Lecture 3

Software Testing Fundamentals

Lecture Overview

- Introduction to Software Testing
- Key Testing Concepts and Definitions
- Types of Testing
- Testing Levels and Approaches
- Common Testing Techniques

1. Introduction to Software Testing

Software testing is a critical process in Software Quality Assurance (SQA) aimed at identifying defects, verifying functionality, and ensuring that the software meets the specified requirements.

Effective testing helps to:

- Detect errors and defects early.
- Enhance software quality.
- Build user confidence and ensure reliability.

Objectives of Software Testing

- Verify that the software meets requirements.
- Identify and fix defects.
- Ensure the software performs as expected in real-world scenarios.

2. Key Testing Concepts and Definitions

- **Error**: A human action that produces an incorrect result.
- **Defect (Bug)**: A flaw in the software that causes it to produce an incorrect or unexpected result.
- **Failure**: The inability of the software to perform a required function within specified limits.

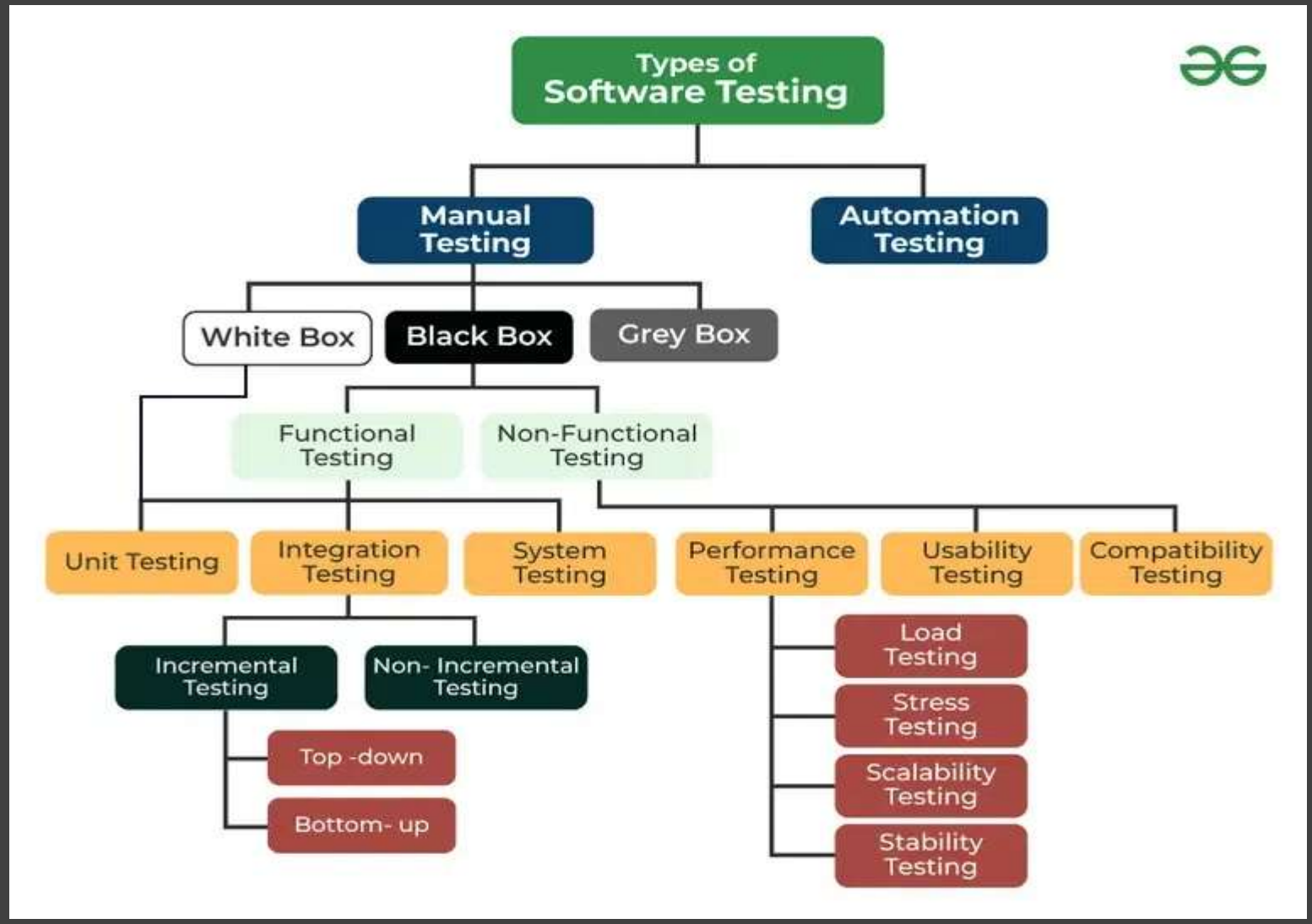
Testing vs. Debugging

- **Testing**: The process of identifying defects.
- **Debugging**: The process of locating, analyzing, and fixing defects.

