The V-Model

Phase of testing sequentially

1. Unit Testing
2. Integration testing
3. System Testing
4. Acceptance Testing

When is Acceptance Testing done?

1. After System Testing

**Waterfall Methodology**

1. Classical approach to the systems development life cycle
2. Linear and sequential in approach
3. Water-tight (fixed) stages
4. Allows greater control on the project

**Agile Methodology**

1. A low-overhead method that minimizes risk
2. Ability to cope with change
3. Methodology that works in cycle
4. Benefit small teams, rather than larger projects

**Waterfall method** is suited for projects in which requirements are fixed and which have a greater control.

**Agile method** however is capable of responding to change and is suitable for small projects.

**What are defects?**

Defects are the gaps between the expected behavior and the actual behavior of the application.

Defect life cycle

1. Defect Opened Status
2. Defect Review
3. Defect?
   1. No; Close the defect with appropriate resolution
   2. Yes;
4. Assign defect to Developer
5. Defect Fix/Retest Status
6. Retest the defect
7. Expected Result
   1. No: Defect Opened Status
   2. Yes:
8. Close the defect with Appropriate Resolution Status

**Software Fault & Failure**

Software failure occurs when the software does not do what the use expects to see

Software fault is a hidden programming error.

**Fault vs. Failure**

1. A failure is a “user-oriented concept”
2. It is “a departure of system behavior in execution from user needs/”
3. A fault, on the other hand, is a “developer-oriented concept”
4. It is “the defect that causes or can potentially use the failure when executed”

**Defect Reporting is used to**

1. Evaluate the quality of the software

**Which of the following is a defect management tool**

1. Clear Quest and Remedy

**Test Automation**

The automation helps greatly in optimizing the time and effort on test execution.

It controls; the execution of tests, the comparison of actual outcomes to predicted outcomes, the sitting up of rest preconditions and other test control and test reporting functions.

**An example for non-functional testing is:**

1. Load Testing

Usability Testing is like Manual Testing

Test automation is like Data-driving tests.

**Static Testing:** Testing the software by performing a manual inspection, review or walkthrough. It is a testing in which code is not executed.

1. Inspection: it is a technique in which the work product is examined for its compliance to specific standards and also checked against a history of common errors
2. Review: It is a technique in which the work product is discussed upon by a group of two or more persons and reexamined or revaluated for possible corrections.
3. Walkthrough: It is a technique mostly done on the code developed, where the code is traced manually to monitor the state of the program variables as a way of analyzing the logic.

**Dynamic Testing:** Testing the software by actually executing the software.

1. White Box Testing
2. Black Box Testing

**Review Benefits:**

1. Early defect detection and correction
2. Development productivity improvement
3. Reduce development timescales
4. Reduce testing cost and time
5. Lifetime cost reductions
6. Fewer defects and improved communication

**Phase of Formal Review**

1. Planning
2. Kick-off
3. Individual Preparation
4. Review Meeting
5. Rework
6. Follow-up

**Review process-Roles & Responsibilities**

1. **Manager:** Decide on the execution of reviews, allocates time in project schedules and determines if the review objectives have been met.
2. **Moderator:** The person who leads the review of the documents or set of documents, including planning the review, running the meeting, and follow-up after the meeting.
3. **Author:** The writer or person with chief responsibility for the documents to be reviewed
4. **Reviewers:** Individuals with a specific technical or business background who, after the necessary preparation, identify and describe finding in the product different perspectives and roles in the review process and they take part in any review meeting.
5. **Scribe (or Recorder):**

Types of Review

1. **Informal review:** 
   1. No formal process
   2. May be pair programming
   3. Optionally may be documented
   4. May vary in usefulness depending of the reviewer
2. **Walkthrough:**
   1. Meeting led by author
   2. Scenarios, dry runs, peer group

Dynamic Testing Types

1. Functional Testing  **White box**
   1. **White Box: also called Glass Box** Testing and structural or structure-based techniques
2. Functional Testing  **Black Box**
   1. **Black Box: Also called specification-based technique**
   2. Classified into specification based or experience based techniques. System testing is an example of Black box testing
3. Non-Functional Test

**Requirement Based / Black Box Techniques**

1. Equivalence Partitioning
2. Boundary Value Analysis
3. Decision Table Testing
4. State-transition Testing
5. Use-case Testing

Structure-based or White Box testing is based on an identified structure of the software or system, at various levels, such as:

1. Component Level
2. Integration Level
3. System Level

Test:

