Extraction Guideline

For the **Use Case Adoption** Study

This document provides guidelines on how to extract data from use cases contained in the obtained data set of requirements from Jira. It defines attributes (i.e., variables), their data types, and possible values. The attributes are on use case level, not on requirement level.

Table of Contents

[Basic Attributes 2](#_Toc192672570)

[Identifier 2](#_Toc192672571)

[Title 2](#_Toc192672572)

[Form 2](#_Toc192672573)

[Fields 2](#_Toc192672574)

[Procedural Scenario 3](#_Toc192672575)

[Location 3](#_Toc192672576)

[Level 4](#_Toc192672577)

[Use Case Quality Attributes 4](#_Toc192672578)

[Cogent 4](#_Toc192672579)

[Text Order 4](#_Toc192672580)

[End-to-end Dependencies 5](#_Toc192672581)

[Coherent 5](#_Toc192672582)

[Consistent Abstraction 5](#_Toc192672583)

[Steps 5](#_Toc192672584)

[Functional Steps 6](#_Toc192672585)

[White-box Steps 6](#_Toc192672586)

[Cyclic Steps 6](#_Toc192672587)

[Consistent Structure 6](#_Toc192672588)

[Number of misplaced Variations 6](#_Toc192672589)

[Number of misplaced main Steps 6](#_Toc192672590)

[Sequence (main) 7](#_Toc192672591)

[Consistent Grammar 7](#_Toc192672592)

[Consideration of Alternatives 7](#_Toc192672593)

[Has Alternatives 7](#_Toc192672594)

[Numbering 7](#_Toc192672595)

[Bibliography 9](#_Toc192672596)

# Basic Attributes

The basic attributes represent the fundamental use case description properties.

## Identifier

|  |
| --- |
| **Numerical** |

**Description**: This attribute captures the identifier (ID) of the use case (if available).

**Annotation criteria**: Record the identifier of the use case if an explicit ID was assigned in the requirement. If not, select an ID that is unique within the requirement and, in the best case, maintains a logical sequence.

**Examples**:

* REQ-XXXX: The two use cases in the description have no explicit ID. It makes sense to just assign ID 1 and ID 2 to them based on their order of appearance.
* REQ-XXXX: The use cases have explicit IDs assigned to them. Record them as is.

## Title

|  |
| --- |
| **Textual** |

**Description**: This attribute captures the assigned name of the use case (if available).

**Annotation criteria**: If the use case has an assigned name or title, record this phrase. If not, record “(no title).”

**Examples**:

* REQ-XXX: The first use case has the explicit title. Record this value as the title.

## Form

|  |
| --- |
| **Categorical** |

**Description**: This attribute records in what form the use case appears. A use case should be specified using the use case template, but it may also only consist of a title or a single-sentence user story.

**Annotation criteria**: Select the *value* if …

|  |  |
| --- | --- |
| **Value** | **Rule** |
| **Title** | The use case only consists of a title |
| **User story** | The use case consists of a single sentence following the template “As a <role> I want to <goal> so that <reason>.” |
| **Description** | The use case is described in a tabular structure containing at least one attribute-value pair, a scenario that is specified as a list of steps. |
| **Informal** | The use case consists of free text, e.g., a paragraph |

**Examples**:

## Fields

|  |
| --- |
| **List** |

**Description**: This attribute records all the fields that the use case description contains. This also includes fields that might not typically appear in a use case description (e.g., a solution proposal).

**Annotation criteria**: Extract the fields of the use case description (1) in order of appearance, (2) lower-case, and (3) separated with semicolons. To allow comparisons, common attributes should follow a unique naming scheme. The following

|  |  |
| --- | --- |
| **Field to record** | **Observed values in the data** |
| **title** | Title, name |
| **main scenario** | Main success scenario, success scenario |
| **extension** | Extensions, alternative scenarios |
| **postconditions** | Acceptance criteria, expected/agreeable performance, end conditions (success), end conditions (failure), end conditions |
| **preconditions** | Preconditions, prerequisites |
| **limitations** | Limitations, out of scope |

**Examples**:

* REQ-XXXX: The use cases have the following fields list: **title; level; main scenario; extension; additional information**. The field “Main Success Scenario” was recorded as “main scenario” according to the table above.
* REQ-XXXX: The first use case has the following fields list: actor, main scenario, additional information. The use case has a title, but not a title field.

