Mock Objects Framework for TDD in the Network Environment

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ABSTRACT

TDD is a software development approach which is based on test. TDD let us get improved code and refined design through lasting test with refactoring process. However, if network or database environment and other object were not developed, TDD could have a problem to make progress. If you will use the Mock Objects in this situation, TDD will be processed more effectively. To make Mock Objects needs a lot of cost and effort for network and database. Therefore this paper presents a Mock Objects frameworks for TDD which can save time and make safe Mock Objects.

Keywords : Software Testing, TDD, Agile Software Development, XP

1. Introduction

TDD(Test driven development) makes progressive development possible through the continuous tests[1]. ; It divides complex problems into small units and execution and tests repeat and proceeds gradually.

At TDD, The first make out a test that a program is passed and is next done. It is preceded like this.

In the case of developing as TDD, It can promote test coverage and reveal purpose of the coding better and has an advantage written automatically. It can gain a code of the good design as refining a design through refactoring processes continuously[2].

But in the case of making out a test concerning database, other objects or network, making out a test before composing a program has a difficulty, either. So we can apply unit test technology to use mock object to be more easily in this process. In the test technology using mock object the user makes the test compose temporarily as creating mock object to do the role of other object instead of other object, the network or the database

We can follow the principle of the test priority and focus on currently composing separately between the program codes and yet other externally incomplete factors by practicing it. Above of all, we can also compose the test by using mock objects concerning the program of network or database environment additionally. Mock object is to do the role of the database and

Of the network formed incompletely. But to compose complete mock object replacing the network or the database requires much time and effort. First you should imitate to implement

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complete network or database environment. Additionally we need the adequate request and the response of the client object or the server object to exist beyond the actual network because you have to imitate to implement it.

We consequently propose mock object framework being able to make stable mock object and take less time in the dissertation. Mock object framework offers fundamental form of mock object of network or database environment. You can save much time and be sparing of your effort through this work.

2. Mock Object

To compose the unit test is important process in extreme programming. But it isn't easy to make the independent test when you compose the complex codes partly. So when you make the test, it makes it complex and unstable. In the result, it is difficult to translate and maintain the test. The test of TDD is ideal when you only examine single feature every one times and understand the difficult problem at once. But it is difficult to do the test because you depend on external codes part (other related object or the environment like external network) in order to compose it in general testing. That is, the test is to be complex and unstable.

The technique that named mock object can solve this problem [3]; these can replace the domain codes as imitatively embodied codes from actual codes. The domain codes mean actual the application codes relatively. You can build the exactly independent tests from other external codes by using mock object in testing and make both the structure of test codes and domain codes better.

The technique of mock object is not only general object but also applied to make the objects taking the place of network or database environment. Mock object is to replace the role of these environments that yet wasn't built when the unit test is composed about the domain code that need network or database environment. You can easily develop TDD of the application of database or network environment using the technique of mock object through this method.

You can use appropriately in the situation like detailed lists

When the behavior of the actual object is not decided .

When it is difficult to set up actual objects being the characteristic status.

When the actual object include the difficult behavior to practice for the test.

When the actual object was slow.

When the actual object has the user interface or is the user interface.

When the object yet existed

When you review above situation, it is difficult to apply TDD and you can gain the usefulness using mock object simultaneously. The mentioned situation also happens in network or database environment. Mock object will be the applying technique usefully .When we propose mock object framework in the dissertation, it need not make mock object from beginning.

3. Mock Object Framework

To precede TDD of network and of database environment can use mock object

Above all, to make mock object, you imitate to implement the basic function of database or network itself regardless of actually the necessary content. You should also imitate to implement the operation of clients, processing and response of the server expected in the network. But if you compose the content without the clear standard, the work and management of making mock object will be difficult. That is, when you make mock object in network or database environment looking at carefully the dissertation, we propose the framework that is able to be fundamental form. You can compose mock object for TDD test of network environment and database environment using the proposed mock object framework. Complete mock object takes the place of network and database in the test. Consequently, you can lessen the making time of mock object and effort by utilizing the framework concerning mock object. The basic function of the network can be expressed in the framework and the contents concerning request and response can be expressed by dividing with mock object, then you can gradually distinguish and separately expressed the protocol of network, the schema of database.