1. Which of the following is likely to benefit most from the use of test tools providing test capture and replay facilities?
   1. Regression testing
2. System testing is an example of?
   1. Black box Testing
3. In a typical waterfall model?
   1. Testing is done after construction
4. Software Quality Assurance & software Testing are not one and the same.
   1. True
5. While selecting test cases both valid and invalid inputs have to be chosen
   1. True
6. Which of the following are source of Testing knowledge at TCS?
   1. KnowMax, Assurance Academy, Learning & Development team
7. Requirement review helps in ?
   1. Ascertaining the testability of the software
8. In the context of Software testing, verification does not mean different things?
   1. False
9. Winrunner is an automation tools used by?
   1. Functional Testers
10. White box testing is also known as?
    1. Glass box testing
11. If static testing is done on a source code, dynamic testing is not necessary?
    1. False
12. To deliver quality software, which of the following is a must?
    1. Software Quality Assurance, software testing, a good tester
13. TSl stands for?
    1. Test Script Language
14. ISTQB is a certification related to?
    1. Testing
15. Which of these best describes integration test?
    1. Verifies that modules across systems can communicate
16. Test entry and exit criteria are documented in
    1. Test Approach/Strategy
17. Test cases are designed by?
    1. Testers
18. Identify the popular testing website from below?
    1. [www.stickyminds.com](http://www.stickyminds.com/)
19. Testing in which code is not executed is called?
    1. Static
20. Testing is means to?
    1. Identify the presence of defects and fix them
21. What has to be completed before staring test designing?
    1. Requirements Signoff, Test Strategy Signoff, Test Plan Signoff
22. Which is a best practice that can be followed during test design to clarify doubts in requirements?
    1. Maintaining Query log and sending it to stakeholders for clarification.
23. Equivalence Partition is a technique used in?
    1. Test Design
24. Which of the following is a method used in Black-Box testing
    1. Equivalence Partitioning, Boundary Value analysis, Cause Effect Graphing
25. System testing is mainly done using the?
    1. Black box testing technique