## Procedural Scenario

|  |
| --- |
| **Categorical** |

**Description**: This attribute records whether the *scenario* fields were correctly used. A scenario should consist of steps and describe a process, but the field is sometimes misused like a *postconditions* field.

**Annotation criteria**: Select the *value* if …

|  |  |
| --- | --- |
| **Value** | **Rule** |
| **True** | All scenarios describe a process |
| **False** | At least one scenario describes the outcome of the process instead of the process. |

**Examples**:

* REQ-XXXX: Both use cases contain main success scenarios that are stepwise processes. The procedural scenario is **true**.
* REQ-XXXX: The use case states as the main success scenario that “guidelines should exist.” This is not a process, but the outcome of the process. The value of procedural scenario is, therefore, **false**.

## Location

|  |
| --- |
| **Categorical** |

**Description**: This attribute records in which section of the description of the requirement the use case is located. Requirements are usually structured in three tiers: the business background (i.e., the why), the business requirements (i.e., the what), and the solution proposal (i.e., the how).

**Annotation criteria**: Select the *value* if …

|  |  |
| --- | --- |
| **Value** | **Rule** |
| **Business Background** | The use case appears under the heading “Business Background” |
| **Business Requirements** | The use case appears under the heading “Business Requirements” |
| **Solution Proposal** | The use case appears under the heading “Solution proposal” |
| **Default** | The requirements description does not have the 3-tier structure |

**Examples**:

* REQ-XXXX: All use cases appear under the heading “**Business Requirements**.”
* REQ-XXXX: The two use cases appear under the heading “**Solution proposal**.”

## Level

|  |
| --- |
| **Categorical** |

**Description**: This attribute records the level of abstraction that a use case is explicitly assigned to as some use cases have the field “Level.”

**Annotation criteria**: Select the *value* if …

|  |  |
| --- | --- |
| **Value** | **Rule** |
| **System** | The use case has the “Level” variable “System.” |
| **User** | The use case has the “Level” variable “User.” |
| **Business** | The use case has the “Level” variable “Business.” |
| **(no level)** | The use case has not “Level” variable. |

**Examples**:

* REQ-XXXX: The two use cases have an explicit level “**System**.”

# Use Case Quality Attributes

The quality of use case descriptions is measured via the 7Cs guideline by Phalp et al. [1] except for the quality factors “Coverage” and “Cogent – Rational Answer,” which extractors cannot decide without deep domain knowledge.

## Cogent

### Text Order

|  |
| --- |
| **Categorical** |

**Description**: This attribute records whether the use case description scenario(s) follow a logical path with events in the correct order.

**Annotation criteria**: Select the *value* if …

|  |  |
| --- | --- |
| **Value** | **Rule** |
| **true** | All scenarios in the use case description follow a logical order. |
| **false** | otherwise |

**Examples**:

### End-to-end Dependencies

|  |
| --- |
| **Categorical** |

**Description**: This attribute records whether the use case completes an end-to-end transaction, i.e., whether the actor starting the use case also ends it.

**Annotation criteria**: Select the *value* if …

|  |  |
| --- | --- |
| **Value** | **Rule** |
| **true** | The final step of the use case is a response to the actor that initiated the use case |
| **false** | otherwise |

**Examples**:

* REQ-XXXX: The use case describes a simple request-response pair that terminates with a response to the user who started the use case. The dependency attribute is **true**.
* REQ-XXXX: The use case describes a simple request-response pair that is preceded by another actor initiating a node transfer. While the second actor receives a response from the system, the first actor does not. The use case is, hence, not end-to-end and the dependencies attribute is **false**.

## Coherent

|  |
| --- |
| **Numerical** |

**Description**: This attribute captures the degree of steps in the use case with *local coherence*, i.e., the portion of use case steps that repeat at least on noun of the previous step.

**Annotation criteria**: To calculate the degree of coherence, conduct the following steps:

1. Calculate the number of steps in the use case (sum up all scenarios) with a predecessor (e.g., a scenario with 5 steps has 4 eligible steps with a predecessor).
2. Calculate the number of steps that repeat at least on noun of their predecessor.
3. Divide the numbers.

