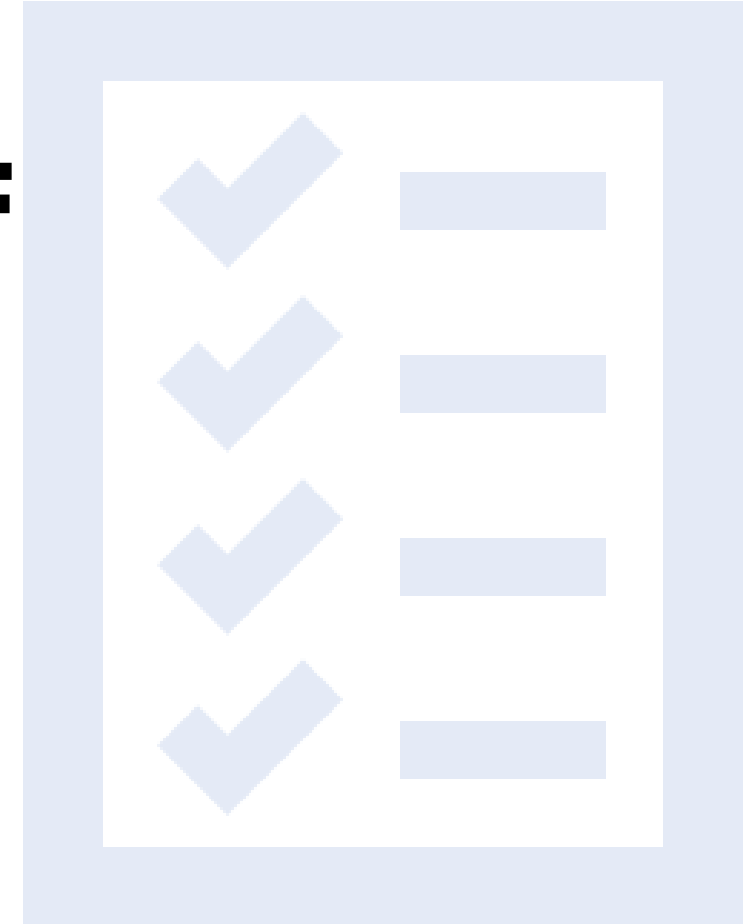# Anatomies of Test Plans & Test Cases

Medi Servat

INFO6255 – Quality Management

Northeastern University

2020

What is a Test Plan?

- A **Test Plan** describes the testing scope and the approach. **Test Plan is a dynamic document**.

- Defines the objectives of the testing clearly.

- It **summarizes** the testing scope and specifies all aspects of the testing including the testing **roadmap**.

- It sets the **conditions for testing** by defining the testing activities and the testing dependencies.

- It identifies **the tools, the resources, the timelines, the risks and the entrance/exit criteria** for testing.

- The **Test Plan is a testing contract** that will have to be reviewed and **approved** by all of the project stake holders.

What is a Test Plan?...

- The **Test Plan** goes through many iterations before completion.

- The Test Plan **starts early** in the project and gets completed before the testing starts.

- There are many different **test plan formats**. The **Test Plan** outline should be flexible and should fit the project.

- The **test plan reviews** allow more fact findings and yields great results.

- The **test plan** should be **clear, concise** and to the point.

- The **test plan** is one of the important **testing artifacts**.
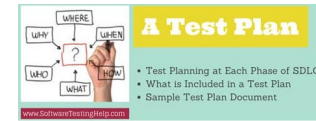
Test Plan Sections

☐Test Plan/ Test Strategy is a document that outlines the

    ☐ Scope of testing

    ☐ Testing Objectives

    ☐ Testing Schedules

    ☐ Roles and Responsibilities

    ☐ Testing Phases

    ☐ Features to be Tested (in scope)

    ☐ Features not to be tested (out of scope)