**Assessment**

1. You are planning to test software outside of its normal operating condition and is unlikely user environment.
2. Which testing method is Not focused on the internal structure of the software?
   1. Smoke
3. Which testing methodology do you use to become familiar with the product or the environment when formal testing materials are currently incomplete?
4. Which tool do you use to conduct software testing without affecting live production software?
5. Call CreateFile function, Ensure file Exists , call deletefile function, check that file no longer exists, Referring to the sample test script above, you reject this case because it:
6. Which set of ASCII codes do you use to test the sample code above without redundant coverage?
   1. ASCII codes 43-57
7. Acceptance tests are generally written by the test engineer together with which team?
   1. Configuration management
   2. Engineering management
   3. Development Engineers
   4. Business customers
   5. Project management
8. At what point during the software development process does the testing process begin?
   1. When the first batch of code is released
   2. When the first requirement document is approved
   3. When the first use interface is available
   4. When the first software design is completed
   5. When the test environment is prepared
9. You are using functional requirement as the basis for test case development on a new application. The functional requirement have not been deconstructed for architectural or design considerations. Based on the scenario above, which testing approach do you use that is designed to address writing test cases for the software?
   1. Integration
   2. White box
   3. Structural
   4. Unit
   5. Acceptance
10. A company is developing a new set of drivers for its video card. The drivers will resolve some existing support issue, optimize performance for some existing applications, and enable support for two new applications. While the drivers are being developed, a developer of the host operating system release several security patches that were not included in the original test planning. The test team needs to augment the test plan to address this risk
    1. System
    2. Dynamic
    3. Usability
11. You are testing a software product before go-live for your company to verify that data migration and installation are working successfully. Based on the scenario above, which method do you use to verity that the produce works an expected?
    1. Control flow testing
    2. Data flow testing
    3. Decision coverage
    4. Path testing
    5. Statement coverage
12. In which stage of a software project do you implement configuration management?
    1. At the first code release to testing
    2. At the first code release to production
    3. After first test cycle
    4. During test planning
    5. During requirements gathering
13. Call create file function, ensure file exists ( test fails if exception is raised), Call Deletefile function, check that file no longer exists( test fail if the file still exists)
    1. Tests more than one function
    2. Fails to verify that the function has permission to write on file first
    3. Specifies what error is raised at each fail point
    4. Specifies the example file name
    5. Fail to verify that the function has permission to delete the file first
14. Which is an advantage of static analysis tools?
    1. They provide the ability to test large amount of code
    2. They generate a low number of false positives
    3. They reveal configuration issues in your application
    4. They help identify security problems
    5. They help validate an identified security issue as a true vulnerability
15. Which method do you use to document graphical data of a program’s behavior when designing automated functional tests?
    1. Video thermography
    2. Screen capture
    3. Photograph
    4. Text description
    5. Sketch
16. Which testing method is Not focused on the internal structure of the software?
    1. White box
    2. Smoke
    3. Regression
    4. Black box
    5. Unit
17. Which must be included in a software specification document?
    1. The name of the developer
    2. Traceability matrix
    3. Data and control flow diagram
    4. Log of reported defects
    5. Unit and integration test reports
18. You view the source code of a web form your web browser to determine if JavaScript is used to authenticate an email address. Based on the scenario above, which test method are you using to view the source code?
    1. White box
    2. Visual
    3. Grey box
    4. Conformance
    5. Black box
19. Your company has a complex software product that has three teams working on different areas. After extensive integration testing, you deploy the code to the test environment. Based on the scenario above, which preliminary test do you run before preforming more detailed testing?
    1. Alpha
    2. Acceptance
    3. Smoke
    4. Regression
    5. Performance
20. To supplement your current testing methods with the ability to flag memory leaks and unassigned pointers, you use”
    1. Code inspection
    2. Dynamic analysis tool
    3. A configuration management tool
    4. Code execution
    5. An integrated test framework
21. You are starting a project that will serve users who are visually, audibly, or physically impaired. This will require the user interface implement technology designed to assist this group of people in using the features of the web application. Which testing method do you use to satisfy the requirement in the scenario
    1. Compatibility
    2. Accessibility
    3. Configuration
    4. Functional
    5. Performance
22. Configuration management is critical in software testing because it:
    1. Provides controls for identifying what item make up the software to be tested
    2. Provides a methodology for integration testing
    3. Provides a framework for evaluating different use-case scenarios of the product for different product configuration
    4. Helps identify all variations of a test case necessary for different configurations of software
    5. Allows copies of live data to be used in the environment, create
23. You identified a defect in your production application earlier in the weak, and now you development team has submitted a fix for the defect. Which test method do you use to retest the application?
    1. Confirmation
    2. Unit
    3. Component
    4. Security
    5. Integration
24. What is measured by e a code coverage tool?
    1. Parts of the software that have never been tested
    2. Modules or blocks of code that are added since the start of the test phase
    3. Partitions that are tested
    4. Paths of code that are tested by the test suite
    5. Modules or block of code that are tested by the test suite
25. The company has completed principal development of its new web portal and the site is functionally complete. The website was designed to give the workd a window into the focus and operation of the company. Market research leads the company to the conclusion that is should expect a steady stream of no greater than 1000 simultaneous users of its new website
    1. Load
    2. Stress
    3. System
    4. Compatibility
    5. Performance
26. Which element does a unit test include?
    1. Boundary conditions or bounds checking, coverage of every executable statement, conditional compilation
    2. Coverage of every executable statement, strick type checking, testing of high and love bounds
    3. Strick type checking ,LINT analysis ,conditional compilation
27. For which type of testing do you use Impact Analysis the most?
    1. User acceptance
    2. Regression
    3. Smoke
    4. Sanity
    5. Block box
28. Your company just bought a software package it plans to market. You are given the user’s guide and asked to write functional test cases for the new product. Which type of testing do you use for the majority of your test cases?
    1. Static code analysis
    2. Performance
    3. Component
    4. Black box
    5. White box
29. After completion of development tests, what is the primary role of the testing team in its review?
    1. Identifying logic errors in the software
    2. Assisting in debugging problem
    3. Spotting design shortfalls
    4. Finding gaps in testing
    5. Understanding the requirement better
30. You are given a user’ guide to a web-based software your company acquired with a company it purchased. you must familiarize yourself with software and begin to write a test plan. Which of tests do you start with?
    1. Regression
    2. Critical resources
    3. Performance
    4. Stress
    5. Functional
31. When designing a software test for a product using grey box testing, which documentation do you rely on to build your test?
    1. Date models and schema
    2. Interviews with software designers
    3. Evaluation of source code
    4. Interface definition and functional specifications
    5. Code inspections and walkthroughs
32. When designing a test which will employ an automated GUI testing tool, what is the basic starting point?
    1. The debugger
    2. The technical specification document
    3. The user interface
    4. A scripting tool
    5. The database
33. The project team has raised a risk that its test plan does not account for possible diversity in the user population. All of the users on the development and test team have similar technical backgrounds and may not represent a typical system users. Which test type do you use to expand the audience of users to include more diversity among testers?
    1. Beta
    2. Operational
    3. Alpha
    4. System
    5. Usability
34. Your company has been using a commercial enterprise resource planning system for the past several years. The company is pleased with the system, but it is running on hardware that will soon be out of warranty and needs to be decommissioned. The company wants to mitigate the risk of hareware failure by transitioning the system to new hardware before the old hardware is retired. Which testing method do you implement that addresses the transition requirement?
    1. Performance
    2. Load
    3. Stress
    4. System
    5. Parallel
35. Your software project is a desktop application. The project is nearing the end of its development cycle and will be ready to launch soon. Your company wants to customer’s first experience with the software to be a good experience. Which testing do you conduct to ensure that the customer’s initial interation with you application is positive
    1. System
    2. Compatibility
    3. Installation
    4. Usability
    5. Acceptance
36. Which is the fundamental different between block box and white box testing?
    1. It is easier to tell that a white box test case passed or failed
    2. Testers have access to the code and funcational design specification when using white box
    3. Testers write their own test cases when using black box testing technique
    4. It is easier to tell that a black box test case passed of failed
    5. Testers are the actual user of the software when using white box testing
37. Which testing practice do you use to implement IEEE standard 1044-2009 for the classification of software anomalies?
    1. Test coverage
    2. Verification efficiency
    3. Test execution status
    4. Maintainability
    5. Tracking of failure reports
38. Your team is building software for transactional banking. It is critical that if an unexpected event occurs, the software does not fail or suffer any loss of data. Which type of testing do you include in your testing plan to meet these requirement?
    1. Monkey
    2. Sanity
    3. Scalability
    4. Storage
    5. Recovery
39. A large number of new features were just released for testing. Management has set a tight deadline for release, and there may not be time to test all features. Ensuring a smooth release is critical for your customers. You begin with test cases for?
    1. Large areas of code changes
    2. High risk items
    3. Simple features
    4. Complex items
    5. Existing feature
40. What occurs when a program attempts to write more data to a block of memory than the block is allocated to hold?
    1. An arithmetic overflow
    2. A buffer overflow
    3. A truncated value
    4. A stack overflow
    5. An interrupt in the stack
41. The company you work for is interesting in developing an automated test framework for its application. The application is somewhat limited in the feature and functions it provides to its user. The single path of business functionality is capable of processing facts, figures, and records from a variety of different input format. Which automated test framework method do you implement to meet the company’s need?
    1. The plan driven
    2. Functional decomposition
    3. Data driven

