**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:

1. Create Test Plans.
2. Create Test Specifications.
3. Review Test Plans and Test Specifications.
4. Conduct tests according to the Test Specifications, and log the defects.
5. Fix defects, if any.
6. When defects are fixed continue from activity.

UNIT

TESTINGG

MODULE

TESTING

SUB-SYSTEM

TESTING

SYSTEM

TESTING

TESTINGG

ACCEPTANCE

TESTING

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.

1. Unit Testing.
2. 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.

## **7.3 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.

**6.3 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.

**6.3.1 Add 2D object**

Table : add 2D object.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Steps** | **Input** | **Expected Results** | **Status** |
| 1 | Pressing Configure Button from the Home Page. | None | Camera View appears showing 2 buttons 2D and 3D. | **Pass** |
| 2 | Click on 2D button. | None. | Start Button Shown. | **Pass** |
| 3 | Click on start button. | None. | Camera View appears for capturing image.  After capturing save alert view displayed. | **Pass**  **Pass** |
| 4 | Click on save button. | Object name | Add object details view shown. | **Pass** |
| 5 | Click on audio button. | None | Action view shown for choosing audio. | **Pass** |
| 6 | Click on Library button. | None. | Audio Library displayed. | **Pass** |
| 7 | Click done button. | Choose audio file. | Add object details view shown. | **Pass** |
| 8 | Click on video button. | None. | Action view showing for choosing video. | **Pass** |
| 9 | Click on record button. | None. | Camera View shown for recording video. | **Pass** |
| 10 | Click on Record icon. | None. | Video recording started. | **Pass** |
| 11 | Click on done button. | Recorded video. | Use video option shown. | **Pass** |
| 12 | Click on Use button. | None. | Add object details view shown. | **Pass** |
| 13 | Click on save button. | URL ,  Desc,Audio,  Video | Back to Home Page. | **Pass** |

**6.3.2 Add 3D object**

Table : add 3D object.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Steps** | **Input** | **Expected Results** | **Status** |
| 1 | Pressing Configure Button from the Home Page. | None | Camera View appears showing 2 buttons 2D and 3D. | **Pass** |
| 2 | Click on 3D button. | None. | Start Button Shown. | **Pass** |
| 3 | Click on start button. | None. | Camera View appears for capturing 3dmap.  After capturing save alert view displayed. | **Pass**  **Pass** |
| 4 | Click on save button. | Object name | Add object details view shown. | **Pass** |
| 5 | Click on audio button. | None | Action view shown for choosing audio. | **Pass** |
| 6 | Click on Library button. | None. | Audio Library displayed. | **Pass** |
| 7 | Click done button. | Choose audio file. | Add object details view shown. | **Pass** |
| 8 | Click on video button. | None. | Action view showing for choosing video. | **Pass** |
| 9 | Click on record button. | None. | Camera View shown for recording video. | **Pass** |
| 10 | Click on Record icon. | None. | Video recording started. | **Pass** |
| 11 | Click on done button. | Recorded video. | Use video option shown. | **Pass** |
| 12 | Click on Use button. | None. | Add object details view shown. | **Pass** |
| 13 | Click on save button. | URL ,  Desc , Audio,  Video | Back to Home Page. | **Pass** |

**6.3.3 Detect 2D object**

Table : detect 2D object.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Steps** | **Input** | **Expected Results** | **Status** |
| 1 | Pressing 2D detection Button from the Home Page. | None | Camera View appears . | **Pass** |
| 2 | Track object which user wants. | None. | Information shown for object which tracked. | **Pass** |
| 3 | Click on audio button. | None. | Audio controls displayed. | **Pass** |
| 4 | Click on close button of audio view. | None. | Audio controls disappeared. And information view displayed. | **Pass** |
| 5 | Click on video button. | None | Video view shown and video controls displayed. | **Pass** |
| 6 | Click on Done button | None | Video view closed and information view displayed. | **Pass** |
| 7 | Click on close button | None | information view closed and camera view appear. | **Pass** |
| 8 | Click on close button | None | Camera view closed and back to home page. | **Pass** |

**6.3.4 Detect 3D object**

Table : detect 3D object.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Steps** | **Input** | **Expected Results** | **Status** |
| 1 | Pressing 3D detection Button from the Home Page. | None | Camera View appears . | **Pass** |
| 2 | Track object which user wants. | None. | Information shown for object which tracked. | **Pass** |
| 3 | Click on audio button. | None. | Audio controls displayed. | **Pass** |
| 4 | Click on close button of audio view. | None. | Audio controls disappeared. And information view displayed. | **Pass** |
| 5 | Click on video button. | None | Video view shown and video controls displayed. | **Pass** |
| 6 | Click on Done button | None | Video view closed and information view displayed. | **Pass** |
| 7 | Click on close button | None | information view closed and camera view appear. | **Pass** |
| 8 | Click on close button | None | Camera view closed and back to home page. | **Pass** |