    ☐ QA Entrance Criteria

    ☐ QA Exist Criteria

    ☐ Dependencies

    ☐ Test Environments

    ☐ Risks & Assumptions

    ☐ Defect Severities/Processes
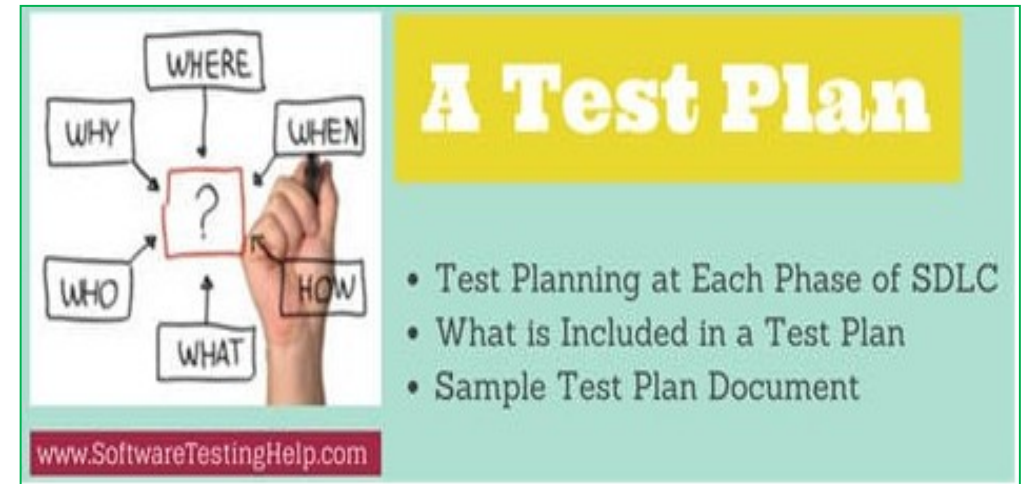
Developed by the QA or the Lead QA, reviewed by all members on the project team.
Approved by the managers.

Test Plan Sections

Document Version Control

- The **Test Plan** document should have **version numbers, Author, and dates** associated with the last updates to the document

Appendices

- References to Test Case documentations must exist in the **appendices**
- Include any **user roles list**, and **technical details information** in the **Appendices** as well

Test Plan Sections…

Scope of Testing:

- This will be a **high level description** of what will be covered in the testing. It also includes the functions that will be tested and the areas that will not be tested.

Testing Objectives:

- This will include the **goals and the objectives** of the testing. It helps the QA manager and the testers to focus on the areas that are needed for testing.

Testing Schedules:

- This section confirms the **testing schedules** for all of the subset of testing. E.g **Functional, Integrations, End to End, Performance, and UAT** timelines.

Test Plan Sections...

Roles and Responsibilities:

- It is important to specify who is responsible for which aspect of testing and the support associated with the testing.

Testing Phases:

- **Re-iterate** the testing phases and the timelines associated with the entire testing life cycle.
- **Show** the sequence of testing and the dependency with other projects.
- **State the requirements** for Performance and load testing and the required SLAs.

In Scope/Out of Scope:

- **Specify** the features that will be part of testing and the features that will not be in the scope of testing. Explain the reasoning why for both.

Test Plan Sections

QA Entrance/Exit Criteria:

- Each phase of testing should have an **entrance and exit criteria** to ensure that the objectives are met before the start or ending each phase of the testing.
- A complete **Code Freeze prior to start of Functional Testing** (Entrance Criteria)
- **No Open major defects** open upon completion of the End to End testing (Exit Criteria)

Dependencies:

- State any testing **dependencies to any external systems**, or any other **test equipment**, or resources in other groups creating input/output data for the testing.

Risks and Assumptions:

- Enter **any risks that could jeopardize the time lines** or any assumptions that is taken into considerations during the testing.
- It includes any assumptions about the testing or the **development resources**, testing tools and/or the downstream test environments availability.

Test Plan Sections…

Test Environment:

- **State any hardware requirements** or any peripheral test equipment needed in the test environment.
- State any requirements for the **test configuration** or any particular test data needed for testing.
- State the **Release Management process** during testing and how each release should get deployed in QA for testing.

Defect Tracking Guidelines:

- **Re-iterate the Defect Tracking processes** and the Defect Severities.
- **Responsibilities of the Development, Test Lead and QA** in regards to the defect management.

What are Test Scenarios & Test Cases

- A Test Scenario is **a high level description** of the Test Case(s).
  - It covers a wide range of possibilities.
  - It is a high level description of the test area.
- A **Test Case** is a **detailed description** of a test condition.
  - There are <u>One to One</u> or <u>One to Many relationships between a</u> Test Scenario and Test Cases.
- **Example:**
  - **Test Scenario:**
    - Test Scenario 1: **Check the Login Functionality of Google.Com.**
  - **Test Cases:**
    - Test Case 1: ***Check for Valid user id and password (Positive Test Case).***
    - Test Case 2: ***Check for invalid user id and password (Negative Test Case).***
    - Test Case 3: ***Check for Null values for User id and Password (Negative Test Case).***

