Use Cases and Test Cases Relation in Testing Process

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Abstract

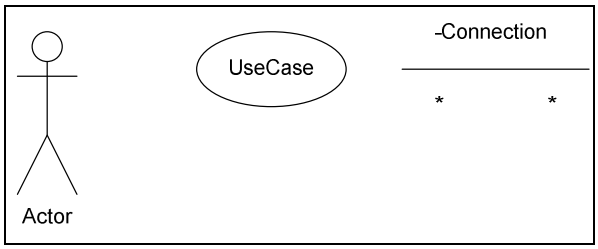
Use cases make my life easier in doing the test cases. Use cases are nit usually shown is the time used to operate each individual step in the main scenario and extension. I will retrieve it from the non-functional requirement section. I get more information by observation the business operation and/or discussion with System Analyst. In this article I will explain use cases, test cases, how I develop and validate my test cases. Finally I summarize the relation between use cases and test cases.

This is the document containing concept of work from my experience. I would like to share to all of you the way I think and the way I apply to my job.

Contents

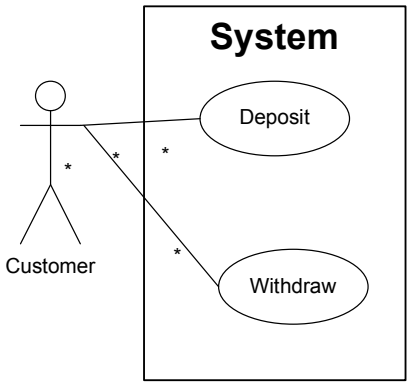
Use Cases

A use case is a set of scenarios that describing an interaction between a user and a system. A use case diagram displays the relationship among actors and use cases. The two main components of a use case diagram are use cases and actors.



An actor is represents a user or another system that will interact with the system you are modeling. A use case is an external view of the system that represents some action the user might perform in order to complete a task.

Use Cases Diagram is used in almost every project. They are helpful in exposing requirements and planning the project. During the initial stage of a project most use cases should be defined, but as the project continues more might become visible.



The detail of each use case will show in the narrative. The following pattern is one of the most useful narratives one.

Use Cases ID	UCD001
Name	Deposit Money
Objective	To deposit money to the Deposit Machine
Entry Conditions	Customer selects Deposit button
Success End Condition	Customer gets deposit slip.
Fail End Condition	Customer selects "Cancel" button.
Actors	Customer, Cash Machine
Main Scenario	1. Customer press 'Deposit' button. 2. System prompts account number. 3. Customer enters 10 digits of account number and press 'Confirm' button. 4. System validates the account number. 5. System opens the drawer. 6. System pops up message "Please put the money in the

	drawer." 7. Customer put the money in the drawer. 8. System closes the drawer. 9. System counts the money in the drawer. 10. System displays the deposit amount on screen. 11. System requests the customer to make confirmation by popping up the message "Please press 'Confirm' button to continue." 12. Customer presses 'Confirm' button. 13. System issues the deposit slip. 14. System acknowledges the message 'Transaction is completed.' 15. Customer gets the slip.
Extension	4a System cannot find the account number. Then go back to step 2 with the message 'Invalid Account Number, Please try again.' 12a Customer presses 'Cancel' button. The drawer is opened and request customer to pick up the cash.

What use cases narrative tells you?

The narrative in the use case will help us to describe the functional requirements in detail. What steps the actor will perform and what are the system activities. Tester will study the scenario and derive it into the test cases. On use case may lead to one test case or more than one. The Traceability Metric will be updated to ensure that all functions are handling by tester.

This is how I use narrative to help create Test Cases.

Use Cases ID	Use as reference.
Name	Use as reference.
Objective	To identify the main purpose of the Test Cases. I have to make sure that the Test Case object is relevant to the objective of use case.
Entry Conditions	What is the pre-required Test Cases if need? What are the activities or action or the equipment that I have to prepare for test in function?
Success End Condition	This information tells me about the conditions that actor performs completely and has to be tested.
Fail End Condition	In case the actor terminate the request what the can do. It will help me identify the case that I have to write.
Actors	The role play that I have to create in my test case.
Main Scenario	The working steps for each role in detail. I will use this information to detail my test case and validate all the success and fail condition that already defined.
Extension	The activities that will be happened in case the step in the main scenario is not operated as planned.