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This course help you to pass Foundation certification.

Learning Objective:

* To understand fundamental principles software testing
* To learn the importance of test process, objectives, techniques and tools
* To understand the Fundamental test management principles
* To learn how to select and implement tools effectively

ISTQB Introduction (International Software Testing Qualification Board (ISTQB) course

* Train staff involved in testing related activities such as developers, testers and managers
* Attempt and pass the external ISTQB Foundation exam in software testing

CTFL: Certified Tester Foundation Level

CTAL: Certified Tester Advanced Level

CTEL: Certified Tester Expert level

1. Which defects are Often much cheaper to remove?
   1. Defects that detected early
2. Purpose of test design technique is to:
   1. Identifying test condition and test cases
3. Which ordering of the list below gives increasing levels of test independence? A) Test designed by a fellow-member of the design team. B) Tests designed by a different group within the organization. C) Tests designed by the code author. D) Tests designed by different organization

C, a, b, d

1. Testing should be stopped when:
2. It depends on the risks for the system being tested
3. Which is NOT the testing objectives?
   1. Debugging defects
4. Which is NOT a testing principle?
   1. Exhaustive testing
5. A software error can be described as”
   1. A mismatch between the program and its specification
6. Which of the following are characteristics of good testing in any life cycle model? A) Every development activity has a corresponding test activity. B) Testers review development document early. C) There are separate levels for component and system integration test. D) Each test level has objectives specific to that level. E) Each test level is based on the same test basis.
   1. A,b,d
7. A software model that can NOT be used in functional testing is:
   1. Menu introduction model
8. Designing the test environment set-up and identifying any required infrastructure and tools are a part of which phase?
   1. Test Analysis and design
9. What is the main benefit of designing tests early in the life cycle?
   1. It helps prevent defects from being introduced into the code

Module 2 Objectives:

Explain basic testing terminology

Explain why testing is necessary

Be able to define error, fault and failure

Explain the fundamental test process

Explain that developers and testers have different mindsets

Find out why you cannot test your own work

What is testing?

* Planning, preparation, evaluation
* To find defects
* To gain confidence about the level of quality
* To provide information for decision-making
* To prevent defects

Why is testing necessary?

* Software is likely to have faults
* To learn about the reliability of the software
* Failures are very expensive.
* To avoid being sued by customers
* To stay in business

Seven Principles of Testing

1. Testing shows presence of defects
2. Exhaustive testing is impossible
3. Early testing
4. Defect clustering
5. Pesticide paradox
6. Testing is context dependent
7. Absence of errors fallacy

Fundamental Test Process

* Test Planning and Control
  + **Test Planning:** Specifies how the test strategy and project Test Plan applies to the software under test.
  + **Test Control:** Comparing the actual progress against the plan
  + Reporting status, including deviation from the plan
  + Taking necessary actions to meet the mission and objectives of the project
  + Monitoring the activities throughout the project
* Test Analysis design
  + General testing objectives are transformed into tangible Test Conditions and Test Cases
  + Tests should be designed using the test design techniques selected in the test planning activity.
* Test Implementation and execution
  + Test Cases are combined in a particular order to form Test Procedures Specification (Test Scripts)
* Evaluating exit criteria and reporting
  + Test execution is assessed against the objectives defined in Test planning
  + This should be done for each Test level (test stage) – A group of test activities that are organized and managed together
* Test closure activities
  + Collect data from completed test activities to consolidate experience, Testware, facts and numbers.

The Psychology of Testing

* The mindset to be used while testing and reviewing is different from that used while developing software
* Developers are able to test their own code with the right mindset.
* Separation of this responsibility to a tester is typically done to help focus effort and provide additional benefits, such as an independent view by trained and professional testing resources.

