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Aspect oriented model description enviroment for model checking

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1 Research Background

Recently, software is used by various field such as finance, public service, industry system, traffic system, automobile and consumer electronics.

Therefore, the error of software has a deep negative impact effect on society, thus , Model Checking Technology has attracted attention as a new choice of methodology to confirm correctness of software.

Model Checking is one of technology that can automatically verify whether a logical property satisfy on given finite state model. And Spin Model Checker is a one of model checking tool software.

To verify correctness of specification can according to the following step. First, we describe the model of verification target using promela. Next, we generate verification software, called PAN, from that model with SPIN. And finally, we can verify collectness by executing verification software.

2 Problems

In general, the verification model by promela is described on the basis of the verification purpose.Therefore, verification model changes according to

the change of verification purpose. And the verification model's change often appears in all over the model.

For instance, we think about example that verifying the model which use channel operation many times. If we want to verify the property, which is interested in post condition of the channel operation, we have to add assertion statement to channel operation.

In this case, It is necessary to modify in all over the model , because channel operation is used in this model many times.

3   Propose of this research

To solve this problem, we propose grammar and language processing system of the aspect extension for promela.

This grammar has the following features compared with the existing aspect oriented language, for example, AspectJ.

First, description ability for channel operation is improved , because channel operation is an important language element in promela.

Specifically, the channel name and massage is specified by regular expression, and all the channel operation can specify in this grammar.

Secondarily, it is difficult to specify the range with the meaning, because there is no language element of function in promela. So we extends idea of pointcut in an existing language.And we give two semantics "language element with range". As a result, the aspect can be operated to various ranges in promela model.

In this research, We proposed aspect oriented grammar, implements language processing system, the aspect was applied to the model, and the effectiveness of this research were confirmed.

4   Construction of this thesis

This paper consists 8 chapters as follows:

Chapter 2 describes aims and problems to solve in research.

Chapter 3 describes related technology in this research like spin/promela and aspect oriented technology.

Chapter 4 considers the requirement for the aspect oriented grammar proposes by this research, and how the requirement is actually achieved is described.

Chapter 5 describes the grammar of the defined aspect oriented grammar on the basis of the architecture described in Chapter 4.

Chapter 6 describes implementation of language processing system of aspect oriented grammar.

Chapter 7 shows the example of operating the aspect by using this language processing system for the promela model.

And, the summary of this research and future tasks are described in Chapter 8.