Test Scenarios vs. Test Cases

- One Test Scenario maps to <u>One or Many</u> Test Cases covering the entire test scenario:
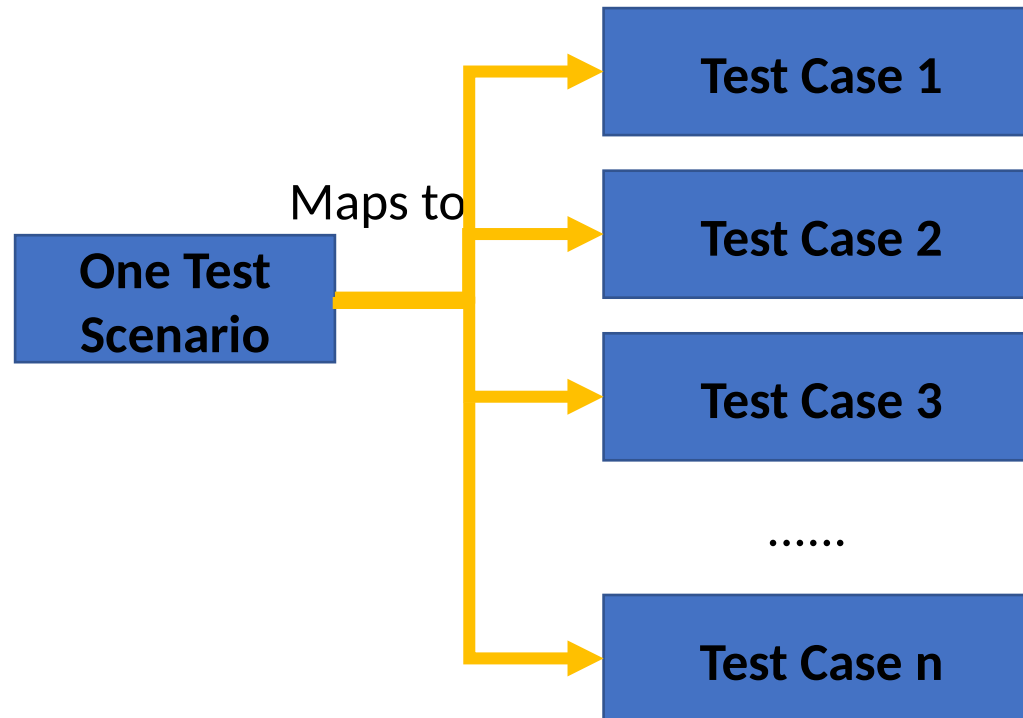
Anatomy of a Test Case

- A **Test Case** contains the following:
    - **Test Case Description:** A clear test description in one sentence.
    - **Pre-Conditions:** Any assumptions or pre-requisites needed for this test case.
    - **Test Steps:** 1 to 7 Test Steps
    - **Expected Results:** What the tester should experience or see during the execution of the steps:
        - **If all test steps yield the correct Expected Results**, **The Test Case Passes**
        - **If not all of the test steps yield the correct Expected Results**, two conditions exist:
            - **The Test Case Fails** with a Medium/High/Major defect
            - **The Test Case Passes** with a minor defect(s)
        - The **Actual Result** is what the tester observes, and compares with the **Expected Results**

Anatomy of a Test Case...

- The **Test Cases** should be written in such away that <u>other testers can execute</u> without any questions.

- The Test Case **description** should be very clear.
    - Example: ***A Registered User should be able to successfully login to the site using valid user id & pw.***

- The test steps need to be clear and be '**Action Driven'** using '**Action Words'**, like '**Click on', 'Navigate', 'Enter', 'Verify' and, etc**.

- The **Expected Results** should clearly describe what the tester should **expect** during the step execution.

A Test Case Example

- **Description:** *A registered user should be able to successfully login to the gmail.com web site.*

- **Precondition:** *the user must already be registered with an email address and password.*

- **Assumption:** *a supported browser is being used.*

- **Test Steps:**
  - *Step 1: Navigate to gmail.com*
  - *Step 2: In the 'email' field, enter the email address of the registered user.*
  - *Step 3: Click the 'Next' button.*
  - *Step 4: Enter the password of the registered user*
  - *Step 5: Click 'Sign In'*

- **Expected Result:** *A page displaying the users 'inbox email should load, showing any new messages.*

