Chapter 9

Testing

Web application consists of numerous Application entries and exit paths, different types of browsers with end users, people with varying technical skills using software which makes testing application, a challenging task. However in this software each module is tested individually with some input. All the requirements were preserved and taken care while testing each module individually.

9.1 Testing Methods

The test designer selects valid and invalid inputs and determines the correct output. This method of test design is applicable to all levels of software testing.

9.1.1 White Box Testing

9.1.1.1 Code Coverage

This describes the degree to which the source code of a program has been tested. It is a form of testing that inspects the code directly. OncoSys is checked for functional coverage, statement coverage and decision coverage.
Each and every line of code is executed for at least once when the necessary condition is true/false.

9.1.1.2 Fault Injection

This is a technique for improving the coverage of a test by introducing faults to test code paths, in particular error handling code paths, that might otherwise rarely be followed.

Fault codes were added in some area of coding like parsing texts and storing indexes.

Testing Level

As it is a web application, there are several tests which can be done but due to time constraint the following were the test done.

- Unit Testing
- Integration Testing
- System Testing
- Functional Testing
- Usability Testing
- Interface Testing
- Compatibility Testing
- Performance Testing
- Security Testing
## 9.1.2 Unit Testing

Unit testing is the testing of individual software units or a group of related units. It is software verification and validation method where the programmer gains confidence that individual unit of source code are fit to use.

**Test for recording Patient’s information**

Input: Medication & Treatment information  
Output: Successfully recorded  
If required input field is missing with data, error message is shown.

**Test for Crawler indexing**

Input: URL  
Output: Successfully indexed  
If URL not found, Time out occurs after certain period of time and further processing is cancelled.

**Test for Search Engine**

Input: keyword  
Output: A set of results matching keyword in files indexed with links to their path  
If keyword does not exist, no match is shown. Any symbols are automatically truncated.

## 9.1.3 Integration Testing

Integration testing is a software testing in which individual software modules are combined and tested as a group. The purpose of integration testing is to verify functional performance and reliability requirements palaced on major design items.
Testing of Search engine after integrating with physicians profile

Input: Keyword

Output: Search results with feedback by rating or reporting broken links

If keyword is not found, message is displayed

9.1.4 System Testing

System testing of a software is testing conducted on a complete, integrated system to evaluate the systems compliance with its specified requirements. OncoSys system is tested for different values by the developer.

9.1.5 Functional Testing

A manual approach was followed to test the links of database connection, forms and web pages submitting information from user.

**Link Testing:** Hyperlinks in page are used to navigate to a document. A link testing was conducted to determine the proper functioning of outgoing link, internal links and broken links of all the pages.

**Validating HTML/CSS and Scripts:** It includes validating the application for HTML syntax errors. Also check the CSS and Scripts functionality.

**Database Testing:** The web application required high data consistency where the data integrity and errors check helps in performing edit, delete or modification of forms or do any DB related functionality. In order to ensure whether the database queries are executing correctly, data is retrieve and update correctly, the database has to undergo various test.
9.1.6 Usability Testing:

Test for Navigation: Test of navigation is conducted to determine the way users surf the web page, control the buttons, boxes and various links on the page. The following should be taken care of during the test:

- Web site design should be simple and easy to use. The clear instruction should be provided to execute the function, resolve the error and satisfy the purpose of end user.

- There should be consistency in the menus provided on the page.

Content Checking: Content were checked to verify that they are logical and easy to understand and meaningful. Check for spelling errors. Images are placed properly with proper sizes.

9.1.7 Interface Testing

The main interfaces are:

- Web Server Interface

- Application Server Interface

- Database Server Interface

A test was run to verify that these servers are executing in the right manner and handling the errors properly. It has also been checked whether the system is providing the correct message in the case of any error.
9.1.8 Compatibility Testing

Compatibility of web application is very important testing aspect.

**Browser Compatibility:** Different browsers have different settings and ways of rendering a page.

Following browsers were used for testing:
- Internet Explorer 7
- Mozilla Firefox 3.6
- Opera 10
- Google Chrome

There was minor changes in UI with thick borders at certain places and color with different browsers. Mozilla Firefox rendered it in most efficient manner than others. Some color gradients were then replaced with images. However all the features of application were equally accessible from all the browsers.

**Printing Options:** Test was made of Pages in case base which included printing options. All the fonts, colors, graphs fit to a paper size and prints properly.


9.1.9 Security Testing:

Following are some tests that are done:

<table>
<thead>
<tr>
<th>Test Description</th>
<th>Output Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test by pasting internal URL directly into browser address bar without login</td>
<td>Access Denied</td>
</tr>
<tr>
<td>URL injection by manipulating querystring parameters of secured pages</td>
<td>Access Denied</td>
</tr>
<tr>
<td>Logging with invalid login username, password</td>
<td>Username and/or password did not match.</td>
</tr>
</tbody>
</table>

Table 9.1: Security Testing