Test

1. To test a function, the programmer has to write a …… , which call to function to be tested and passed it test
   1. Driver
2. Different between re-testing and regression testing is:
   1. Re-testing is running a test again, regression testing looks for unexpected side effects
3. What test can be conduct for off-the-shelf software to get market feedback?
   1. Beta testing
4. No functional system testing includes:
   1. Testing quality attributes of the system including performance and usability
5. The main focus of acceptance testing is:
   1. Testing for a business perspective
6. A system under development contains complex calculation and decision logic, and it is assessed as high risk because of the relative inexperience of the development team in the application domain. Which of the following would be the most appropriate choice of test design technique for component testing
   1. Decision testing
7. Regression testing should be performed ;a) every week, b) after the software has changed, c) as often as possible, d) when the environment has changed, e) when the project manage says to do so,
   1. B&d are true, a, c & e are false
8. Explain how much testing is enough?
   1. The answer depends on the risk for your industry, contract and special requirements
9. Which testing preforms sufficient testing to evaluate every possible condition in the application system. This is only test method thatt guarantee proper functioning of the app system
   1. Basic path testing
10. In any software development life cycle model, a) providing complete test coverage of all branches of the system code, b) having a corresponding testing activity for each development activity, c) testers should be involved in reviewing documents as soon as drafts are available d) each test level has test objectives
    1. B,c & d
11. Which of the following is not a type of non-functional test?
    1. State-transition
12. Which is the difference between component testing and integration testing?
    1. Component testing searches for defects; integration testing tests interfaces
13. What type of tools to be used for Regression testing?
    1. Record/playback
14. In which phase does the majority of system errors occur?
    1. Requirements phase
15. Which of the following is the odd one out?
    1. Functional
16. A common test technique during component test is:
    1. Statement and branch testing
17. When to stop testing?
    1. Stop when scheduled time for testing expires
18. Which of the following are true in relation to component testing? A) stubs may be used. B) may cover resource behavior e.g. memory leak c) tests the interaction between software component d) defects are typically fixed without formally managing these defects
    1. A,b,d
19. Which additional test level could be introduced into a standard V-model after system testing?
    1. System integration testing
20. In this testing, the entire system is tested to verify that all functional information, structural and quality requirements have been met. This testing is predetermined combination of test cases, which designed that when executed satisfies the management that the system specification are met?
    1. User acceptance testing
21. How is the scope of maintenance testing assessed?
    1. Scope is related to the risk, size of the changes and size of the system under test
22. Non-functional system testing include?
    1. Testing quality attributes of the system including performance and usability
23. What test can be conducted for off-the-shelf software to get market feedback?
    1. Beta testing
24. What is the acceptance test cases based on?
    1. Requirement
25. The main focus of acceptance testing is:
    1. Testing for a business perspective
26. What is the key difference between a) contract and regulation acceptance testing, and b) alpha and beta testing”
    1. Are for custom-development software b) are for off-the-shelf software

**Module 3: Testing through the Software life cycle**

Objectives:

* Describe the different software models
* Explain the various the levels
* Describe the test types

SDLC:

* is a process used by software industry to design, develop and test high quality software.
* It aims to produce a high quality software that meets or exceeds customer expectations, reaches completion within time and cost estimates.
* It is a framework defining tasks performed at each step in the software development process.
* There are various SDLC models defined and designed and used during the development process known as “Software Development Process Models”.

V-Model

* Verification: Have we build right product?
* Validation: is this the right product?

Testing within a Lift Cycle Model

* Requirement
* Design
* Development
* Testing
* Implementation

Integrative-Incremental development Models

* Establish Requirement
* Design the system
* Test the system
* Build the System

Test Levels

* Component Testing
  + The testing the individual software components
* Integration Testing
  + Testing performed to expose defects in the interfaces and in the interactions between integrated components or systems
* System Testing
  + The process of testing an integrated system to verify that it meets specified requirements
* Acceptance Testing
  + Usually for ensuring the system is ready for deployment into production

Test Types

* A function to be performed by the software
* A non-functional quality characteristic, such as reliability or usability
* The structure or architecture of the software or system
* Changes related which means confirming that defects have been fixed and looking for unintended changes
* **Maintenance Testing:** is done on an existing system, and is triggered by modification, migration, or retirement of the software or system
* **Regression Testing:** Regression testing is the repeated testing of an already tested program, after modification, to discover any defects introduced or uncovered as a result of the changes
* **Re-testing:** after a defect is detected and fixed, the software should be re-tested to confirm that the original defect has been successfully removed.
* **Structural Testing:** Structural (white Box) testing may be performed at all test levels. Structural techniques are best used after specification-based techniques, in order to help measure the thoroughness of testing through assessment or coverage of a type of structure.
* **Functional Testing:** Testing based on an analysis of the specification of the functionality of a component or system.
* **Non-functional Testing:** Testing the attributes of a component or system that do not relate to functionality. For example reliability, efficiency, usability, maintainability and portability

Assessment for Module 3:

1. Find the correct flow of the phases of a formal review.
   1. Planning, Review meeting, Rework, Follow up
2. Which of the following is a static test?
   1. Code Inspection
3. Static analysis is best describe as:
   1. The analysis of program code
4. Which of the following are the typical defects found by static analysis tools? A) variables that are never used. B) security vulnerabilities. C) Poor performance. D) Unreachable code, E) Business processes not followed
   1. A,B,D are true, c,e are false
5. A statement Coverage will not check for ……………………………
   1. Missing statements
6. Which of the following statements about early test design are true and which are false. A) Defects found during early test design are more expensive to fix. B) Early test design can find defects. C) Early test design can cause changes to the requirements. D) early test design takes more effort.
   1. B,C are true , A, D are false
7. Unreachable code would best be found using:
   1. Code reviews
8. Which statement about the function of a static analysis tool is true?
   1. Gives quality information about the code without executing it.
9. Which expression best matches the following characteristics or review process; A) led by author. B) Undocumented. C) No management participation. D) Led by a trained moderator or leader. E) uses entry exit criteria. I) inspection. Ii) peer review. Iii) informal review. iv) walkthrough
   1. I = d & E; ii = C; iii = B; iv = a
10. Which of the following characteristics and types of review processes belong together? 1. Led by the authoer. 2. Undocumented. 3. No management participated. 4. Led by trained moderator or leader. 5. Uses entry and exit criterial. S) inspection, T) Technical review, U) informal review, V) walkthrough
    1. S = 4 & 5, t = 3, u = 2, v = 1

**Module 4: Static Techniques**

Objective:

* Explain the various review techniques that you can apply to documentation and code
* Explain the difference between walkthroughs, formal reviews and inspections
* Explain how static analysis techniques can detect errors in code

Static Testing and the Test Process:

* Static testing techniques relies on manual examination and automated analysis of code or other project document
* Software product that can be reviewed are requirements specification, code, test plans, test specification, test cases, test scripts, user guides or web pages
* Static testing techniques involve examination of the project’s documentation, software and other information about the software products without executing them
* Static techniques find causes of failure (defects) rather that the failure themselves

Types of defects:

* Deviation from Standards
* Design Defects
* Incorrect interface Specification

Benefit of static Testing:

* Early defect detection and correction
* Development productivity improvement
* Reduced development timescales
* Reduced testing code and time
* Lifetime cost reduction
* Fewer defects
* Improved communication
* Find omissions in requirements
* Find causes of failure

Review Process:

* Formal review
  + **Planning:** Defining the entry and exit criteria
  + **Kick-off:** Checking entry criteria
  + **Individual preparation:** Nothing potential defects, questions, and comments
  + **Examination/evaluation/recording of result:** Examining, evaluating and recording of results during tracking any group electronic communications
  + **Rework:** fixing defects found
  + **Follow-up:** checking on exit criteria

Review process: role and responsibility

* Manager:
  + Decides on the execution of reviews, allocate time in project schedules and determines if the review objectives have been met
* Moderator:
  + Lead, plans and runs the review. May mediate between the various points of review and is often the person upon whom the success of the review rests
* Author:
  + Holds chief responsibility for the documents to be reviewed
* Reviewers:
  + Identifies and describes findings, and takes part in any review meetings. They are individuals with a specific technical or business background
* Scribe/Recorder:
  + Documents all the issues, problems and open points that were identified during the meeting

Types of Reviews

* Informal Review
* Walkthrough
* Technical review
* Inspection

Static Analysis by Tools

* To find defects in code and models
* Mainly before and during component and component integration testing
* Typically for; standards checking, variable not initialized, high complexity measures, variables defined but not used, syntax violation
* Generally by Developers

Module 3 Assessment

1. Order numbers on a stock control system can range between 10000 and 99999 inclusive. Which of the following inputs might be a result of designing test for only valid equivalence classes and valid boundaries:
   1. 10000, 50000, 99999
2. …………………. Technique can be used to achieve input and output coverage
   1. Equivalence partitioning
3. Boundary value analysis can only be used during white-box testing
   1. False
4. Which of the following are structure-based techniques? A) Decision table testing. B) Boundary value analysis. C) Multiple condition coverage. D) Use case testing. E) Decision testing.
   1. C & E
5. Equivalence testing divides the input domain into classes of data, from which test cases can be derived to reduce the total number of test cases that must be developed.
   1. True
6. Which of the following is true about White and Black box testing technique:
   1. Equivalence partitioning, state transition, use case testing are block box testing techniques
7. White Box Testing is:
   1. Same as glass box testing and same as clear box testing
8. Error guessing is best used?
   1. After more formal techniques have been applied
9. Which of the following is NOT a block box techniques?
   1. Linear Code Sequence and Jump (LCSAJ)
10. Equivalence partitioning is:
    1. A block box testing technique appropriate to all levels of testing

**Module 5: Test Design Techniques**

Objectives

* Explain about the test development process
* Explain about the black box testing and white box testing techniques
* Explain how to use equivalence partitioning and boundary value analysis to design test cases
* Describe the use of state transition testing
* Explain the difference between statement testing and branch testing
* Explain that testing techniques can be supplemented by error guessing

The Test Development Process

* Test condition
  + The conditions are binary statement which determine a system’s fitness for purpose
  + Defines what we must test and is referred to as a Test item.
  + Grouped by Test Object or system function/process.
  + Test Conditions should be linked back to their source documents from which they are derived.
    - Impact Analysis
    - Traceability
* Test Cases
  + Define how the system should be tested.
    - Input values
    - Execution pre conditions
    - Expected result ( output, changes in state and so on)
    - Cross referenced test conditions
* Test Procedures
* Test Execution Schedule

The Process define what and how!!