Verification and Validation

- **Verification**: Ensuring the software is built correctly and adheres to specifications.
- **Validation**: Ensuring the software meets user requirements and expectations.

3.Types of Software Testing



3.Types of Software Testing

1.Manual Testing:

a tester carries out tests on the software by following a set of predefined test cases. In this testing, testers make test cases for the codes, test the software, and give the final report about that software. Manual testing is time-consuming because it is done by humans, and there is a chance of human errors.

Advantages of Manual Testing

1. **Less expensive:** It is less expensive as it does not require any high-level skill or a specific type of tool.
2. **No coding is required:** No programming knowledge is required while using the black box testing method. It is easy to learn for the new testers.
3. **Efficient for unplanned changes:** Manual testing is suitable in case of unplanned changes to the application.

2.Automated Testing: .

a technique where the Tester writes scripts on their own and uses suitable Software or Automation Tool to test the software. It is an Automation Process of a Manual Process.
It allows for executing repetitive tasks without the intervention of a Manual Tester.

3.Types of Software Testing

Advantages of Automation Testing:

- **Simplifies Test Case Execution:** simplifying the overall test execution and increasing the efficiency of the application.
- **Improves Reliability of Tests:** Automation testing ensures that there is equal focus on all the areas of the testing, thus ensuring the best quality end product.
- **Increases amount of test coverage:** Using automation testing, more test cases can be created and executed for the application under test. Thus, resulting in higher test coverage and the detection of more bugs. This allows for the testing of more complex applications and more features can be tested.
- **Minimizing Human Interaction:** In automation testing, everything is automated from test case creation to execution thus there are no changes for human error due to neglect.
  This reduces the necessity for fixing glitches in the post-release phase.

3.Types of Software Testing

Testing Approaches (Types of Manual Testing):

- **White Box Testing :**
  a testing technique that looks into an application's core architecture, logic, and implementation.

- **Black Box Testing :**
  Focuses on testing software functionality without knowledge of internal code.
  Black Box Testing can also be categorized into further types:
  1. **Functional Testing**: Validates the software functions as per the requirements.
  2. **Non-Functional Testing**: Checks aspects such as performance, usability, reliability, and scalability.

- **Grey Box Testing :**
  grey box testing combines aspects of black box testing and white box testing.
  the system being tested are only partially known to the testers.
  As an illustration, consider testing a web application where testers have access to the source code but aren't fully aware of how it is implemented.

3.Types of Software Testing

Examples of Functional Testing:

The steps you would generally take to perform functional testing on this e-commerce application are as follows:

1. Test User Registration:

- Fill up the registration form with accurate user information (name, email, and password).
- Make that the user can successfully log in and that a new user account is generated.

2. Test Product Search:

- Enter a search term for a particular product to test the product search function.
- Check to see if the necessary products are displayed in the search results.
- Repetition is crucial. Use several search terms, including misspelled or incorrect keywords, and check that the results are correct.

3. Test Shopping Cart Management:

- Test the shopping cart management system by adding items to the cart.
- Check to make sure the chosen products were added properly.
- Adjust the quantity, delete goods, and make sure the cart is adjusted appropriately.

3.Types of Software Testing

Examples of Non Functional Testing:

The steps you would generally take to perform functional testing on this e-commerce application are as follows:

1. Performance Testing:

- examines how well an application performs both under average and peak load situations.
- Response times, resource use, and scalability are all evaluated.

2. Usability Testing:

- the application's user-friendliness and usability are assessed.
- involves evaluating elements like navigation, user satisfaction, accessibility, and user interface design.
- testers might look at how simple it is for customers to browse the website's various areas or find and add items to their shopping carts..

3. Compatibility Testing:

- This testing makes sure that the program runs properly on various operating systems, platforms, and browsers.
- It checks compatibility with different hardware and software setups.
- testers may verify that the web application works properly on several browsers, including Chrome, Firefox, and Internet Explorer.

4.Levels of Software Testing

Software testing can be broken down into various levels to identify issues as early as possible and ensure end-to-end functionality:

Testing Levels

Unit Testing

- Focus: Testing individual units or components.
- Who: Usually done by developers.

Integration Testing

- Focus: Testing interactions between integrated units.
- Who: Often handled by developers or integration teams.

System Testing

- Focus: Testing the complete system as a whole.
- Who: Typically performed by QA testers.

Acceptance Testing

- Focus: Ensuring the system meets business requirements.
- Who: Typically performed by end-users or clients.