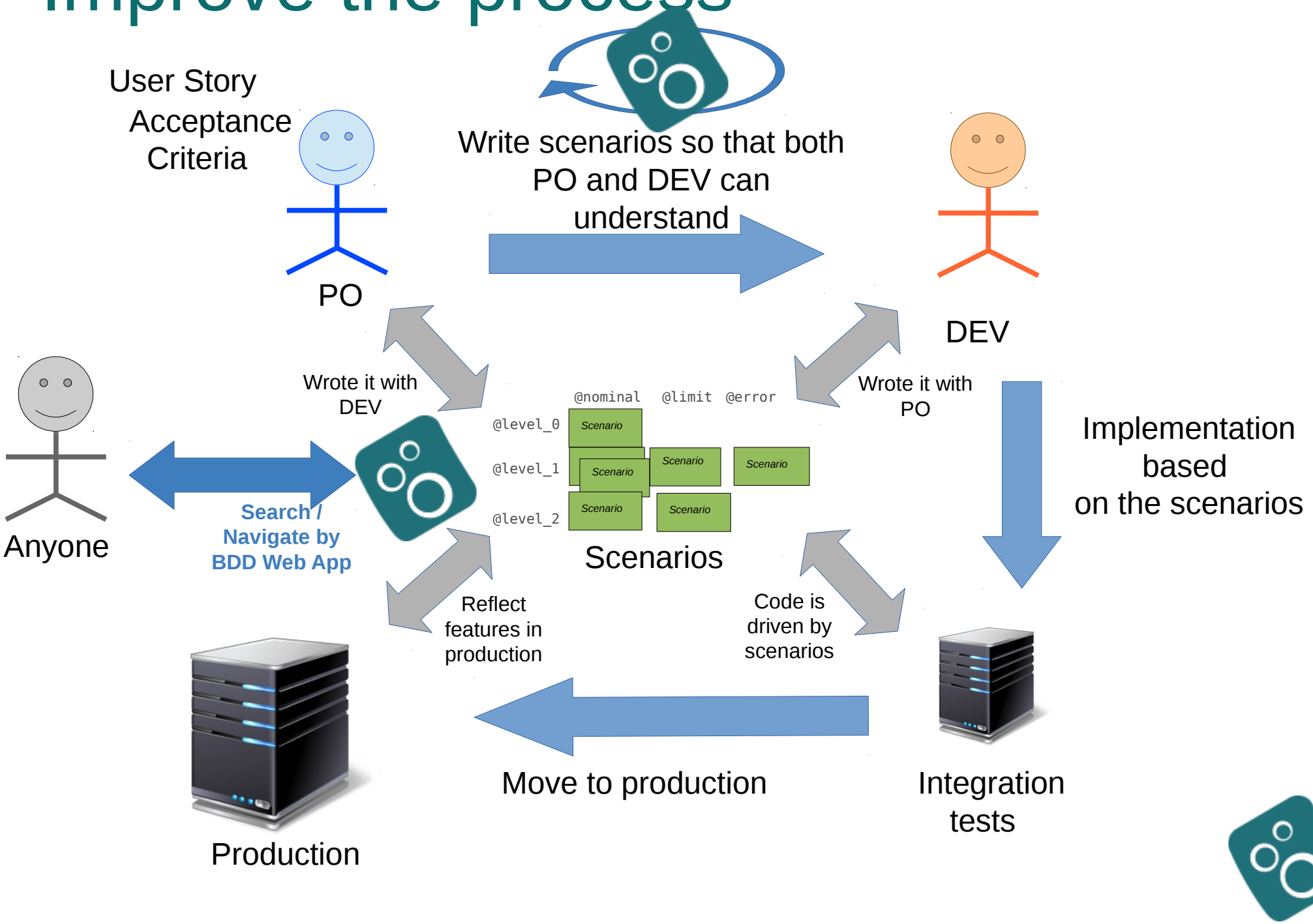


Continuous Integration

Improve the process



Improve the process



Conclusion

- Specification by example
  - Close collaboration DEV / PO is required
  - Use examples to open discussion and find many cases
  - Allows a very fast feedback loop
- Functional tests
  - Fast and stable tests
  - The developer is guided, the code is pulled by the tests
  - Flexible code is required to mock external interactions
- Runnable Documentation
  - Pulled from code, the documentation is always up to date
  - The documentation is exhaustive

Conclusion

- The team is more welded around the project
  - same level of understanding for everyone
  - the scenarios constitute a clear contract
- Trust
- Velocity
  - very fast feedback loop for the PO
  - In case of change of orientation product, the modification of the tests and the code is faster

Conclusion

- Failure factor
  - DEV or PO not involved
  - BDD applied during the project : need to be done a the very first step
- the gardener

  aim is to address too important use cases not really addressed yet :

  - easily access to the scenario
  - collaborative tools to help PO and DEV discussion

  => https://github.com/KelkooGroup/theGardener/wiki