A Sample Test Case

	A	B	C	D	E	F	G	H	I	J	K
1	Test Case ID		BU_001	Test Case Description		Test the Login Functionality in Banking					
2	Created By		Mark	Reviewed By		Bill		Version		2.1	
3											
4	QA Tester's Log			Review comments from Bill incorporated in version 2.1							
5											
6	Tester's Name		Mark	Date Tested		1-Jan-2025		Test Case (Pass/Fail/Not		Pass	
7											
8	S #		Prerequisites:			S #	Test Data				
9	1		Access to Chrome Browser			1	Userid = mg12345				
10	2					2	Pass = df12@434c				
11	3					3					
12	4					4					
13											
14	Test Scenario	Verify on entering valid userid and password, the customer can login									
15											
16	Step #		Step Details		Expected Results		Actual Results		Pass / Fail / Not executed / Suspended		
17											
18	1		Navigate to http://demo.guru99.com		Site should open		As Expected		Pass		
19	2		Enter Userid & Password		Credential can be entered		As Expected		Pass		
20	3		Click Submit		Cutomer is logged in		As Expected		Pass		
21	4										
22											

Testing, Test Results and the Testing Artifacts

- During testing **screen shots** may be captured and recorded.
- During testing the database may have to get **restored multiple times**.
- **Test Stubs** may have to be written to be able to execute more test cases.
- **Multiple rounds of regression** testing may have to be performed.
- **Automation test scripts** should be written to speed up the testing.
- All test cases have to be in the **Test Management System** before execution.
- **Test Reports** should show the clear execution status. Passed, Failed, Executed.

Test Scenarios & Test Cases Where to start?

The Loan Application Example

INFO6255 2020

Steps to Writing Test Cases?

1. Read the Business Requirements (BRD)
2. Read and analyze the Functional Requirements (FRD)
3. Write the Test Plan/Test Strategy document
4. Create the Test Condition Matrix and come up with the test permutations
5. Perform the Equivalence Class Partitioning to reduce the test permutations
6. Create the test scenarios and link them to the Functional Requirements
7. Create the test cases with the test steps/expected results and actual results
8. Create the Traceability Matrix

Example of BRD/FSD/Test Condition Matrix

- The Loan Application
  - **The Business:** Delivered the Business Requirements.
  - **The BSA**: Completed the Functional Requirements (Requirements or the Use Cases)
  - **QA:** Created the Master Test Plan/Test Strategy document.
  - **QA:** Created the Test Condition Matrix.
  - **QA:** Created the Test Scenarios and the Test Cases.
  - **QA and the BSA:** Created the Traceability Matrix.

The Loan Application

- Picture an application called 'The Loan Application'.
- The Loan Application allows the users to go onto their web site and perform Loan activities:
    - **As a 'New User'**, apply for a loan:
        - Create a New User ID and sign in (Register).
        - Go in as a 'Guest'.

    - **As an 'Existing User',** log in to the Web Site to View the status of their loan:
        - Sent for Review (The loan is Processing)
        - Reviewed and Approved (The loan has been Approved)
        - Reviewed and Deleted (The loan has been Rejected)

The Loan Application

- **Apply For a Loan as a New User - The 'New User' Workflow**

New User accesses the bank's URL → **User clicks on the 'Apply Loan' button** → **User enters his/her Personal information** →

User Registers → **User Selects a Password** →

User continues as a 'Guest' → **User Does Not get a Password Selection prompt** →

New User Successfully applies for a loan
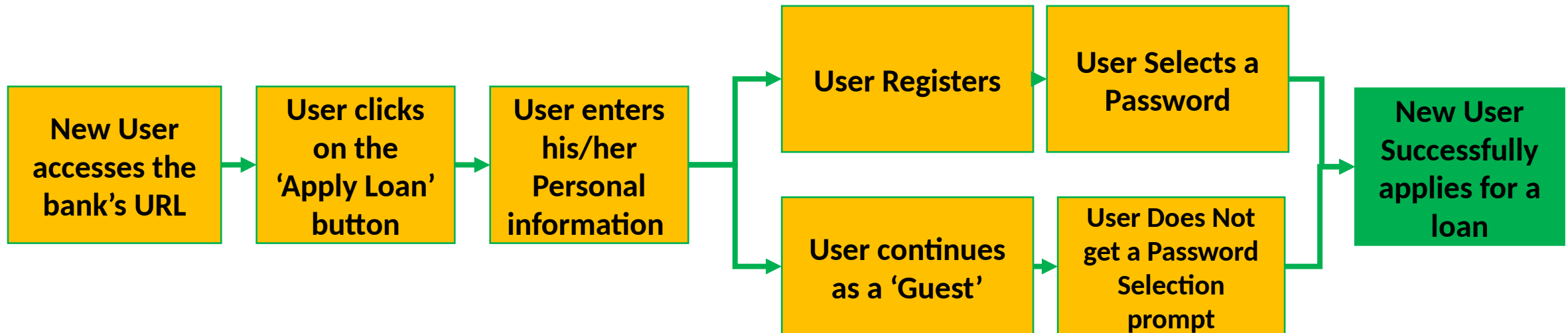
The Loan Application

