**Unit - 4: System Testing**

**4.1 GUI Testing:**

Graphical User Interface Testing (GUI) Testing is the process for ensuring proper functionality of the graphical user interface (GUI) for a specific application.

GUI testing generally evaluates a design of elements such as layout, colors and also fonts, font sizes, labels, text boxes, text formatting, captions, buttons, lists, icons, links, and content. GUI testing processes may be either manual or automatic and are often performed by third-party companies, rather than developers or end users.

There are two main types of GUI testing available:

Analog Recording:

This is often what people associate with GUI testing tools. With analog recording, the

testing tool basically captures specific mouse clicks, keyboard presses and other user

actions and then simply stores them in a file for playback. For example, it might record

that a user left-clicked at position X = 500 pixels, Y = 400 pixels or typed the word

“Search” in a box and pressed the [ENTER] key on their keyboard.

Object based Recording:

In object based recording, the testing tool is able to connect programmatically to the

application being tested and “see” each of the individual user interface components (a

button, a text box, a hyperlink) as separate entities and is able to perform operations

(click, enter text) and read the state (is it enabled, what is the label text, what is the

current value) reliably regardless of where that object is on the screen.

**4.2 Compatibility Testing:**

Software compatibility testing means checking that your software interacts with and shares information correctly with other software.

This interaction could occur between two programs simultaneously running on the same computer or even on different computers connected through the Internet thousands of miles apart.

The interaction could also be as simple as saving data to a floppy disk and hand-carrying it to another computer across the room.

Examples of compatible software are

• Cutting text from a web page and pasting it into a document opened in your word processor

• Saving accounting data from one spreadsheet program and then loading it into a completely different spreadsheet program

• Having photograph touch-up software work correctly on different versions of the same operating system

**4.3 Security Testing:**

is a type of Software Testing that uncovers vulnerabilities of the system and determines that the data and resources of the system are protected from possible intruders.

It ensures that the software system and application are free from any threats or risks that can cause a loss.

Security testing of any system is focused on finding all possible loopholes and weaknesses of the system which might result in the loss of information or repute of the organization.

Goal of Security Testing: The goal of security testing is to:

● To identify the threats in the system.

● To measure the potential vulnerabilities of the system.

● To help in detecting every possible security risks in the system.

● To help developers in fixing the security problems through coding.

**4.4 Performance Testing:**

Performance Testing is a type of software testing that ensures software applications to perform properly under their expected workload.

It is a testing technique carried out to determine system performance in terms of sensitivity, reactivity and stability under a particular workload.

Performance Testing is the process of analyzing the quality and capability of a product. It is a testing method performed to determine the system performance in terms of speed, reliability and stability under varying workload.

Performance testing is also known as Perf Testing.

Performance Testing Attributes:

Speed:

It determines whether the software product responds rapidly.

Scalability:

It determines amount of load the software product can handle at a time.

Stability:

It determines whether the software product is stable in case of varying workloads.

Reliability:

It determines whether the software product is secure or not.

**4.5 Volume Testing:**

Volume Testing is a type of software testing which is carried out to test a software application with a certain amount of data.

The amount used in volume testing could be a database size or it could also be the size of an interface file that is the subject of volume testing.

In volume testing a huge volume of data is acted upon the software. It is basically performed to analyze the performance of the system by increasing the volume of data in the database

Characteristics of Volume Testing:

Following are the characteristics of the Volume Testing:

● Performance of the software decline as passing of the time as there is huge amount of data overtime.

● Basically the test data is created by test data generator.

● Only small amount of data is tested during development phase.

● The test data need to be logically correct.

● The test data is used to assess the performance of the system.

**4.6 Stress Testing:**

Stress Testing is a software testing technique that determines the robustness of software by testing beyond the limits of normal operation.

Stress testing is particularly important for critical software but is used for all types of software.

Stress testing emphasizes robustness, availability, and error handling under a heavy load rather than what is correct behavior under normal situations.

Stress testing is defined as a type of software testing that verifies the stability and reliability of the system.

Characteristics of Stress Testing:

● Stress testing analyzes the behavior of the system after a failure.

● Stress testing makes sure that the system recovers after failure.