As a tester you need to study all the use cases and come up with one or more test cases. The next topic I will explain you about my test case in detail.

What are Test Cases?

First, I would like to start with the definition of Test Case.
IEEE Standard 610 (1990) defines *test case* as follows:
"(1) A set of test inputs, execution conditions, and expected results developed for a particular objective, such as to exercise a particular program path or to verify compliance with a specific requirement.
"(2) (IEEE Std 829-1983) Documentation specifying inputs, predicted results, and a set of execution conditions for a test item."

Test case is the document that tells the working steps in checking the completeness and correction of the deliverables. The main objectives of the test cases are the following.

1. Plan to do the working steps as describe in the use cases references.
2. Check the deliverables to ensure that they pass the acceptance criteria.
3. Verify that only deliverables identify in the scope are developed.
4. Ensure that all steps are conformed to the use cases.

I have the Test Case Template that I have to fill in the information needed before and after execution. The template is divided into three sections.

1. The first section contains the test objective, test environment, test type, conditions required.
2. The second section contains the testing steps.
3. The last section will be used to record the test results.

This is the standard template of my test case.

						Test Cases Template 1.0	
Project Code				Created By:		Verified By:	
Test ID				Use Cases Reference			
Test Type		☐Unit Test		☐Integration		☐System	
Test Environment							
Quality Covered							
Pre-Conditions							
Post-Conditions							
Notes							
Testing Steps							
No.	Description	Test Data	Expected Results	Actual Results	Severity	Test Status	Remarks
				Test Date:			
				Total Test Time:			
				Test By:			

From the template above, I will fill in section number 1 and 2 first. Section number 3 will have data during the test execution. The next section will demonstrate you how I generate the test case.

Test Cases development

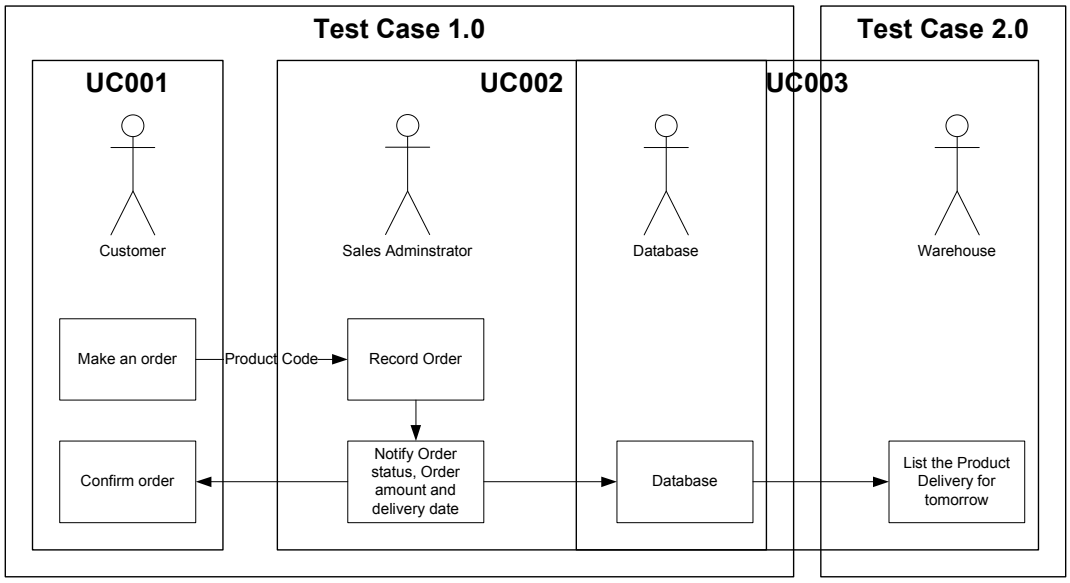
How to make test cases correctly and completely is the most challenge step for me. I have to well prepare. In order to ensure that I have all information needed I have to do the following steps.