- **Apply For a Loan as an Existing User - The 'Existing User' Workflow**

```
┌─────────────┐     ┌─────────────┐     ┌─────────────┐          ┌─────────────┐
│ An Existing │     │ User Logs in│     │ The User    │     ┌───▶│ "Sent for   │──┐
│ User accesses│───▶│ with his/her│───▶│ should see  │─────┤    │ Review"     │  │
│ the bank's  │     │ User Id     │     │ his/her loan│     │    └─────────────┘  │
│ URL         │     │             │     │ Status      │─┐   │                     │
└─────────────┘     └─────────────┘     └─────────────┘ │   │    ┌─────────────┐  │    ┌─────────────┐
                                                         │  ├───▶│ "Reviewed and│──┼───▶│ The user logs│
                                                         │  │    │ Approved"   │  │    │ off         │
                                                         └─◀┤    └─────────────┘  │    └─────────────┘
                                                            │                     │
                                                            │    ┌─────────────┐  │
                                                            └───▶│ "Reviewed and│──┘
                                                                 │ Deleted"    │
                                                                 └─────────────┘
```
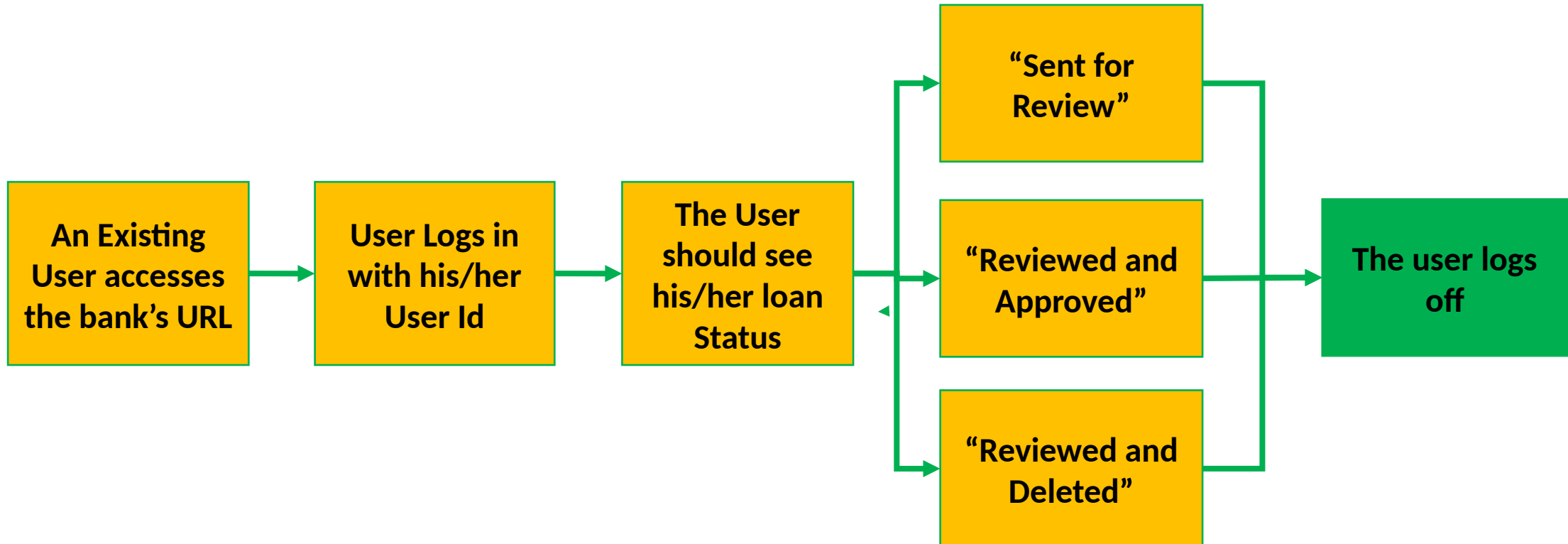
The Loan Application

