

# Software Testing

Buddha Chandra Banik

# Benefit of Testing

- Process of evaluating a system or its component(s) with the intent to find whether it satisfies the specified requirements or not
- Benefits
  - Checking the quality and functionality of a solution before deployment
  - Cost and time efficiency

*Software testing is never a time consuming process.*

# Testers

- Software Developers (Unit testing, integration testing)
- Code reviewers
  - Reviewer 1: Team Leader
  - Reviewer 2: Project Leader
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- Software Testers
- End Users

# Testing in different phases of SDLC

- Requirement Specification Phase
  - Are the requirements valid?? (*feasibility check*)
- Development Phase
  - Unit testing
  - Integration testing
  - System testing
- Deployment Phase
  - Does the software do what it is supposed to do?? (acceptance testing)
- Operational Phase
  - Bug fixes

# Validation and Verification

Criteria	Validation	Verification
Question	Are we building the right product??	Are we building the product right??
Objective	Ensures that the product meets end users' needs	Ensures that the product meets the specified requirements and design.
Evaluation Item	Actual product.	Requirements, design, codes etc.
Activities	Testing	Code refactoring, Code review, Walkthrough
Done by	Testers	Developers/production team
Execution time	After the product is ready	During development life cycle

# Quality Assurance vs Quality Control

Criteria	Quality Assurance	Quality Control
Objective	Ensure quality in software engineering processes.	Ensure quality of the software product
Focus	Software development process	Product under development
Orientation	Prevention oriented	Detection oriented
Scope	Software Company	Specific product
Activities	Process definition and implementation, audit, training	Review, testing

# Types of testing

- Manual Testing

- Product is tested from the viewpoint of end user
- Are the instructions clear enough to follow??
- Is the software/component doing what it is supposed to do??

- Automation Testing

- Using scripts/another software to perform the test scenarios performed in manual testing quickly and repeatedly.
- Checking the performance, load and stress testing.

# Methods of testing

## Blackbox Testing

- Process of testing a software without knowing about the code, design, structure or any implementation details
- Tester does not have any access to the source code
- Pros
  - Software is tested unbiasedly from end users' perspective.
  - Testers do not *need to* be highly skilled. So, intensive training is not required. So, it is cheap.
- Cons
  - Inefficient testing. Testers blindly test the software ***hoping*** that they ***may*** find a bug.



# Methods of testing(cont)

## **Whitebox Testing**

- Testers knows about the internal workings and implementation details of the software being tested.
- Pros
  - Tester is able to find the critical test cases based on erroneous implementation.
  - Another layer of Code review and Walkthrough process.
- Cons
  - Skilled testers needed. So, intensive training is a must. Expensive
  - Time consuming
  - Not always very practical

# Methods of testing(cont)

## Graybox Testing

- Tester has limited knowledge of the internal working of the software.
- In most of the cases, tester knows about the components and how these components interact with each other. But do not know how these components work.
- Pros
  - Cheaper and Faster than Whitebox Testing. More Practical.
  - Better than Blackbox coding.
- Cons
  - Always falls under a **gray** area.

# Functional and Non functional Testing

- Functional Testing
  - Does the software do what it is intended to do??
  - Does the software meet all the specified requirements??
- Different kinds of functional testing
  - Unit testing
  - Integration testing
  - System Testing
  - Acceptance Testing
  - Regression Testing
    - Check that a change such as bug fix does not lead to another bug or a violation of software design.

# Functional and Non functional Testing

- **Non Functional Testing**

- Does the software do what it is intended to do ***correctly***??
- Different kinds of non functional testing
  - Performance Testing
    - Load Testing
    - Stress Testing
  - Usability Testing
  - Security Testing
  - Portability Testing