

# The Research on Scenario-Based Requirements Definition

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Scenarios that describe concrete situations of software operation play an important role in software development, especially in requirements engineering. In scenario-based requirements definition, there are several problems as follows. (1) It is difficult to describe a scenario, which can be easily written and read, and can also be processed automatically. (2) It will require a great deal of labor to describe scenarios from different viewpoints. (3) Scenarios from different viewpoints may result in inconsistencies. (4) Scenarios may include some errors. If these problems can not be solved, mass man-hours will be taken for scenario description, furthermore scenarios with errors will lead to the failure of software development. In order to solve these problems, this paper describes a series of methods.

First, a scenario description language, for describing scenarios in which simple action traces are embellished to include typed frames based on a simple case grammar of actions and for describing the sequence among events, is proposed. This language is a controlled language, which is near to the nature language, so scenarios can be easily written and read. Furthermore, scenarios described in this language can be processed automatically by transforming them into internal representations. Problem (1) can be solved by the scenario description language.

Second, a transformation method between scenarios from different viewpoints is developed. A scenario from one viewpoint can be transformed into an internal representation, which is independent of any viewpoint firstly, and then be transformed into a scenario from another viewpoint. By using this method, the description time of scenarios from different viewpoints can be reduced. Problem (2) can be solved by the transformation method.

Next, an integration method of scenarios from different viewpoints is developed. By integrating scenarios, which describe the same system behavior from different viewpoints, the inconsistencies between these scenarios can be detected. The inconsistencies include (a) an event that occurs in both scenarios, having different time sequence between scenarios and (b) an event that is concerned with both viewpoints, occurring in only one of scenarios. Problem (3) can be solved by the integration method.

Finally, a verification method of the correctness of scenarios with rules is developed. This method uses rules, which describe the correct occurrence times of an event and/or the correct time sequence among events, to detect the errors in scenarios. The errors, also as the correctness verification items, of scenarios include (a) the lack of necessary events, (b) extra events, and (c) the wrong time sequence among events. Problem (4) can be solved by the verification method.

Based on the above methods, a scenario description environment named CASA (Computer Aided Scenario Analysis) has been developed. By using CASA, the usefulness of these methods is demonstrated by means of several experiments. These methods can improve the productivity and quality of scenarios, so scenarios can be used in requirements definition more effectively.