Lesson Proper for Week 8

Software Testing

Software Testing is a method to check whether the actual software product matches expected requirements and to ensure that software product is Defect free. It involves execution of software/system components using manual or automated tools to evaluate one or more properties of interest. The purpose of software testing is to identify errors, gaps or missing requirements in contrast to actual requirements.

Some prefer saying Software testing as a White Box and Black Box Testing. In simple terms, Software Testing means the Verification of Application Under Test (AUT). This tutorial introduces testing software to the audience and justifies its importance.

Why Software Testing is Important?

Software Testing is Important because if there are any bugs or errors in the software, it can be identified early and can be solved before delivery of the software product. Properly tested software product ensures reliability, security and high performance which further results in time saving, cost effectiveness and customer satisfaction.

Testing is important because software bugs could be expensive or even dangerous. Software bugs can potentially cause monetary and human loss, and history is full of such examples.

- In April 2015, Bloomberg terminal in London crashed due to software glitch affected more than 300,000 traders on financial markets. It forced the government to postpone a 3bn pound debt sale.
- Nissan cars recalled over 1 million cars from the market due to software failure in the airbag sensory detectors. There has been reported two accidents due to this software failure.
- Starbucks was forced to close about 60 percent of stores in the U.S and Canada due to software failure in its POS system. At one point, the store served coffee for free as they were unable to process the transaction.
- Some of Amazon's third-party retailers saw their product price is reduced to 1p due to a software glitch. They were left with heavy losses.

- Vulnerability in Windows 10. This bug enables users to escape from security sandboxes through a flaw in the win32k system.
- In 2015 fighter plane F-35 fell victim to a software bug, making it unable to detect targets correctly.
- China Airlines Airbus A300 crashed due to a software bug on April 26, 1994, killing 264 innocents live
- In 1985, Canada's Therac-25 radiation therapy machine malfunctioned due to software bug and delivered lethal radiation doses to patients, leaving 3 people dead and critically injuring 3 others.
- In April of 1999, a software bug caused the failure of a $1.2 billion military satellite launch, the costliest accident in history
- In May of 1996, a software bug caused the bank accounts of 823 customers of a major U.S. bank to be credited with 920 million US dollars.

What are the benefits of Software Testing?

Here are the benefits of using software testing:

- **Cost-Effective:** It is one of the important advantages of software testing. Testing any IT project on time helps you to save your money for the long term. In case if the bugs caught in the earlier stage of software testing, it costs less to fix.
- **Security:** It is the most vulnerable and sensitive benefit of software testing. People are looking for trusted products. It helps in removing risks and problems earlier.
- **Product quality:** It is an essential requirement of any software product. Testing ensures a quality product is delivered to customers.
- **Customer Satisfaction:** The main aim of any product is to give satisfaction to their customers. UI/UX Testing ensures the best user experience.

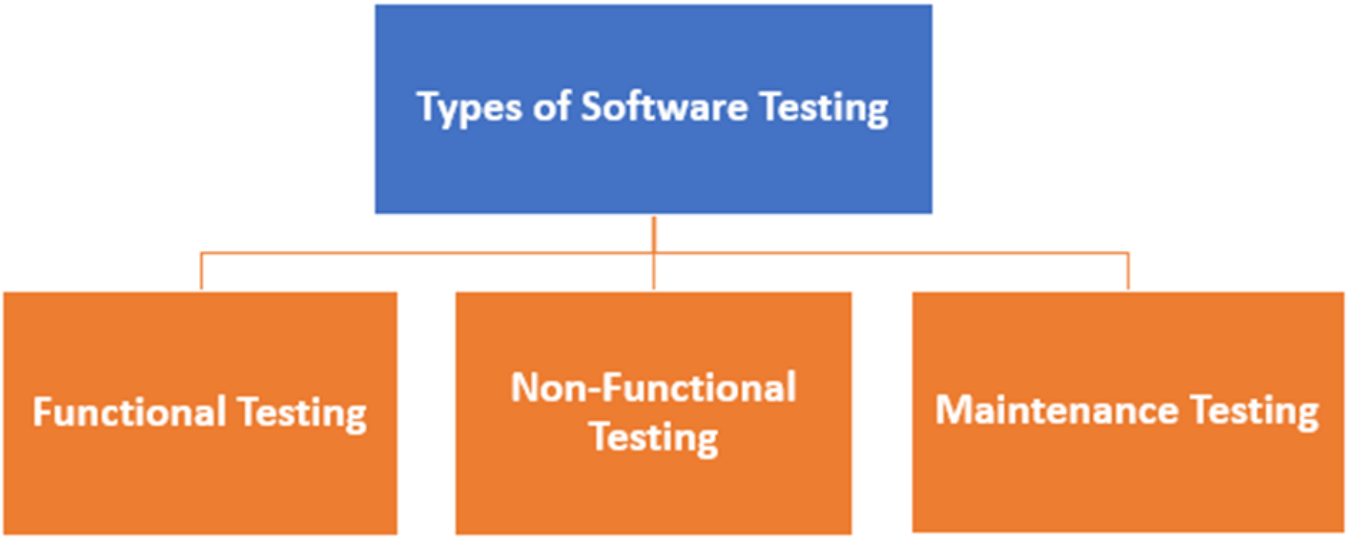
Testing in Software Engineering

As per ANSI/IEEE 1059, **Testing in Software Engineering** is a process of evaluating a software product to find whether the current software product meets the required conditions or not. The testing process involves evaluating the features of the software product for requirements in terms of any missing requirements, bugs or errors, security, reliability and performance.

Types of Software Testing

Typically Testing is classified into three categories.

- Functional Testing
- Non-Functional Testing or Performance Testing
- Maintenance (Regression and Maintenance)



Testing Category	Types of Testing
Functional Testing	Unit Testing Integration Testing Smoke UAT (User Acceptance Testing) Localization Globalization Interoperability So on
Non-Functional Testing	Performance Endurance Load Volume Scalability Usability So on
Maintenance	Regression Maintenance

This is not the complete list as there are more than 150 types of testing types and still adding. Also, note that not all testing types are applicable to all projects but depend on the nature & scope of the project.

Testing Strategies in Software Engineering

Here are important strategies in software engineering:

Unit Testing: This software testing approach is followed by the programmer to test the unit of the program. It helps developers to know whether the individual unit of the code is working properly or not.

Integration testing: It focuses on the construction and design of the software. You need to see that the integrated units are working without errors or not.

System testing: In this method, your software is compiled as a whole and then tested as a whole. This testing strategy checks the functionality, security, portability, amongst others.

Program Testing

Program Testing in software testing is a method of executing an actual software program with the aim of testing program behavior and finding errors. The software program is executed with test case data to analyze the program behavior or response to the test data. A good program testing is one which has high chances of finding bugs.

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