

Chapter 6

Testing

Introduction

Testing is the process carried out on software to detect the differences between its behavior and the desired behavior as stipulated by the requirements specifications. Testing is advantageous in several ways. Firstly, the defects found help in the process of making the software reliable. Secondly, even if the defects found are not corrected, testing gives an idea as to how reliable the software is. Thirdly, over time, the record of defects found reveals the most common kinds of defects, which can be used for developing appropriate preventive measures such as training, proper design and reviewing.

6.1 Testing Plan

The testing technique that is going to be used in the project is black box testing. In black box testing the expected inputs to the system are applied and only the outputs are checked.

The testing sub-process includes the following activities in a phase dependent manner:

- a) Create Test Plans.
- b) Create Test Specifications.
- c) Review Test Plans and Test Specifications.
- d) Conduct tests according to the Test Specifications, and log the defects.
- e) Fix defects, if any.
- f) When defects are fixed continue from activity.

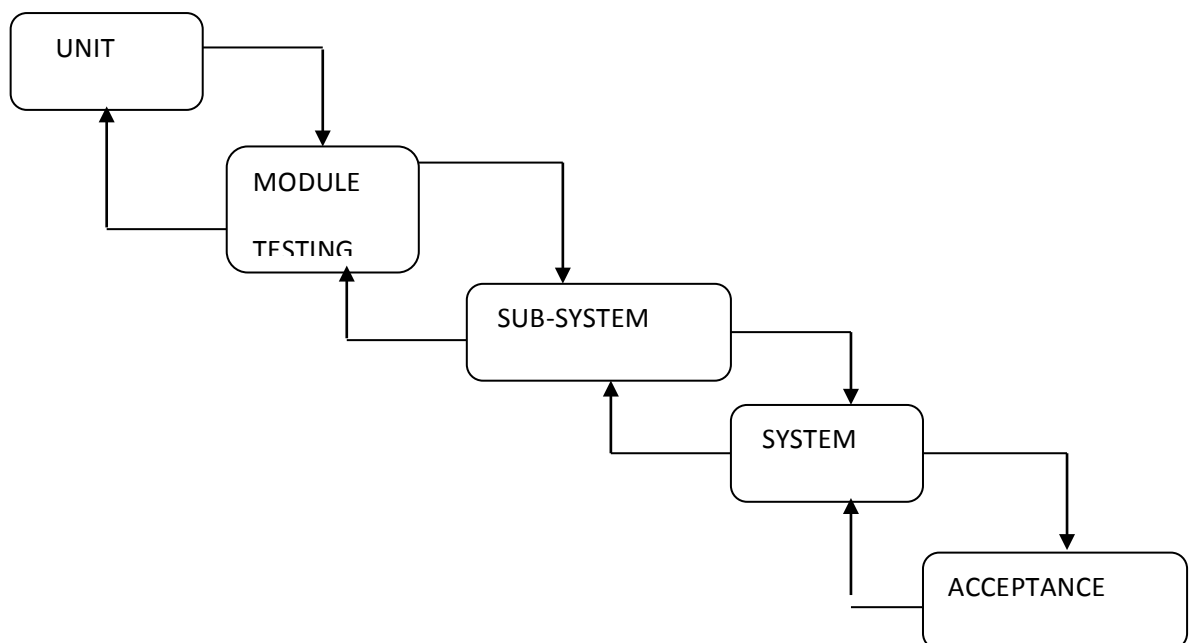


Figure 6.1 Testing Plan

6.2 Testing Strategy

The development process repeats this testing sub-process a number of times for the following phases.

- a) Unit Testing.
- b) Integration Testing

Unit Testing tests a unit of code (module or program) after coding of that unit is completed. Integration Testing tests whether the various programs that make up a system, interface with each other as desired, fit together and whether the interfaces between the programs are correct. System Testing ensures that the system meets its stated design specifications. Acceptance Testing is testing by the users to ascertain whether the system developed is a correct implementation of the Software Requirements Specification.