- **The Banker: Approves, Rejects and Requests Changes…**

```
                    ┌──────────────────┐
                    │   Grant/Approve  │
                    │     the Loan     │
                    └──────────────────┘
┌──────────────┐    ┌──────────────────┐    ┌──────────────┐
│ The Banker is│───▶│  Reject the Loan │───▶│  The Banker  │
│ notified of any│  │                  │    │   logs off   │
│   changes    │    └──────────────────┘    └──────────────┘
└──────────────┘    ┌──────────────────┐
                    │     Request      │
                    │  Changes to the  │
                    │       Loan       │
                    └──────────────────┘
```
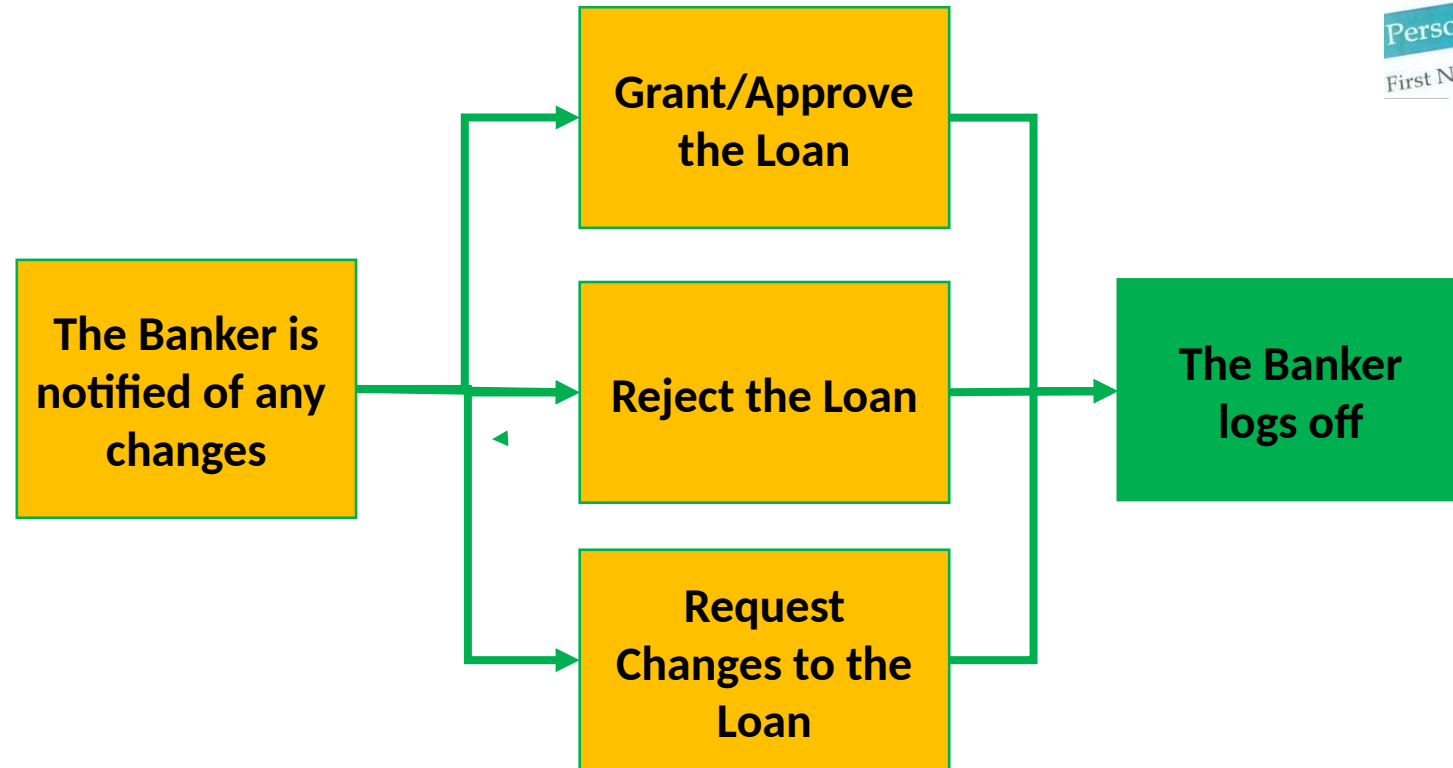
Path to Creating Test Cases

The steps below show the path of creating test cases:

Business Requirements → Functional Requirements → Test Condition Matrix → Test Scenarios → Test Cases With Test Steps → Traceability Matrix

