



**MIDDLE EAST
TECHNICAL UNIVERSITY**



DEPARTMENT OF COMPUTER ENGINEERING

NewStreamLine

TESTING SPECIFICATIONS

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1. INTRODUCTION

Testing is the last phase of software development before the product is presented to customers. For this reason, the testing phase cannot take a short period of time and never be ignored. In this section, you'll read the purpose of testing and preparing test specification plans, the primary goals and objectives to be achieved by means of them and our main constraints.

1.1. Purpose of Testing and Test Specification Plan

In this section, you'll read the purpose of testing phase and this test specification plan.

1.1.1. Purpose of Testing

As mentioned above, testing is the last phase of software development before its presentation to market and customers. That's why, errors and inconsistencies in analysis and design phases will not be recovered in this phase, but the errors, bugs and inconsistencies in the product will be examined and the verification and validation will be done by comparing its modules and capabilities with the analysis and design constraints.

1.1.2. Purpose of Test Specification Plan

The purpose of this Test Specification Plan is to formally describe the testing process that plays an important role in software development. This document will be used as a guide in testing the software product in several aspects which will be described in the following sections of this report.

1.2. Primary Goals and Objectives

The primary goal of testing is to verify and validate the developed product before its release. In other words, it is done to ensure the development team and the product's future users about the development process and the product meet the requirements and needs of the future users. In addition, testing is done to maximize the software quality before its release. The main and sub attributes in testing are:

- Functionality -> Suitability, accurateness, interoperability, compliance and security

- Reliability -> Fault tolerance, recoverability, maturity
- Usability -> Easiness in learning, understanding and operating
- Efficiency (with respect to time and resource)
- Maintainability -> Changeability, stability, testability, analyzability
- Portability -> Adaptability, conformance, easiness in installing and replacing

Finally, our last goal in testing is to recover most of the bugs in our software before its final release.

1.3. Testing Constraints

Software Development is a process that has several constraints from its proposal to its release. That's why; testing phase has some constraints similar as/different from other phases in Software Development. In this section, you'll see our main constraints in testing. They are time, financial, staff and operating system constraints.

1.3.1. Time Constraints

Our product is still in development and its first release will be available by 7th May. After its release, the testing process will start and it will end by 11th June. In other words, we'll have five weeks for completion of tests. If we take the size of the project into account, five weeks are sufficient for a complete product. But as mentioned earlier, our project is still in development and there are some additional features to be completed. For this reason, testing schedule should be prepared and followed carefully.

1.3.2. Financial Constraints

There are several software testing tools and methods which would lighten the load on us in testing. Unfortunately, most of them are not for free, in fact, expensive. As our group doesn't have any budget, we'll use free tools and procedures in testing.

1.3.3. Staff Constraints

The project group consists of six people who are undergraduate students and inexperienced in software testing. For this reason, it will take some time for them to learn testing methods and apply them on the product.

1.3.4. Operating System Constraints

In Analysis and Design reports, it was told that the product would be operating system independent. Recently, there are many operating systems and it would take a huge amount of time to test our product in each operating system. In order to solve this problem, we'll test our product in Windows and some popular Unix OS.

2. TESTING STRATEGY

In this section, we'll give a general explanation of the testing procedures we'll use in our product's testing. If you search in Google or Software Engineering books about testing methods, you'll see various testing methods. In a meeting of our group, we agreed on which testing procedures we'll use. They are, in the order of completion, Unit Testing, Integration Testing, System Testing, Performance Testing and Installation Testing. In the next section, *Testing Procedures*, you'll see the applications and components to be tested and testing scenarios of each.

2.1. Unit Testing

Unit testing is the testing of individual software components. It verifies that the product was built correctly. This type of testing should take place before the integration test and should have at least one scenario for each component. It is a white-box type of testing.

2.2. Integration Testing

After completing the unit testing, the integration testing will take place. It is the testing process in which individual software modules are combined and tested as a group. This type of testing is very important to see if the product works as a whole and meets the Design Specifications.

2.3. System Testing

System testing is testing conducted on a complete, integrated system to evaluate the system's compliance with its functional requirements. System testing falls within the scope of black-box testing, and as such, should require no knowledge of the inner design of the code or logic.

2.4. Performance Testing

Performance Testing is the testing conducted to evaluate the compliance of a system or component with specified performance requirements. This is usually performed by using an automated test tool to simulate large number of users.

2.5. Installation Testing

Installation testing confirms that the application under test recovers from expected or unexpected events without loss of data or functionality. Events can include shortage of disk space, unexpected loss of communication, or power out conditions.

3. TESTING PROCEDURE

In the previous section, *Testing Strategy*, the testing procedures that we'll apply were shortly described. In this section, you'll see which testing procedure will be used in which function/ module of our product. The testing procedures will be in the order of completion.

3.1. Unit Testing Modules

3.1.1. Interface Unit (Web Server Unit)

In Interface Unit, there will be a web server which will contain Admin Interface, User Interface, Error Pages, Login Page, and User Feedback forms. By means of the web server, we'll see how the interface of the product is displayed in other computers. The purposes of testing the interface are:

- To see the integrity between pages
- To see that system responds properly
- To see that it notifies the user of errors,etc
- To see that it provides user with help information
- To see that it contains information flow
- To see that it properly handles all exceptions that can be risen from database or file system units
- To see if the GUIs of the product is displayed the way the developers designed.
- To see if the users are prevented from the data and pages that he is unauthorized to access. For example, a user who is not able to login shouldn't access

to the news server. If he succeeds in accessing, the developers must work on the login process and recover those reliability problems.