**Examples**:

## Consistent Abstraction

The use case descriptions should be on a consistent level of abstraction. In the

### Steps

|  |
| --- |
| **Numerical** |

**Description**: This attribute captures the number of steps in the total use case.

**Annotation criteria**: Sum up the number of steps in each scenario (both from the main success scenario and the extensions).

**Examples**:

* REQ-XXXX: The first use case contains two scenarios, a main success scenario with 6 steps and one extension with one step. The total number of steps is **7**.

### Functional Steps

|  |
| --- |
| **Numerical** |

**Description**: This attribute captures the number of steps in the total use case that classify as functional steps, i.e., describing a function (and not a property).

**Annotation criteria**: Sum up the number of steps in each scenario that are functional steps. One step does not necessarily need to cover both the actor’s action and the system’s response like a true functional requirement. Either of both qualify a step.

**Examples**:

* REQ-XXXX: The first use case contains 7 steps. However, two of these steps are non-functional requirements: steps 5 of the main success and the one step in the extension do not describe functional requirements. The total number of functional steps is **5**.

### White-box Steps

|  |
| --- |
| **Numerical** |

**Description**: This attribute records how many of the functional steps go beyond a black-box interaction, i.e., beyond the interaction between a user and the system from a black box perspective.

**Annotation criteria**: Sum up the number of functional steps in each scenario that describe the interaction between two system components.

**Examples**:

### Cyclic Steps

|  |
| --- |
| **Numerical** |

**Description**: This attribute records how many of the functional steps describe interactions of an actor with themselves. These internal workings should not be part of the use case.

**Annotation criteria**: Sum up the number of functional steps in each scenario that describe the interaction of an actor with themselves.

**Examples**:

## Consistent Structure

### Number of misplaced Variations

|  |
| --- |
| **Numerical** |

**Description**: This attribute records how many of the functional steps that represent alternatives are misplaced in the main success scenario

**Annotation criteria**: Sum up the number of variations contained in the functional steps of the main success scenario.

**Examples**:

### Number of misplaced main Steps

|  |
| --- |
| **Numerical** |

**Description**: This attribute records how many of the functional steps that represent steps of the main success scenario were incorrectly listed in the alternative flow.

**Annotation criteria**: Sum up the number of main steps omitted from the main success scenario but included in the extensions.

**Examples**:

### Sequence (main)

|  |
| --- |
| **Categorical** |

**Description**: This attribute records whether the use case scenarios contain a sequential ordering.

**Annotation criteria**: Select the *value* if …

|  |  |
| --- | --- |
| **Value** | **Rule** |
| **true** | The steps of a use case are ordered sequentially |
| **false** | otherwise |

**Examples**:

* REQ-XXXX: Both use cases contain steps that are unordered. The sequence attribute is **true**.

## Consistent Grammar

|  |
| --- |
| **Numerical** |

**Description**: This attribute records how many of the functional steps follow the recommended simple sentence pattern.

**Annotation criteria**: Sum up the number of functional steps in all scenarios that comply to the following requirements:

1. The sentence is written in simple, present tense.
2. The sentence is written in active voice.
3. The sentence complies with a basic <subject> <verb> <object> pattern.

**Examples**:

## Consideration of Alternatives

### Has Alternatives

|  |
| --- |
| **Categorical** |

**Description**: This attribute records whether the use case description contains a separate section for the alternatives.

**Annotation criteria**: Select the *value* if …

|  |  |
| --- | --- |
| **Value** | **Rule** |
| **true** | The use case contains a section labeled “Extensions” or “Alternatives” |
| **false** | otherwise |

**Examples**:

### Numbering

|  |
| --- |
| **Categorical** |

**Description**: This attribute records whether the numbering system used in the extension section is consistent with the numbering system in the main scenario.

**Annotation criteria**: Select the *value* if …

|  |  |
| --- | --- |
| **Value** | **Rule** |
| **true** | The steps listed in the extension are indexed numerically and these IDs connect them with the appropriate steps in the main scenario. |
| **false** | otherwise |

**Examples**:

# Bibliography

|  |  |
| --- | --- |
| [1] | K. T. Phalp, J. Vincent and K. Cox, "Assessing the quality of use case descriptions," *Software Quality Journal,* pp. 69-97, 2007. |