One BR to One or Many FRs Relationship

One TS to One or Many TCs Relationship
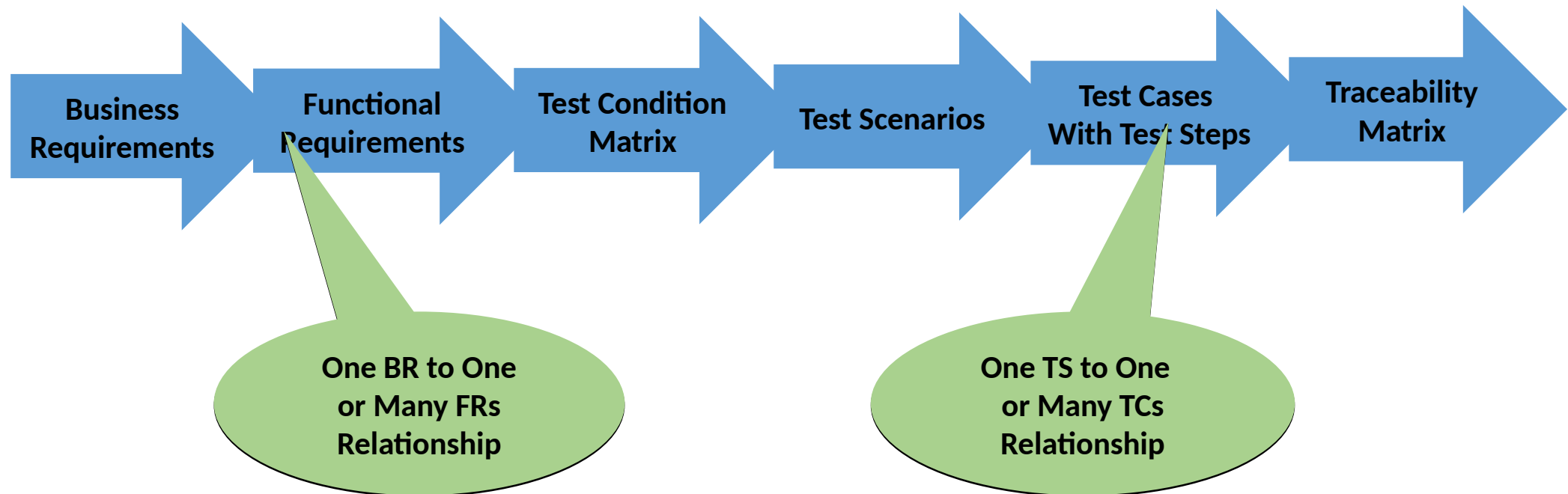
Sample Business Requirement Document (BRD):

This is a site that aims at computerizing the loan system for XYZ bank. The following are the business targets that are to be achieved via this:

1. Loan process

BRD_1	The loan system must cater to both the **existing** and **new** users. For **new** users it should provide a way to apply for loan. The **existing** users should be able to access the loan information. The banker should be notified of the changes or new loan requests and can grant, reject, suggest changes to the request made

2. Ease of use

BRD_2	All the information should be easy to access. If the banker needs to make administrative changes, they should be able to do through the web interface.

3. Integration with the bank users list

BRD_3	The loan customers and the other bank customers list has to be merged but the identification of the loan customers should be unique.

Sample Functional Specification Document: (FSD)

1 Loan Process

1.1 New users

Req. #

Req. #	
Req_New_User_1	The new users can access the bank URL and when they click on the "Apply Loan" button they are going to be displayed a page to enter their information.
Req_New_user_2	A new user needs to provide first name, last name, address, DOB, SSN and email address mandatorily.
Req_New_User_3	A new user can **register** or continue as a **guest** before entering the loan specific information.
Req_New_User_4	If the user chooses to continue as guest, there will not be a prompt for password selection.
Req_New_User_5	If the user chooses to register the user will be asked to choose a password.

1.2 Existing users

Req_Existing _user_1	The existing users can be the ones who have applied for a loan and are waiting on confirmation or the ones that already have the loan granted.
Req_Existing _user_2	The users who are waiting will be displayed the information on in which stage the loan is at.
Req_Existing _user_3	The loan as soon as being applied is in the stage of "Sent for review".
Req_Existing _user_4	Once it is reviewed it moves to "Reviewed and approved" or "Reviewed and deleted" based on the banker's decision.