Testing is carried out in such a hierarchical manner to ensure that each component is correct and the assembly/combination of components is correct. Merely testing a whole system at the end would most likely throw up errors in components that would be very costly to trace and fix.

We have performed both Unit Testing and System Testing to detect and fix errors. A brief description of both is given below.

6.2.1 Unit Testing

Objective

The objective of Unit Testing is to test a unit of code (program or set of programs) using the Unit Test Specifications, after coding is completed. Since the testing will depend on the completeness and correctness of test specifications, it is important to subject these to quality and verification reviews.

Input: Unit Test Specifications

Testing Process

- Checking for availability of Code Walk-thru reports which have documented the existence of and conformance to coding standards.
- Review of Unit Test Specifications

Verify the Unit Test Specifications conform to the program specifications. Verify that all boundary and null data conditions are included.

6.3 TESTING METHODS

Black-box and White-box Testing

In black-box testing a software item is viewed as a black box, without knowledge of its internal structure or behavior. Possible input conditions, based on the specifications (and possible sequences of input conditions), are presented as test cases.

In white-box testing knowledge of internal structure and logic is exploited. Test cases are presented such that possible paths of control flow through the software item are traced. Hence more defects than black-box testing are likely to be found.

The disadvantages are that exhaustive path testing is infeasible and the logic might not conform to specification. Instrumentation techniques can be used to determine the structural system coverage in white box testing.

For this purpose tools or compilers that can insert test probes into the programs can be used.

Code Coverage

The way to make sure that you have got all the control flow covered is to cover all the paths in the program during the testing (via white-box testing). This implies that both branches are exercised for an 'if' statement, all branches are exercised for a case statement, the loop is taken once or multiple times as well as ignored for a while statement, and all components of complicated logical expressions are exercised. This is called Path Testing.

Branch Testing reports whether entire Boolean expression tested in control structures evaluated to both true and false.

Additionally it includes coverage of switch statement cases, exception handlers and interrupts handlers. Path testing includes branch testing as it considers all possible combination of individual branch conditions.

A simpler version is Statement Testing which determines if each statement in the program has been executed at least once. The coverage via Path Testing includes the coverage via Statement Testing. Since Path Testing is extremely comprehensive it is costly, hence a viable minimum should be measuring Statement Testing coverage.

Performance Testing

Performance testing is design to test the runtime performance of the system within the context of the system. This test is performed at module level as well as at system level. Individual modules developed by Developers are tested for required performance.

6.4 Test Cases

A test case has a component that describes an input, action or event and an expected response, to determine if a feature of an application is working correctly.

6.4.1 Save User Profile

Table 6.1: Save User Profile Test Case

No.	Steps	Input	Expected Results	Status
1	Tap on menu button	None	Menu shown	Pass
2	Tap on Profile tab	None	User profile screen shown	Pass
3	Tap on Save	None	Error: "Empty Fields"	Pass
4	Tap on Save	Empty DOB	Error: "Select DOB"	Pass
5	Tap on Save	Empty Name	Error: "Enter Name"	Pass
6	Tap on Save	Empty Height	Error: "Enter Height"	Pass
7	Tap on Save	Empty Weight	Error: "Enter Weight"	Pass
8	Tap on Save	Invalid Height	Error: "Enter Proper Height"	Pass
9	Tap on Save	Invalid Weight	Error: "Enter Proper Weight"	Pass
10	Tap on Save	Proper Details	Data Saved Successfully	Pass
11	Tap on Cancel	Proper Details	Error: "Enter Details to Proceed"	Pass

6.4.2 Edit User Profile

Table 6.2: Edit User Profile Test Case

No.	Steps	Input	Expected Results	Status
1	Tap on menu button	None	Menu shown	Pass
2	Tap on Profile tab	None	User profile screen shown	Pass
3	Tap on Save	None	Error: "Empty Fields"	Pass
4	Tap on Save	Empty DOB	Error: "Select DOB"	Pass

