Describing the capabilities and cases of uses for sequence diagrams in software engineering *

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Abstract

The article will describe the general principles of constructing sequence diagrams, and provide optimal cases of their use in the field of software engineering modeling.

The main structural elements of a sequence diagram will be described, the rules for their use with corresponding examples.

1 Introduction

In the well-known graphical description language for modeling in the field of software development, UML, there are several types of diagrams, each of which has its own advantages and disadvantages.

Among the popular types of diagrams are class diagrams, component diagrams, and activity diagrams.

The problem with all the above diagrams is that they cannot simulate the dynamics of the model, the behavior and the relationship between "actors" over time. They represent the structure, but not the behavior of the model on the timeline.

To solve this problem, a sequence diagram was created. It, unlike other types of diagrams, shows the interactions of "actors" on the timeline, the exchange of "messages" (data) between them. And, again, this is all shown in projection on the time axis. That is, it allows you to explore the model in dynamics.

When to use a sequence diagram is detailed in the Part 2. Details about sequence diagram notation are in a 3 Part. In a 4 Part there are tips about creating sequence diagram. And the 5 Part is a Conclusion of this article.

2 When to use a sequence diagram

A sequence diagram should be used primarily to visualize relationships between objects, taking into account the sequence of these very relationships [1].

This diagram is very useful for modeling synchronous services, it allows you to think through all the interactions between "actors" from the beginning to the end of the service life cycle on the timeline.

3   The notation

3.1   Frame

The first notation element to know is the frame. It is makes a graphical boundary of a sequence diagram and provide place for a diagram label (Frame 1).
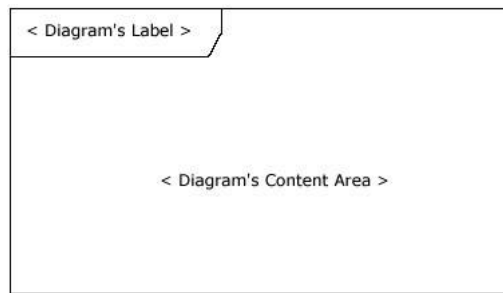

Figure 1: Frame template.

This element is not required in sequence diagrams, but it is better to use it for convenience. When using this element, it is necessary to place all subsequent elements, which will be described below, inside the frame.

3.2   Lifelines

Lifelines are designations of objects that make up the model, and between which information is exchanged. This is one of the key elements of a sequence diagram.

Figure 2: Lifeline template.

Lifelines are drawn as a box with a dashed line descending from the center of the bottom edge (Figure 2) [1].

3.3 Messages

3.3   Messages

Messages are illustrating calling a function from one object to another, data exchange between the objects. There are dispatch messages, that display calling
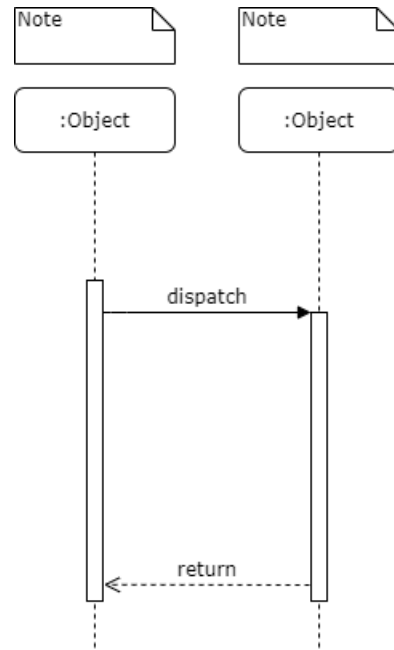

Figure 3: Messages template.

functions, and return message, that display end of execution [2].

White rectangle is an Execution Specification, it is used to visually display the start and end of an operation.

4   Building a Sequence Diagram

5   Conclusion

References

[1] Donald Bell. Explore the uml sequence diagram. `https://developer.ibm.com/articles/the-sequence-diagram/`.

[2] Object Managment Group. Unified modeling language, v2.5.1. `https://www.omg.org/spec/UML/2.5.1/PDF`.