

# Project Quality Assurance using Traceability Matrix

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**Abstract**— Requirement Traceability Matrix (RTM) keeps track of all user requirements and maps it with test case ids. This document contains the various steps that are used to create a traceability matrix. In this paper we include template of RTM which contains requirements and its associated test case that is required in any of web based project and also benefits of using this matrix which will assure the quality of the project. We are focusing on RTM which manages, maintains and check the test cases against the specified requirements, it also defines the expectation of the testing team. Software always contains a bug that needs to be fixed, but traceability helps to minimize failures and helps to deliver the right software. Ensures the team are not just building the product right, but also building the right product.

**Index Terms**— Creating of RTM and Test cases, Requirement Traceability Matrix, Correctness, Quality check.

## 1 INTRODUCTION

This paper contains importance of requirement traceability matrix (RTM) which is most essential and required to check against the System requirement Specification (SRS) by the client or development team. RTM is an automated tool for managing and maintaining the Test Cases. Requirement Traceability Matrix or RTM consists of all requirements proposed by the client or development team and traces all the functionality of the project and test whether it has met the requirements using forward traceability matrix, backward traceability matrix and bidirectional traceability matrix. In other words, it is a document that maps and traces user requirement with test cases. Requirements, Test case, Execution of Test cases are all interlinked, and each case can be traced to each other to check whether all the tests are covered. The main purpose of Requirement Traceability Matrix is to see that all test cases are covered so that no functionality should miss while testing and Any changes that happens after the system has been built we can trace the impact of the change on the Application through RTM Matrix. In every phase of system development life cycle we find test cases and for each test cases RTM ensures the test coverage. It ensures and provides the system with error free

### Types of Traceability Test Matrix

**Forward traceability:** This matrix is used to check whether the project progresses in the desired direction and for the right product. It makes sure that each requirement is applied to the product and that each requirement is tested thoroughly. It maps requirements to test cases.

**Backward or reverse traceability:** It is used to ensure whether the current product remains on the right track. The purpose behind this type of traceability is to verify that we are not expanding the scope of the project by adding code, design elements, test or other work that is not specified in the requirements. It maps test cases to requirements.

**Bi-directional traceability ( Forward+Backward):** This traceability matrices ensures that all requirements are covered by test cases. It analyzes the impact of a change in requirements affected by the defect in a work product and vice versa.

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and provides a quality system.

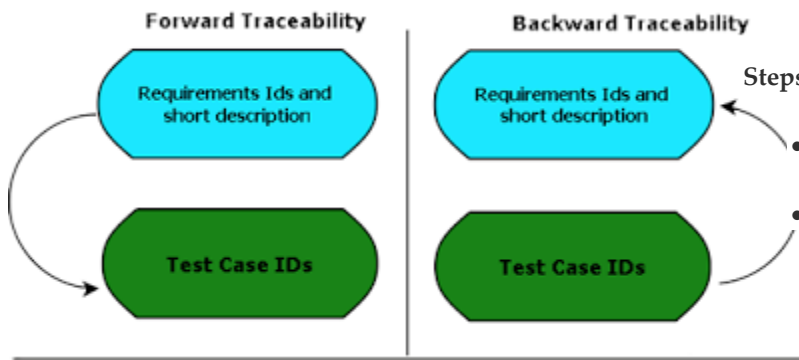


Figure: 1

### Creating the Test cases

A Test Case is a set of actions executed to verify a particular feature or functionality of your software application. Test Scenario consists of test cases where all the possible functionality is been checked.

Below is format of a standard login Test case.

Test Case ID	Test Scenario	Test Steps	Test Data	Expected Results	Actual Results	Pass/Fail
TU01	Check Customer Login with valid Data	Go to site <a href="http://demo.com">http://demo.com</a> Enter UserId Enter Password Click Submit	Userid = Pass-word =	User should Login into application	As Expected	Pass
TU02	Check Customer Login with invalid Data	Go to site <a href="http://demo.com">http://demo.com</a> Enter UserId Enter Password Click Submit	Userid = Pass-word =	User should not Login into application	As Expected	Pass

Table: 1

### Steps to create Traceability Matrix:

- Make use of excel to create Traceability Matrix:
- Define following columns:
  - Base Specification/Requirement ID (If any)
  - Requirement ID
  - Requirement description
  - TC 001
  - TC 002
  - TC 003... So on.
- Identify all the testable requirements in granular level from requirement document. Typical requirements are as follows:
  - Used cases (all the flows are captured)
  - Error Messages
  - Functional rules
  - SRS
- Identity all the test scenarios and test flows.
- Map Requirement IDs to the test cases. Assume (as per below table), Test case "TC 001" is your one flow/scenario. Now in this scenario, Requirements SR-1.1 and SR-1.2 are covered. So mark "x" for these requirements.
- Now from below table you can conclude –
  - Requirement SR-1.1 is covered in TC 001
  - Requirement SR-1.2 is covered in TC 001
  - Requirement SR-1.5 is covered in TC 001, TC 003 [Now it is easy to identify, which test cas-

es need to be updated if there is any change request].

- TC 001 Covers SR-1.1, SR, 1.2 [we can easily identify that test cases covers which requirements].
- TC 002 covers SR-1.3... So on...

### Benefits of Requirement Traceability Matrix:

RTM confirms maximum test coverage. It is easy to make out the missing requirements and confirms the quality project and make sure that all requirements included in the test cases. It helps in analyzing and estimating the test cases against the SRS because in RTM table it is easy to identify the missing functionality and make obvious to the client that the software is being developed as per the requirements and If there is a change request for a requirement, then we can easily find out which test cases need to update for the next release. It also makes sure that developers are not creating features that no one has requested.

Requirement ID	Requirement description	TC 001	TC 002	TC 003
SR-1.1	User should be able to do this	X		
SR-1.2	User should be able to do that	X		
SR-1.3	On clicking this, following message should appear		X	
SR-1.4			X	
SR-1.5		X		X
SR-1.6				X
SR-1.7			X	

Table: 2

### Drawbacks for not using Requirement Traceability Matrix:

Poor or unknown test coverage, more defects found in production. It will lead to miss some bugs in earlier test cycles which may arise in later test cycles. Difficult project planning and tracking of requirements, misunderstandings between development and tester team on SRS.

### Conclusion:

The use of RTM is most essential for the quality project because it confirms the error free software and in less time the test cases can be estimated and tracked avoiding the confusion before the next release. If any change required by the client, then easily it can be updated. Since the RTM checks the test scenario and test cases against the SRS of the client so it ensures whatever is build is the right project.

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