5	Tap on Save	Empty Name	Error: “Enter Name”	Pass
6	Tap on Save	Empty Height	Error: “Enter Height”	Pass
7	Tap on Save	Empty Weight	Error: “Enter Weight”	Pass
8	Tap on Save	Invalid Height	Error: “Enter Proper Height”	Pass
9	Tap on Save	Invalid Weight	Error: “Enter Proper Weight”	Pass
10	Tap on Save	Proper Details	Data Saved Successfully	Pass
11	Tap on Cancel	Proper Details	Changes Discarded	Pass

6.4.3 Connect BLE Peripheral

Table 6.3: Connect BLE Peripheral Test Case

No.	Steps	Input	Expected Results	Status
1	Tap on menu button	None	Menu shown	Pass
2	Tap on Connection Manager tab	None	Connection Manager screen shown	Pass
3	Tap on Scan button.	None	Scanning Started Device Found	Pass Pass
4	Tap On Device Name	None	Device Connected	Pass

6.4.4 Disconnect BLE Peripheral

Table 6.4: Disconnect BLE Peripheral Test Case

No.	Steps	Input	Expected Results	Status
1	Tap on menu button	None	Menu shown	Pass
2	Tap on Connection Manager tab	None	Connection Manager screen shown	Pass

3	Tap On Connected Device Name	None	Confirmation Asked	Pass
4	Tap On Yes	None	Device Disconnected	Pass

6.4.5 Save Workout Goal

Table 6.5: Save Workout Goal Test Case

No.	Steps	Input	Expected Results	Status
1	Tap on menu button	None	Menu shown	Pass
2	Tap on Workout Goal tab	None	Workout Goal screen shown	Pass
3	Tap on Set	None	Error: "Empty Fields"	Pass
4	Tap on Set	Invalid Duration	Error: "Enter Proper Duration"	Pass
5	Tap on Set	Invalid Distance	Error: "Enter Proper Distance"	Pass
6	Tap on Set	Invalid Calories	Error: "Enter Proper Calories"	Pass
7	Tap on Set	Proper Details	Goal Saved Successfully	Pass

6.4.6 Enable Workout Goal

Table 6.6: Enable Workout Goal Test Case

No.	Steps	Input	Expected Results	Status
1	Tap on menu button	None	Menu shown	Pass
2	Tap on Workout Goal tab	None	Workout Goal screen shown	Pass
3	Tap on Enable WO Goal	None	Error: "Select Goal Type"	Pass

4	Select Goal Type	Goal Value	Goal Selected	Pass
5	Tap on Enable WO Goal	None	Workout goal enabled	Pass

6.4.7 Disable Workout Goal

Table 6.7: Disable Workout Goal Test Case

No.	Steps	Input	Expected Results	Status
1	Tap on menu button	None	Menu shown	Pass
2	Tap on Workout Goal tab	None	Workout Goal screen shown	Pass
3	Tap on Disable WO Goal	None	Workout goal disabled	Pass

6.4.8 Play Music

Table 6.8: Play Music Test Case

No.	Steps	Input	Expected Results	Status
1	Tap on Music Button	None	Music Panel Appears	Pass
2	Tap on Play button	None	Error: "Empty Playlist"	Pass
3	Tap on Add button	None.	Music Picker Displayed	Pass
4	Tap on Tracks	Tracks to be added	Tracks selected	Pass
5	Tap on Done	None	Tracks added to playlist	Pass
6	Tap on Play button	None	Music Played	Pass
7	Tap on Pause button	None	Music Paused	Pass
8	Tap on Next button	None	Next track played	Pass

9	Tap on Previous button	None	Previous track played	Pass
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6.4.9 Delete Today's Workout Report