The goals to be achieved by means of Interface Unit Testing are:

- All of the GUIs which are displayed in the users' computers are the same as the GUIs the developers designed.
- No user can access to the pages and data that he is unauthorized to access.
- Webpage of the system correctly represents it
- Webpage of the system simplifies the usage of the it
- Web Server runs without errors

3.1.2. Database Unit

In Database Unit, there will be a SQL server which will contain users' login data. By means of the SQL server, we'll be able to store every user's login data. The purposes of testing the database are:

- To see if the login data of the user is saved to the database with his sign-up.
- To see if the password checking is done correctly.
- To see if duplicate usernames are prevented.

The goals to be achieved by means of Database Unit Testing are:

- Users' data is stored in the related table after each successful sign-up.
- No user can login with wrong passwords.
- No pair of users can have the same username.

3.1.3. File System Unit

In File System Unit, every single post will be stored according to the news group it is related. When a user searches a post by giving its author, date or subject as input/inputs, the files will be searched and matching post will be listed. The purposes of testing the file system are:

- To see if each post is stored under the directory of the news group it is related.
- To see if searching by author only, subject only and date only fail.
- To see if searching by author, subject and date fail.
- To see if searching by keywords returns correct post information.

The goals to be achieved by means of File System Unit Testing are:

- Every post is stored under the directory of the news group it is related.
- Searching by author only, subject only and date only return matching post information.
- Searching by author, subject and date return matching post information.

3.1.4 Mail System Unit

Mail System Unit is responsible of sending posts to the users according to the data stored in database. It retrieves information about preferred period of mail sending and continuously runs on server. The purpose of testing Mail System Unit are:

- To ensure that posts are sent to subscribers
- To see that no duplicated post are sent
- To see that posts are sent on time
- To see that all exceptions are properly handled

The goals to be achieved by Mail System Unit testing are:

- Right posts are sent to right subscribers
- Posts are sent on time
- Mail Unit system runs without errors.

3.2. Integration Testing

After our group members agree that all of the goals in the unit testing are achieved, we'll move to the integration testing.

The task to be done before integration testing is to combine all individual units which are already tested. After completing the integration, we'll start integration testing. The purposes of integration testing are:

- To see if the individual units function correctly as a complete system.
- To see if the integrated units satisfy our design specifications.
- To see if any user experience any problems while doing his tasks on the news server from the beginning (log-in) to the end (log-out). For this purpose, we'll prepare some test scenarios.

Test Scenario #1

Ahmet is a registered user of NewStreamLine. At the weekend, he is going to meet his close friends who are also registered users of NewStreamLine. On Friday night, he sees a post in the newsgroup that he and his friends are subscribed (Ankara High School '03). The post says that one of their friends don't know the meeting point. Ahmet replies the post and informs his friend about the meeting point.

The goals to be achieved by Test Scenario #1 are:

- Every user with correct data can sign in.
- Every user who is subscribed to a newsgroup can see all posts related with that newsgroup.
- Every user can reply to a post which is related with the newsgroup that he is subscribed.

Test Scenario #2

Ayşe is working and has to depart from her office in Ankara for a meeting in Istanbul within half an hour. While preparing the necessary files for the meeting, NewStreamLine reminds her about an incoming post from her friend, Sule. Ayşe reads the post and learns that

she forgot her kitchen window open while leaving for work. She replies her friend and asks her if she minds to go to her house and close the window by taking her house keys from her office. Sule accepts to go and Ayse calls a taxi.

The goals to be achieved by Test Scenario #2 are:

- Every user with correct data can sign in.
- Every user who is subscribed to a newsgroup can see all posts related with that newsgroup.
- Every user can put a reminder for a news group and a user.
- Every user can reply to a post which is related with the newsgroup that she is subscribed.

3.3. System Testing

After completing the integration of the units and the integration testing, we'll no more deal with codes of the units. From this testing procedure on, we'll deal with the inputs and the outputs of each unit. System Testing is also known as Black-Box Testing. The purposes of system testing are:

- To see if our system gives correct outputs to the inputs which satisfy system specifications. In order to do this, we'll prepare some input-output samples for our product.
- To see if functional requirements are satisfied in the current status of the product.

Input-Output Sample

Esma signs up NewStreamLine with her personal data:

username: daisy

password: jaded87

name: Esma Aydinli

e-mail: esmaaydinli@gmail.com

When Esma sends a post to a newsgroup that she is subscribed, her post is sent to esmaaydinli@gmail.com.

When another user searches her posts in NewsStreamLine, he has to write search by author field : daisy.

Whenever Esma sends a post, every user who puts reminder for her username: daisy will be reminded unless they have signed out.

The goals to be achieved by means of System Testing are:

- Inputs are related with outputs of the system.
- The product meets all system functional requirements.

3.4. Performance Testing

After system testing is completed successfully, we'll be sure that it meets all of our design specifications and functional requirements. The next thing to wonder about will be its efficiency. The purposes of performance testing are:

- To see if updates and configuration changes are adjusted on time.
- To see if the system will fail when some users ask for the same data or function and to discover the amount of load that the system cannot stand. In order to measure the maximum load the system can stand, we'll use an automated test tool: AppPerfect Test Studio v8.5.0. It has 3 main functions: Load Tester, Functional Tester for Windows and Functional Tester for Web. This tool will help us in our measurements in performance testing.

The goals to be achieved by means of Performance Testing are:

- Every update and configuration change will be done in the time period that is specified in the design reports.
- The system will be capable of answering user requests without any delay and cancellation.

3.5. Installation Testing

When we complete Performance Testing successfully, our product will be functioning correctly, under stress, in ideal conditions. In order to avoid its crash in a power cut or loss of disk space, we'll check the backup functions of our system.