● It checks whether the system works under abnormal conditions.

● It ensures to display of appropriate error messages when the system is under stress.

● It verifies that unexpected failures do not cause security issues.

● It verifies whether the system has saved the data before crashing or not.

**4.7 Load Testing :**

Load Testing is a type of Performance Testing that determines the performance of a system, software product, or software application under real-life based load conditions.

Basically, load testing determines the behavior of the application when multiple users use it at the same time.

It is the response of the system measured under varying load conditions. The load testing is carried out for normal and extreme load conditions.

Objectives of Load Testing: The objective of load testing is:

● To maximize the operating capacity of a software application.

● To determine whether the latest infrastructure is capable to run the software application or not.

● To determine the sustainability of application with respect to extreme user load.

● To find out the total count of users that can access the application at the same time.

● To determine scalability of the application.

● To allow more users to access the application.

**4.8 Installation Testing :**

Testing the procedures to achieve an installed software system that can be used are known as installation testing.

In this installation testing checking full or partial upgrades and other features install/uninstall processes are included.

The installation testing ensures that the software application has been successfully installed with all its inherent features or not.

It is also named as implementation testing, mainly it’s done in the end phase.

Features of installation testing:

● Activity-based testing

● Executed during operational Acceptance testing

● Performed by software testing engineers along with configuration manager

● Helps in delivering the optimum user experience

● Helps in the identification and detection of bugs during the installation

● Installation testing is executed during the last stage of STLC

**4.9 Regression Testing:**

Regression Testing is the process of testing the modified parts of the code and the parts that might get affected due to the modifications to ensure that no new errors have been introduced in the software after the modifications have been made.

Regression means return of something and in the software field, it refers to the return of a bug.

Advantages of Regression Testing:

• It ensures that no new bugs has been introduced after adding new functionalities to the system.

• As most of the test cases used in Regression Testing are selected from the existing test suite and we already know their expected outputs. Hence, it can be easily automated by the automated tools.

• It helps to maintain the quality of the source code.

Disadvantages of Regression Testing:

• It can be time and resource consuming if automated tools are not used.

• It is required even after very small changes in the code.

**4.10 Smoke Testing :**

Smoke tests are a minimum set of tests run on each build. Smoke testing is a

process where the software build is deployed to a quality assurance environment and

is verified to ensure the stability of the application.

Smoke Testing is also known as Confidence Testing or Build Verification Testing.

Advantages of Smoke Testing:

• Smoke testing is easy to perform. It runs quickly

• It helps in identifying defects in the early stages.

• It improves the quality of the system.

• Smoke testing reduces the risk of failure. It saves test effort and time.

• It makes it easy to detect critical errors and helps in the correction of errors.

Disadvantages of Smoke Testing:

• Smoke Testing does not cover all the functionality in the application. Only a certain part of the testing is done.

• Errors may occur even after implementing all the smoke tests.

• In the case of manual smoke testing, it takes a lot of time to execute the testing process for larger projects.

**4.11 Sanity testing :**

Sanity testing is performed to ensure that the code changes that are made are working as properly. Sanity testing is a stoppage to check whether testing for the build can proceed or not.

The focus of the team during sanity testing process is to validate the functionality of the application and not detailed testing.

Advantages of Sanity Testing:

• Sanity testing helps in quickly identify defects in the core functionality.

• It can be carried out in lesser time as no documentation is required for sanity testing.

• If the defects are found during sanity testing, project is rejected that is helpful in saving time for execution of regression tests.

Disadvantages of Sanity Testing:

• It focuses only on the functions and commands of the system application.

• It is not possible to cover all the test cases in test scenarios.

• It covers only few functionalities in the system application. Issues in the unchecked functionalities can’t be recovered.

**4.12 Adhoc Testing :**

Adhoc testing is a type of software testing which is performed informally and randomly after the formal testing is completed to find out any loophole in the system. For this reason, it is also known as Random testing or Monkey testing.

Advantages of Adhoc testing :

• The errors which can not be identified with written test cases can be identified by Adhoc testing.

• It can be performed within very limited time.

• Helps to create unique test cases.

Disadvantages of Adhoc testing :

• Sometimes resolving error based on identified issues is difficult as no written test cases and documents are there.