**6.3.5 Edit 2D object**

Table : edit 2D object.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Steps** | **Input** | **Expected Results** | **Status** |
| 1 | Pressing More tab from the Home Page. | None | More view displayed. | **Pass** |
| 2 | Click on edit object button. | None. | Table view shown of object which is already added. | **Pass** |
| 3 | Click on any object from 2d section . | Choose object. | Edit object details view displayed. | **Pass** |
| 4 | Click on audio button. | None. | If audio is already added then action view shown of change or remove audio. | **Pass** |
| 5 | Click on change audio button. | None | Action view shown for choose audio. | **Pass** |
| 6 | Click on Record button. | None | Record view shown for recording audio. | **Pass** |
| 7 | Click on record icon button | None | Audio recording started. | **Pass** |
| 8 | Click on stop button | None | Audio recording stopped. | **Pass** |
| 9 | Click on record icon button | None | Audio recording started. | **Pass** |
| 10 | Click on stop button | None | Audio recording stopped. | **Pass** |
| 11 | Click on save button | None | Audio record view closed and audio file saved and edit detail view shown. | **Pass** |
| 12 | Click on video button | None | If video already added then action view shown of remove or change video. | **Pass** |
| 13 | Click on remove Video button | None | Video removed and edit detail view shown. | **Pass** |
| 14 | Click on save button | None. | Object Information saved and back to table view. | **Pass** |
| 15 | Click on back icon button | None | Back to More view . | **Pass** |

**6.3.6 Delete object Test case.**

Table : Delete object Test case.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Steps** | **Input** | **Expected Results** | **Status** |
| 1 | Pressing More tab from the Home Page. | None | More view displayed. | **Pass** |
| 2 | Click on edit object button. | None. | Table view shown of object which is already added. | **Pass** |
| 3 | Swipe on any object from section which user wants to delete. | None. | Object deleted and table view shown after deleting that object.. | **Pass** |
| 4 | Click on back button. | None. | Back to more view. | **Pass** |

**6.3.7 Object detection after settings saved.**

Table : Object detection after settings saved.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Steps** | **Input** | **Expected Results** | **Status** |
| 1 | Pressing More tab from the Home Page. | None | More view displayed. | **Pass** |
| 2 | Click on settings button. | None. | Settings view shown. | **Pass** |
| 3 | Click on video switch and set that off if it is on. | None. | Video switch off. | **Pass** |
| 4 | Click on audio switch and set that on if it is off. | None. | Audio switch on. | **Pass** |
| 5 | Click on save button. | None | Application settings saved and more view shown. | **Pass** |
| 6 | Click on scan tab. | None | Home page shown. | **Pass** |
| 7 | Pressing 2D detection Button from the Home Page. | None | Camera View appears . | **Pass** |
| 8 | Track object which user wants. | None. | Information shown for object which tracked based on settings.  Video button not displayed. | **Pass** |
| 9 | Click on close button | None | information view closed and camera view appear. | **Pass** |
| 10 | Click on close button | None | Camera view closed and back to home page. | **Pass** |

**6.3.8 FAQ Test Case .**

Table : FAQ Test Case.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Steps** | **Input** | **Expected Results** | **Status** |
| 1 | Pressing More tab from the Home Page. | None | More view displayed. | **Pass** |
| 2 | Click on faq button. | None. | faq view shown. | **Pass** |
| 3 | Click on any question. | None. | Its answer shown below that question. | **Pass** |
| 4 | Click on other question. | None. | Previous answer disappeared and answer for current question displayed below current question. | **Pass** |
| 5 | Click on current question. | None | Answer of current question disappeared. | **Pass** |
| 6 | Click on back button. | None | Back to More View. | **Pass** |

**6.3.9 Social Media Sharing test case .**

Table : Social Media Sharing test case.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Steps** | **Input** | **Expected Results** | **Status** |
| 1 | Pressing More tab from the Home Page. | None | More view displayed. | **Pass** |
| 2 | Click on share button. | None. | Share action view shown. | **Pass** |
| 3 | Click on facebook button. | None. | Facebook share box appear. | **Pass** |
| 4 | Click on share button of that box. | Message that user wants to share on facebook | Message shared on facebook and more view displayed. | **Pass** |
| 5 | Click on scan tab. | None | Home page displayed. | **Pass** |

**6.3.10 Help test case .**

Table : Help test case.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Steps** | **Input** | **Expected Results** | **Status** |
| 1 | Pressing help Button from More view. | None | Help view displayed. | **Pass** |
| 2 | Swipe images | None. | Images swipe left to right or right to left as per user. | **Pass** |
| 3 | Click on any image | None. | Image appeared on full screen. | **Pass** |
| 4 | Click on back button of navigation bar. | None | Back to more view. | **Pass** |
| 5 | Click on scan tab. | None | Home page displayed. | **Pass** |