1. Review the project plan in the Quality Requirement section and Acceptance criteria to find out the quality of the deliverables.
2. Check the schedule tasks and working period in the test plan.
3. Study the Requirement Specification, the functional and non-functional parts. Both are required for making the testing steps.

These skills are required for the tester.

1. Business concept of the customer. If tester realize that why these steps are very important to the customer's business he/she will put them in the test cases.
2. Understand the operation concept. The operation steps are normally defined in the use cases. When I read the use cases I will get the steps the actor interact with the system. Sometimes it required more detail about performance and quality required in each steps. If I know more in working environment I can put in my test cases. Sequence diagram can help to demonstrate them. I always involve in the requirement collection phase. Observation is the better part for me.
3. Risk identification, possibility and impact to both business and operation. This skill is not built easily. Risks may be identified in the project plan. All of them must be monitored. Risks effected in the business and operation is looked like these.
    a. If actor did not perform these steps what will be happened. What is the impact and likelihood of them?
    b. If the system produces the incorrect amount what is the business impacts?
    c. If the system distributes the output to the wrong actor how to ensure that it won't happen?
    d. What will be happened when the system has virus affected?
4. Problem solving. I think it is the important one. I will record all activities that I use in the remark to continue my testing steps. I believe that it will help the maintenance and support team to perform work around in case the errors occurred.

Eventually I will develop the test case. I put all use cases together and get how many actors that I have to be. It should be the same as the high level of use cases. It will look like I simulate the operation routines. This is the sample workflow that I use to make the testing steps.



I create two test cases that cover three use cases. The use cases narrative may be combine together in the test cases steps. The risk that I have identified has been recorded and ready for execution. I can see the pre-condition and post-condition. I know the interface required between each actor and what step they need. This flow will also help me in validation of my test cases against the use cases.

Test Cases Validation

I have to ensure that I cover all functions and quality required then validation process cannot be skipped. In the test case template has the quality cover that I have to fill in and it derived from the quality requirements in the project plan and in Requirement Specification.

I have list of use cases in the Requirement Traceability Metric. I update my test case in it. I will know how many use cases that I have covered and how many that I missed.

The next step is the detail verification. I perform these steps.

1. Make notes of the operation that I have to perform in the specific role.
2. Check the operation steps in the test cases steps.
3. All of them have to get mark.
4. Review the test cases steps that I did not mark to ensure that they conformed to the risk and quality required.

After I finished this step I am ready for the execution process.

Relation Summary

The relation between use case and test case will be shown here. The objective of use case is to identify the actor and working scenario. The objective of test case is to plan for the execution to ensure the quality, risks and acceptance criteria are met with the project and product requirements and satisfy the customer.

I use the detail in the use case to generate the testing steps. The table below is the relation of both.

Use Cases	Test Cases
ID	Use as references
Objective	Clarify the objective and make sure that the objective is met by running the testing steps
Entry Conditions	If they are specified in the use case they must be verified that they are related to the system. They are required to perform before execute this test case.
Success End criteria	It is the output, message or evidence that tells me that this use case execution is successfully ended.
Fail End Criteria	This is the step that the actor terminates the working process. The deliverables will not be generated. The system will not perform any steps further after the actor did this step. Sometimes audit trial is required so the system has to record them. So in the test case will set up the step to verify it.
Actors	They are the role that I set the test case for. They will take actions identify in the testing steps and record the actual results. They have to record the name, testing date, time used in the test case.
Main Scenario	These are the steps that I copy some parts to the testing steps. They are mostly related to system activities. The system must act as defined in this section. In case the system fails to perform these actions they will be recorded in the actual result. The pass/fail criteria are put in the test case. I normally noted working detail in the remark.
Extension	The description that the system behaves after it cannot succeed the specify operation such as the system cannot find the account code, the connection is loss, the input is not correct and etc. The system must follow the steps described in detail here. In the test case the testing steps should have them.