UNIT 4
Software Verification and Validation

Compiled by Ms. Prajakta Joshi
Introduction

- Software verification and validation is a vital model that allows the team of software developers and testers ensure.
- Both software verification and validation help create a software product.
What is software Verification?

- It is performed during the ongoing phase of software development.
- Verification is the process of checking or verifying the credentials, data or information.
- It is highly possible that a software product goes well through the verification process.
Features of Software Verification

- Performed during the early stages of the software development process to determine for the specific requirements.
- Verification denotes precision of the end or final product.
- It conducts software review, walk through, inspection, and evaluate documents.
Methods of Verification

• Static Verification : Static verification involves inspection of the code.

• Dynamic verification : It concerns with the working behaviour of the software.
Types of Reviews on the Basis of Stage Phase

- Reviews
- Walkthrough
- Inspections
- Requirements tracing
- Static analysis
Review in Testing Lifecycle

- Testing - readiness review
- Prerequisites training
- Updations testing
- Un - installation testing
- Test - completion
Coverage in Verification

• Statement Coverage: Code includes many statements. Code are verified.

• Path Coverage: Sequence of control flow from entry to exit.

• Decision Coverage: When an application is executed, it may have to make decisions based upon the situation it faces.

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Concerns of Verification

- Assurance that the best verification techniques will be used.
- Assurance that the verification techniques will be integrated.
- Assurance that the technique will be executed properly.
Validation

- Validation is an actual testing performed on the software product.
- Gathering and analysis of the specifications and requirements,
- Test the error message.
- Boundary values along with stress and functionalities test.
Validation workbench
basic requirements

• Inputs
• Output
• Validation process
• Check process
• Standards, tools, guidelines
Levels of validation

• Unit testing: focuses verification efforts on the smallest unit of software design.
• Unit test consideration: module interface is tested to ensure that information properly flows.
Coverage in validation

• Requirement Coverage : All the requirements need not be necessarily covered.

• Functional Coverage : At time, requirements are expressed in the functionality required for the application to work correctly.

• Feature Coverage : It describes about covering a feature required by the user.
Acceptance testing and types of acceptance

• Acceptance testing is one of the last type of software testing.
• It is conducted by a pool of targeted users to ensure the readiness and quality.
• It is also referred to as red box testing.
• There are two types of acceptance testing: Alpha testing and Beta testing.
V Test Model

- Testing is a lifecycle activity.
- It begins when the proposal of software development made.
- For every development activity, there is a testing activity attached with it.
- Every phase of software development activities must consider corresponding testing activity associated with it.
V Model for Software

- Validation model explains the validation activities associated with different phases of software development.
- Design phase is associated with interface testing which covers design.
- Program-level designs are associated with integration testing.
- All the code level to validate individuals units, unit testing is done.
Testing During Requirements stage

- This stage must cover all the requirements for the system. Verification of problem definition and requirements definition is the basis on which the system requirement specification is developed further.
- Characteristics of good requirements: adequate, clear and verifiable, testable
Testing during test - planning phase

• This phase includes defining a test strategy for the given application.

• The test manager is responsible for defining test strategy.

• Testing artifacts must be reviewed for their consistency.
Testing during design phase

- Design is the backbone of any software application.
- Design may be made by system architects or designers.
- Design must reflect the requirements correctly.
- Verification and validation consist of:
  Consistency with respect to requirements and analyse design for errors.
Testing during coding

• Coding is the most vital stage in software development.

• It is important for the organization to establish verification and validation of a code.

• Aspects to be checked: coding standards implementation, Coding Optimization and Unit testing.
VV model

- VV model describes verification and validation activities associated with software development during the entire lifecycle.
- Various activities associated with each phase of the software development lifecycle.
  - Requirements
  - Requirements verification
  - Requirements validation

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Design

• High level design are created by architects and low-level designs by the designers.
• Design verification - the project team along with designer may walk through the design to find the completeness and give comments.
• Design validation - validation of design occurs at two or more stages during the software development lifecycle.

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Coding

• Coding is done by developers where the low-level designs are implemented.

• Code verification- code review helps in identification of errors with respect to coding standards, indenting standards, commenting standards.

• Code validation - validation of coding happens through unit testing where individual units are tested separately.
Critical roles and responsibilities

• Development: development team may be comprised of various roles under them. They may be performing various activities as per their roles and responsibilities at different stages.

• Testing: testing includes test manager, test leads, and testers as per scope of testing, size of the project, and type of customer.

• Customer: customer may be final user group, or people who are actually sponsoring the project.
Reference:

• Software Testing: Principles, Techniques and Tools M. G. Limaye
• Software Quality Assurance – Techmax Publication
• Software Quality Assurance – Sheth Publication

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