• Needs good knowledge on product as well as testing concept to perfectly identified the issues in any model.

• It does not provide any assurance that the error will be definitely identified.

**4.13 Usability Testing :**

Usability Testing in software testing is a type of testing, that is done from an end user’s perspective to determine if the system is easily usable.

Usability testing is generally the practice of testing how to easy a design is to use on a group of representative users.

Advantages and disadvantages of Usability Testing

As every coin has two sides, usability testing has pros and cons. Some of the pros it has are:

• Gives excellent features and functionalities to the product

• Improves user satisfaction and fulfils requirements based on user’s feedback

• The product becomes more efficient and effective

**4.14 Acceptance Testing-Alpha Testing :**

It is a formal testing according to user needs, requirements and business processes conducted to determine whether a system satisfies the acceptance criteria or not and to enable the users, customers or other authorized entities to determine whether to accept the system or not.

Advantages of Acceptance Testing :

• This testing helps the project team to know the further requirements from the users directly as it involves the users for testing.

• Automated test execution.

• It brings confidence and satisfaction to the clients as they are directly involved in the testing process.

Disadvantages of Acceptance Testing :

• Users should have basic knowledge about the product or application.

• Sometimes, users don’t want to participate in the testing process.

• The feedback for the testing takes long time as it involves many users and the opinions may differ from one user to another user.

**4.15 Beta Testing :**

Beta Testing is performed by real users of the software application in a real environment.

Beta testing is one of the types of User Acceptance Testing.

A Beta version of the software, whose feedback is needed, is released to a limited number of end-users of the product to obtain feedback on the product quality.

Beta testing helps in minimization of product failure risks and it provides increased quality of the product through customer validation.

Advantages of Beta Testing:

• It reduces product failure risk via customer validation.

• Beta Testing allows a company to test post-launch infrastructure.

• It helps in improving product quality via customer feedback.

Disadvantages of Beta Testing:

• Sometimes, it is complex to follow the errors or bugs because the testing environment varies from user to user.

• There is a chance of having duplication of errors or bugs.

• The development team and the testing team are not having control over this real time test environment.

**4.16 Gamma Testing :**

This is the final phase of testing and is performed when the product is ready for release with specific requirements.

Not all the in-house testing activities which are decided to go through this testing phase are performed on the product.

Advantages:

• Helps to assess the quality of the product in terms of usability, security, and performance.

• No scope for enhancements unless the critical bug has to be fixed. So, no chances of new bugs being introduced.

• As this testing skips all the in-house testing activities, it saves a lot of time and testing efforts.

Disadvantages:

• Cannot be adopted when there are tight deadlines, increased pressure, and shorter development cycles.

• Cannot be controlled as end-users are the participants.

• No Guarantee of completion of testing, as its end user’s choice to continue or drop the testing

**Alpha Testing vs Beta Testing vs Gamma Testing**

| **Alpha Testing** | **Beta Testing** | **Gamma Testing** |
| --- | --- | --- |
| [Alpha testing](https://www.feedough.com/what-is-alpha-testing/) is the product’s initial testing for all possible bugs and issues before introducing it to the external testers. | Beta testing is the second level of product testing performed to find out bugs or issues missed during alpha testing. | Gamma testing is the final product testing level performed to gather suggestions and feedback about certain product specifications. |
| In-house developers and QA staff perform this test in a controlled environment. | External testers and developers carry it out in a real environment. | It is performed by a small group of end-users who are certain to use the product after its launch. |
| During alpha testing, the reliability and security of the product are not analyzed in-depth. | During beta testing, more focus is on the reliability, security, and robustness of the product. | During gamma testing, the main emphasis is on checking the product’s safety. |
| The product is tested in controlled lab conditions while performing alpha testing. | The product is tested in a real external environment during beta testing after completing alpha testing internally. | The product is tested in external conditions by a small group of end-users by skipping all the in-house activities during gamma testing. |
| In alpha testing, all the issues and bugs are addressed immediately by the product development team. | In beta testing, the issues and feedback collected are implemented in the forthcoming versions of the product. | In gamma testing, the issues or feedback collected are not implemented unless the severity of it is very high. |