Categories of Test Design Techniques

* **Black box Testing**
  + It is either functional or non-functional
  + Testing without knowing / reference to the internal working of the code
  + It tests WHAT as system does, rather than HOW it does it.
* Specification based testing
  + Tests are created from the requirements.
  + Specification models can used for systematic test case design
* Experience based testing
  + Experience based techniques are non-structured and do not rely on specification documents
  + It cannot be measured in terms of coverage

1. **Equivalence Partitioning** 
   1. If you want to allow a user to select only 10 nominations for a group even, what would you do?
2. **Boundary Value Analysis**
   1. Boundary Value analysis (BVA) uses the same analysis of partitions as EP and is usually used in conjunction with EP in test case design
3. **Decision Table**
   1. This is a table based techniques where inputs to the system are recorded and the outputs to the system are defined.
4. **State Transition Testing**
   1. State diagram: A diagram that depicts the states that a component or system can assume and shows the events or circumstances that cause and/or result from a change from one state to another
   2. State table: A grid showing the resulting transitions for each state combined with each possible event, showing both valid and invalid transitions.
   3. State transition: A transition between two states of a component or system
   4. State transition testing: A block box design technique in which test case are designed to execute valid and invalid state transitions, also known as N-switch testing
5. **Use Case Testing**
   1. Describing requirements
   2. Structured approach
   3. One flow or alternative flows
   4. Determines tests for (Functional) Systems Test and for UAT
   5. Detect defects in the integration of interface

* **White Box Testing**
  + Testing based on an analysis of the internal structure of the component or system
  + Also known as structural or glass box testing or structure based testing.
  + Based on code and the design of the system

1. **Statement Testing** 
   1. Aim to display that all executable statements have been run at least once
2. **Branch Testing** 
   1. Aim that the True and False of each Boolean operand is tested
3. **Decision Testing** 
   1. Aim to demonstrate that all Decision have been run at least once

* Experience Based Techniques

1. **Error Guessing**
   1. Use experience to postulate error
   2. Used as Error guessing to complement test design techniques
   3. Used as “mopping up” approach to supplement systematic techniques
   4. Used to identify special tests not easily captured by formal techniques, especially when applied after more formal approaches
   5. So don’t use as a first choice technique
2. **Exploratory testing**
   1. Is a concurrent process where: Test design, execution and logging happens simultaneously
   2. Testing is often not recorded
   3. Makes use of experience, heuristics and test patterns
   4. More structured than error guessing

**How to choose the right technique?** Type of system, standards, testing objectives, knowledge/skills of the testers, customers or contractual requirement, level of risk, type of risk, documentation available, development processes

Module 5 assessment:

1. Which one of the following statement is true about approaches to test estimation?
   1. A metrics-based approach is based on data gathered from previous projects; an expert-based approach uses the knowledge of the owner of the tasks or experts
2. Which of the following is a MAJOR task of evaluating exit criteria and reporting?
   1. Writing a test summary report for stakeholders
3. Which of the following is NOT included in the Test Plan document of the Test Documentation Standard?
   1. Quality plans
4. When reporting faults found to developers, testers should be:
   1. As polite, constructive and helpful as possible, firm about insisting that a bug is not a feature if it should be fixed, diplomatic
5. We split testing into distinct stages primarily because:
   1. Each test stage has a different purpose
6. What information need not be include in a test incident report?
   1. The actual and expected outcomes
7. In which activity of the Fundamental Test process is the test environment set up?
   1. Test implementation and execution
8. A configuration management system would not normally provide:
   1. Facilities to compare test results with expected results.
9. Test are prioritized so that you:
   1. Do the best testing in the time available
10. IEEE 829 test plan documentation standard contain all of the following except:
    1. Test specifications
11. Which of the following would NOT normally form part of a test plan?
    1. Incident reports

Module 6

Objectives:

* Explain how the testing process can be organized.
* List the different roles in a test team
* Explain the various test approaches use
* Describe the importance of test estimation, monitoring and control
* Explain the need for configuration management of the test assets
* Explain how and why incidents must be logged and tracked.

Test Organization

Test Independence:

* Is effective for a non-developer
* is impartial
* Has no pre-conceived ideas
* Has no emotional attachment

Level of Test Independence

* Independent Testers
  + Acceptance Testing
  + System Integration Testing
  + System Testing
* Developers
  + Component Integration Testing
  + Component Testing

Benefits of test Independence:

* Unbiased
* Verify assumption
* Cost saving
* Fever defects
* Better to rent than to own

Drawback of test independence:

* Isolation
* Bottle neck at the last minute
* Lose responsibility for quality
* Greater cost – consider viability
* Outsourcing is a risk

Who does What?