3.1 structures

Mock object framework concerning network imitates to implement the socket object. It imitate to implement not only socket including connect, send, recv but also the function like makefile or buffer to get almost the same result when you do the test using the actual socket. It makes the complete execution possible that it has no difference between the case using mock object and the actual case. We imitate to implement between the framework concerning the database and the actual database object with the same structure. We implement separately to divide into protocol regions that the

server has to be done in the actual program. The user that is same as environmental part (like the connection and the transmission) and query, response can divide the desiring program

Fig.1. expresses mock object framework's and user mock object's relation. The framework offers mainly the form of the environmental part and basics to compose easily the part of the program. The framework module consists of the network and the class of the basics of mock object concerning database and each fundamental embodiment gives body to the fundamental factor of the socket and connected database object. It includes additionally the setting method concerning the network being able to set temporarily and database environment, the method getting the medium value of the method about ongoing execution. Actually it has the setting method concerning mock object mode variables for the case that doesn't use mock object.

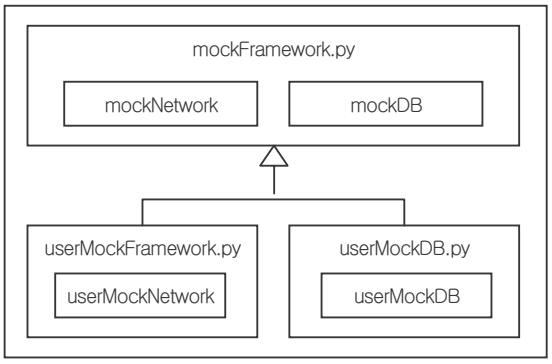

Fig. 1. Mock object framework and user mock object

The protocol or the schema of database embodies in user mock object and offers the original form for it in the framework. Fig.2 presents the role of mock object framework in network environment.

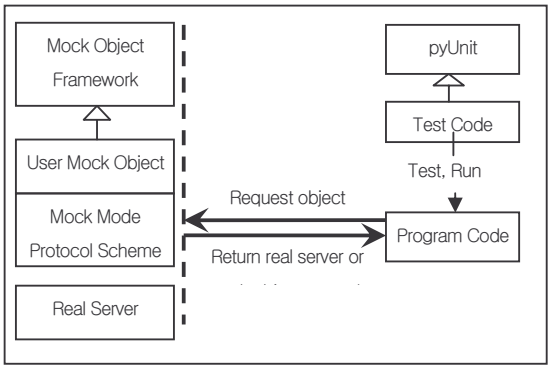

Fig. 2. A Role of Mock Object Framework in Network

Fig.2 present the user that name framework use mock object makes mock object necessarily and process of executing the test for using mock object. The detailed contents present each meaning of the object about Fig.2

3.1.1 pyUnit

The framework library of unit test helps composing the test codes. The test codes are composed from the framework.

3.1.2 Test Code

When the program compares the predicted results executing the program codes with the actual results as the code of testing the program, this program outputs the test results. The test of TDD carries out with such the execution of the program. This test is called the automated test and is faster exactly than checks and executes firsthand

3.1.3 Program Code

Program code is called the domain code and result program actually gotten. The target program needs the connected network in order to execute and test with the network program. To test it needs the adequate response of the server for the case of the client and the request of the client for the case of the server. We use mock object taking the place of actual network environment in order to execute test code rapidly and the time that doesn't consist of network environment of the early development.

3.1.4 Mock Object Framework

Mock object framework offers the basic form of mock object taking the place of network or database environment. So when you make mock object, it can lessen time and effort and it is more credible possibly.

3.1.5 User Mock Object

User mock object is mock object that the user makes from the framework. The user use by composing here protocol in the test. The protocol consists of the set to deliver the value after the processing and the value on request. The protocol set can gradually increase and be possible in the gradual distinction of the protocol or schema through the development. And user mock object offers the mock mode by using the actual server without the correction of test code or the program code after even consisting of network environment and completing the other object through the ongoing development

The creation of user mock object is done through the method not the production and is to choose the object to return by checking the mock mode at that time.

3.1.6 Real Server

User program requests database object or use network object in user mock object. Mock object framework offers that actual server or network object in order to use the program without the correction of the program codes. Fig.3 shows that the role of mock object framework of database environment.