2. Ease of use

2.1 All the information should be accessible in less than 3 clicks for a user.

Test Condition Matrix

1. Apply Loan button for a New User

	First Name	Last Name	Address	DOB	email Address	Go in as Guest	Register	Password Selection	Expected Results	Comment
Guest	Yes	Yes	Yes	Yes	Yes	Yes	NA	NA	Success as a guest	Positive TC
	No	Yes	Yes	Yes	Yes	No	NA	NA	Unable to Go in as a guest	Negative TC
	Yes	No	Yes	yes	Yes	No	NA	NA	Unable to Go in as a guest	Negative TC
	Yes	Yes	No	yes	yes	No	NA	NA	Unable to Go in as a guest	Negative TC
	Yes	Yes	Yes	No	yes	No	NA	NA	Unable to Go in as a guest	Negative TC
	Yes	Yes	Yes	Yes	No	NA	NA	NA	Unable to Go in as a guest	Negative TC
Register	Yes	Yes	Yes	Yes	Yes	NA	Yes	Yes	Successful Register	Positive TC
	No	Yes	Yes	Yes	Yes	NA	Yes	No	Unable to register	Negative TC
	Yes	No	Yes	yes	Yes	NA	Yes	No	Unable to register	Negative TC
	Yes	Yes	No	yes	yes	NA	Yes	No	Unable to register	Negative TC
	Yes	Yes	Yes	No	yes	NA	Yes	No	Unable to register	Negative TC
	Yes	Yes	Yes	Yes	No	NA	Yes	No	Unable to register	Negative TC

2. Access Loan Information button for an Existing Users

	Stage									
	A User is in a 'Sent for Review' status								Verify Success	Positive TC
	A user is in a 'Reviewed and approved' status								Verify Success	Positive TC
	A User is in a 'Reviewed and Deleted' status								Verify Success	Positive TC

2.1 Ease of Use - 3 clicks

	Users									
	A Visitor user processes in 3 clicks								Verify Success	Positive TC
	A Registered user processes in 3 clicks								Verify Success	Positive TC
	A Banker user processes in 3 clicks								Verify Success	Positive TC

Test Scenarios

Test Scenarios from BRD and FSD:

Test scenario ID	Test Objective/Test scenarios	Column1	Column2	Test Case
TS_Loan_1	Validate the "Apply Loan" feature as a new user			
TS_Loan_2	Validate the "Access Loan Information" feature as a already existing user			
TS_Loan_3	**Verify that a New User can apply for a loan as a 'Guest' when the user fills out all of the required fields**			TS_Loan_3.1; TS_Loan_3.2
TS_Loan_4	**For a new user in the "Apply loan", check the Register option and apply loan**			TS_loan_4.1
TS_Loan_005	Login to the loan portal as an already a customer with a loan and check the information displayed			
TS_Loan_006	Check the Loan whose status is "Sent for review"			
TS_Loan_007	Check the Loan whose status is "Reviewed and approved"			TS_Loan_7.1
TS_Loan_008	Check the Loan whose status is "Reviewed and deleted"			
TS_Loan_009	Check for a visitor if the information on the site is accessible in less than 3 clicks or not			
TS_Loan_010	Check for a reigstered user if the information on the site is accessible in less than 3 clicks or not			
TS_Loan_011	Check for a banker if the information on the site is accessible in less than 3 clicks or not			

Test Cases

Test #	Test Case	Step #	Test Step	Expected Results	Actual Results	Status
TS_Loan_3.1	Verify that a New User can apply for a loan as a 'Guest' when the user fills out all of the required fields			The user can continue to the loan process screen. There should be no prompts for password.	The user successfully continued to the loan process screen with no prompts for password	Pass
		1	Go into the Loan Application as a new user.			Pass
		2	Click on the Apply Loan button	The Register and Guest button appear	Guest Button appears	Pass
		3	Click on the Guest User	The Guest User form appears	The Guest User form appeared	Pass
		4	Fill out the following fields, First Name, Last Name, Address, DOB, eMail, and go in as a Guest user	The user Loan Screen appears	The Loan Screen appeared	Pass
			Submit a New Loan for this Guest User	The loan successfully goes through	The loan submission was successful	Pass

Test Cases

Test #	Test Case	Step #	Test Step	Expected Results	Actual Results	Status
TS_Loan_3.2	Verify that the Apply Loan button for a Guest user does not work if the user is missing any information			The user cannot continue to the loan process screen. There should be a proper error message displayed	Success	Pass
		1	Go into the Loan Application as a new user	The "Apply Loan" button should be present		Pass
		2	Click on the Apply Loan button	The "Apply Apply" allows the user to enter a user id		Pass
		3	Click on the Guest User			Pass
		4	Enter the correct information for the following fields, **First Name = blank,** Last Name, DOB, eMail, and go in as a Guest user. Exc	It should now allow to go in as a guest since the First Name is not entered		Pass

References

- https://www.lambdatest.com/blog/17-lessons-i-learned-for-writing-effective-test-cases/
- https://www.guru99.com/what-everybody-ought-to-know-about-test-planing.html