* Independent Testers: Some or all of the testing should be carried out by independent testers
* Developers: Developer may contribute as the lower level
* Specialists: Specialists testers mainly play a role at Functional, Non-Functional and System Integration test level
* Administration: The business and System administration provide testing for Acceptance testing
* Management: The test processes and rules are often defined by the Independent testers but must be agreed by management

Roles and Tasks

1. Test Leader
   1. Test manager or test coordinator
      1. Project manager
      2. QA manager
      3. Development manager
   2. In large projects
      1. Test manager
      2. Test (team) leader
   3. Key tasks of a leader are:
      1. Test Planning
      2. Test Monitoring
      3. Test Control
2. Tester
   1. Specialists in a particular area
      1. Automation
      2. Performance
      3. Usability
      4. Security
   2. May work more generally doing:
      1. Test Analysis
      2. Test Design
      3. Test Execution
      4. Test Environment management
      5. Test Data management

Defining a Test Plan

1. Scope
   1. Documenting what is in scope for the testing engagement
2. Objectives
3. Risks
   1. Recording risks, assumption and mitigations
4. Scheduling
5. Approach
6. Integrating and coordinating
7. Making decisions
8. Assigning resources
   1. Assigning resources for the different tasks defined
9. Testware definition
10. Selecting metrics
11. Process

Exit criteria in Test plan

* Testing
  + End of all testing which is when a product go live happens
  + End of phase of testing which is the hand over from system Test to UAT

Test Estimation – why?

* Establishment of budgets
* Procurement of resources
* Production of a schedule for use in tracking and control

Test Estimation- How

* Metrics from similar or previous project or typical values
* Size of project: function point analysis, Line of Code
* Metrics such as: Length of time in preparation, Length of time in execution, Defect turnaround time, Down time and delay
* Compare metrics from similar sized projects

Test Approaches

1. Analytical Approach
   1. Risk-based testing where testing is directed to area of greatest risk
2. Model-based Approach
   1. Stochastic testing using statistical info about failure rates such as reliability growth models or usage such as operational profiles
3. Methodical Approach
4. Process- or Standard-compliant Approach
5. Dynamic and Heuristic Approach
6. Consultative Approach
7. Regression-Averse Approach

How to select A Test Approach?

* Risk, Skills, Objective, Regulations, Nature

Why is test monitoring necessary?

* Need to know the status of the testing project at any given point in time.
* Need to provide visibility on the status of testing to other stake holders
* Need to be able to measure your testing against your defined exit criteria
* Need to be able to assess progress against: Planned schedule, Measure how you are tracking against your defined budget

Test Monitoring Process Typical Metrics :

* Test Preparation
* Test environment preparation
* Test case execution
* Defect statistics
* Test coverage
* Dates
* Testing costs
* Subjective confidence

Configuration and Control

* Purpose: Configuration management Integrity, software or system, project and product life cycle

Incident management

* Define any event occurring that requires investigation, any discrepancy between actual and expected result

Module 6 Assessment

1. The following factors should be considered for the Test tool selection ( test environment) a) Test Phase, b) Test objective, C) Test technique, D) test deliverable
   1. All of them
2. A typical commercial test execution tool would be able to perform all of the following, except:
   1. Calculation the expected outputs
3. When a new testing tool is purchased, it should be used first by:
   1. A small team who establish the best way to use the tool
4. Tools like change Man, Clear case are used as
   1. Configuration management tools
5. Which of following tools would be involved in the automation of regression test?
   1. Capture / playback
6. Load testing tools:
   1. All of above
7. What is purpose of code coverage tools?
   1. They are used to show the extent to which the logic in the program was execute during testing
8. Tools can be tremendously helpful in improving the efficiency and quality of testing?
   1. True
9. Tools usage is:
   1. Very helpful in regression testing, Save time, helpful in simulating user
10. A tool that supports traceability, recording of incidents or scheduling of tests:
    1. Configuration management tool

Module 7: Tool support for testing

Objective:

* List the types of tools available for testing
* List the benefits for various test tools
* Define how a tool can be implemented in an organization

Computer Aided Software Test Tools (CAST)

Type of Tools:

1. Management of tests
   1. Interface of other tools
   2. Analysis of metrics and progress report
2. Static Testing
   1. Store info on reviews
   2. Manage reviews

* Static Analysis Tools: Code Standards, Code complexity and so on.
* Modeling tools: Database model checker

1. Test Specification
   1. Generate test input or tests based on Unified Modeling Language (UML) or design
   2. Provide structure or states
2. Test Execution and Logging
   1. Scripting
   2. Record and Play
   3. Log incidents
   4. Data driven
3. Performance and Monitoring
4. Specific Application Areas
   1. Embedded testing

Success Factors for Tool Roll-Out

1. Incremental roll-out
2. Adapt Processes
3. Training
4. Learn Lesson and monitor usage
5. Produce Guidelines
6. Other success factors

Windows 10 (loader) (on /dev/sda2)

menuentry / script: os-prober