The real server approaches to make the connected object concerning database actually in database environment. The connected object receives the result and delivers the query to database according to the request of the program. Real server delivers the defined value to program in mock object when it uses mock object by the form of the request without connecting in database. The compositio n of the preferential program and the test is possible without building the actual database according to the intention to use database. Database with the setting form of query and response is imitated to embody in mock object. This database becomes the details of the promise between the program and database when it builds and defines the database actually

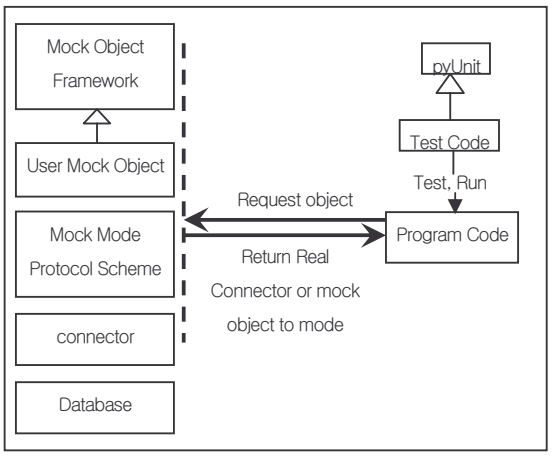

Fig. 3. A Role of Mock Object Framework in Database

3.2. Implementation

Proposing the framework in this dissertation, we made it through the process developing the server or client to TDD in the game projects. When we consider both the case for using the actually embodied server and the case for using mock object, we embodied to get the all result equally concerning the test. We used the computer language of the development such as the Python and the framework of the test such as the pyUnit.

4. The practice use of Mock Object s Framework

4.1 The practice use of network

In network environment, Mock Object embodies actual socket compositionally. The Framework makes client program test in the statue that network isn't linked or the server program isn't yet accomplished.

Also after object or the network environment is all constructed, in the case of the server program it is difficult to set up in the statue of the option and in the case of needing a test when the special situation happens it is still difficult to test because we can't fabricate freely or change. Though it is possible, its practice time is delayed.

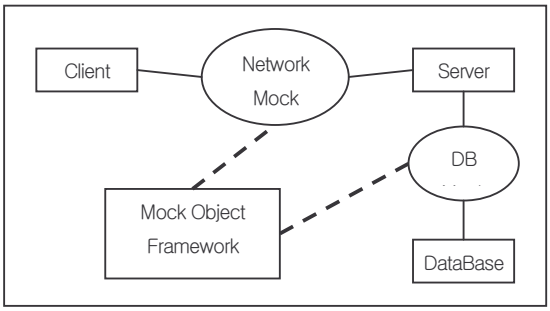

Fig. 4. Service of Mock Objects Framework

In the case of TDD, the delay of the test perform makes the whole TDD development delay because it performs a test continuously in the program development process. So Mock Object that can set up the statue of the server optionally can still be taken advantage effectively the back development. Whenever the test of the actual environment is needed, Mock object is substituted for actual network environment.

4.2. The Practice Use of the database

To database environment, mock object framework embodies the database connection object imitation. Mock object makes a test of the code connecting database possible when database isn't yet designed or implement.

At this time, the user guesses database at mock object as the appropriate responding set about requesting than the database structure.

Through this, we can delay the actual database structure design and design better design. Also at the actual database we can cut down expenses to drive away a test database to a test.

5. Conclusion and Study Problem Afterward

TDD can get the optimized design by determining it through the gradual test and programming process in the design process and also includes the automated test and can obtain the code with fewer errors than the general programming technique.

But before the related object or the construction of the necessary environment, it is difficult to compose the test. To facilitate it, the test technique with the use of mock object can be applied to it. To make mock object, you take the separate time and effort and making mock object

Concerning network or database needs much time and effort. We proposed the method being able to lessen the period and save the cost in making mock object by introducing the framework of mock object through the process in this dissertation.

The project afterward needed to be seen the result of the test applying the framework of mock object offered from this dissertation of the various project. We will also need the work that bridges a gap and correct and review the result. We should research more part that guarantees in corresponding the result of the test using the database environment or the actual network and mock object made with mock object framework. Compared with the research concerning the automated production of mock object or the framework of mock object concerning the general object with the background of the framework, we will also research concerning more progressive framework.

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