Table 6.9: Delete Today's Workout Report Test Case

No.	Steps	Input	Expected Results	Status
1	Tap on View Report in Dashboard	None	Today's workout list displayed	Pass
2	Tap on workout report	None.	Workout details displayed	Pass
3	Tap on Delete button	None	Workout details deleted	Pass

6.4.10 Delete Random Workout Report

Table 6.10: Delete Random Workout Report Test Case

No.	Steps	Input	Expected Results	Status
1	Tap on menu button	None	Menu shown	Pass
2	Tap on Workout reports tab	None	All Workouts displayed	Pass
3	Tap on workout report	None	Workout details displayed	Pass
4	Tap on Delete button	None	Workout details deleted	Pass

6.4.11 Share Workout Report

Table 6.11: Share Workout Report Test Case

No.	Steps	Input	Expected Results	Status
1	Tap on menu button	None	Menu shown	Pass
2	Tap on Workout reports tab	None	All Workouts displayed	Pass
3	Tap on workout report	None	Workout details displayed	Pass
4	Tap on Share button	None	Share menu appears	Pass
5	Tap on Facebook button	None	Facebook Dialog appears	Pass
6	Tap on Post button	None	Status updated on Facebook	Pass

6.4.12 Share Workout Statistics

Table 6.12: Share Workout Statistics Test Case

No.	Steps	Input	Expected Results	Status
1	Tap on menu button	None	Menu shown	Pass
2	Tap on Statistics tab	None	All Workout Statistics displayed	Pass
3	Tap on Share button	None	Share menu appears	Pass
4	Tap on Twitter button	None	Twitter Dialog appears	Pass
5	Tap on Tweet button	None	Tweet sent	Pass

6.4.13 Plot HR

Table 6.13: Plot HR Test Case

No.	Steps	Input	Expected Results	Status
1	Tap on menu button	None	Menu shown	Pass
2	Tap on Heart Rate Monitor tab	None	Heart Rate Monitor displayed	Pass
3	Tap on From	From Date	Date picker appears	Pass
4	Tap on To	To Date	Date picker appears	Pass
5	Tap on Done	None	Plot Appears	Pass
6	Zoom in Plot	None	Units Changed	Pass

6.4.14 Add New Reminder

Table 6.14: Add New Reminder Test Case

No.	Steps	Input	Expected Results	Status
1	Tap on menu button	None	Menu shown	Pass
2	Tap on Workout Goals tab	None	Workout Goals screen shown	Pass
3	Tap on Workout Reminders tab	None	Workout Reminders screen shown	Pass
4	Tap on Add button	None	New Reminder screen appears	Pass
5	Tap on Save	Empty Title	Error: "Enter Title"	Pass
6	Tap on Save	Empty Alert	Error: "Select Alert"	Pass
7	Tap on Save	Empty Repeat	Error: "Select Repeat"	Pass
8	Tap on Save	Proper data	Reminder Saved Successfully	Pass

6.4.15 Edit Reminder

Table 6.15: Edit Reminder Test Case

No.	Steps	Input	Expected Results	Status
1	Tap on menu button	None	Menu shown	Pass
2	Tap on Workout Goals tab	None	Workout Goals screen shown	Pass
3	Tap on Workout Reminders tab	None	Workout Reminders screen shown	Pass
4	Tap on Reminder & edit button	None	Edit Reminder screen appears	Pass
5	Change Time	Start Time	Start Time changed	Pass
6	Tap on Save	Proper data	Reminder Updated Successfully	Pass

6.4.16 Delete Reminder

Table 6.16: Delete Reminder Test Case

No.	Steps	Input	Expected Results	Status
1	Tap on menu button	None	Menu shown	Pass
2	Tap on Workout Goals tab	None	Workout Goals screen shown	Pass
3	Tap on Workout Reminders tab	None	Workout Reminders screen shown	Pass
4	Tap on Reminder	None	Reminder Selected	Pass
5	Tap on Delete button	None	Conformation asked	Pass
6	Tap on Yes	None	Reminder Deleted Successfully	Pass