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# A study of effectiveness of test case generation from formal specification

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## 1 Introduction

Recently attention has gathered in the new development technique that is called ajail development. Test-Driven Development(TDD) is one of ajail development. The test case is first described in TDD before the program is implemented, and it implements as the test case passes. It thinks this test case to be a base of development, the test case not passed in a present mounting is described, and mounting is advanced repeating work of mounting to pass the test case. As for the advantage of the test drive development,

The programmer comes to be able to consider the specification of the program that will try to be written in the future at the stage where it finished writing the test case on the character of previously writing the test case clearly. Therefore , the best mounting can be done at the early stage of development. Moreover, if it is passed because it is thought that the test case is a specification, it can be considered that the specification is filled. However, the developer often makes the test case that becomes basic by the hand work in TDD. Therefore , the description of the test code that becomes 1.5-2 time or more the code for the test on the average becomes a large encumbrance for the developer. It is unwarrantable, and

a certain possibility is and there is a problem such as it is the filling of the test case of the specification to make the test case moreover according to a capability individual of the developer the test leakage is.

This reserch suggests develop method that do TDD based on test case generated from formal specification.

## 2 Approach

The OTS/CafeOBJ specification is a specification where the OTS model is described with CafeOBJ. OTS consists of following 3 components. O:a set of observations , I:a set of initial states , T:a set of conditional taransition rules. The states of the target system are expressed by the change of the observation values in OTS.

In this reserch , Test Case is generated from equation of axiom in OTS/ CafeOBJ specification . Left hand side of equation means after certain transition operation is executed , certain observation operation is executed. Right hand side of equation means result of behavior of that observation.

From equation testcase is generated that comparing expected value and actual value in which expected value is observation after transition and actual value is conclusion of behavior. moreover by divididing testcase from equation by specific term in right hand side of equation further testcases is generated.

## 3 Conclusion

This reserch suggest method for test case generation from formal specification, and doing TDD based on generated testcase. And, the program development was done by making the tool that supported the proposal method, and using it. In the description of the test case according to the pre-condition check that the tool had generated as a result, it was test case according to the specification generable. Moreover, it was confirmed to obtain implementing Java that satisfy the specification with doing the test drive development based on it. Because the term used to divide the test case is only `if_then_else_fi` now. The generation of a more effective test case can be expected by using other term to divide testcase.