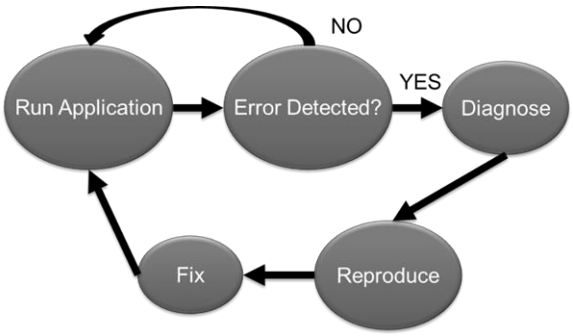
Introduction to Software Testing

- **Debugging**

It is performed heavily by the programmer in a programming phase to find problems and get them fixed.



- **Software Testing**

It is any activity conducted to a program with an intention of finding the existence of different classes of defects/faults and removed them before they are given to everyday stakeholders.

Retrieved from: *http://blogs.aspect.com/wp-content/uploads/2017/03/Software-Testing.png*

- **Software Testing Principles**
  - All tests should be traceable to customer requirements.
  - The test should be planned long before testing begins.
  - The Pareto principle applies to software testing.
  - Testing should begin "in the small" and progress toward testing "in the large".
  - Exhausting testing is not possible.
  - To be most effective, testing should be conducted by an independent third party.

- **Verification**

It ensures that the product is being built according to the requirements and design specification.

Retrieved from: *http://www.professionalqa.com/assets/images/software-verification.jpg*

- **Validation**

It ensures that the product actually meets the stakeholder's needs and that the specifications were correct in the first place.

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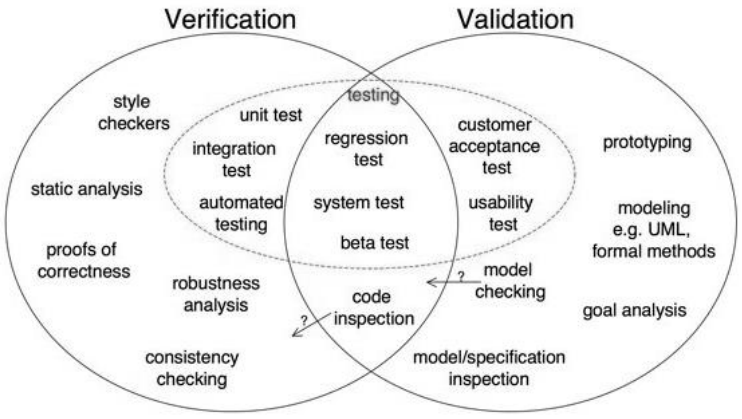
- **A Range of Verification and Validation Techniques**

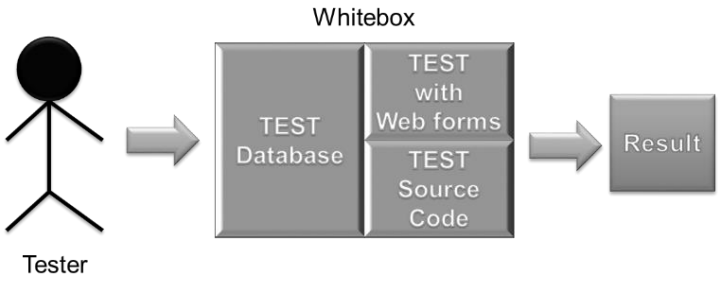


Retrieved from: *http://www.easterbrook.ca/steve/2010/11/the-difference-between-verification-and-validation/*

Software Test Case Design Methods

- **White-Box Testing**

It is a test case design method that focuses on the internal workings of the software product, specifically, the logic and the structure of the code.



- **Basis Path Testing**

It is a white-box testing technique that enables the test case designer to find independent paths that must be followed to guarantee that each statement is executed at least once.

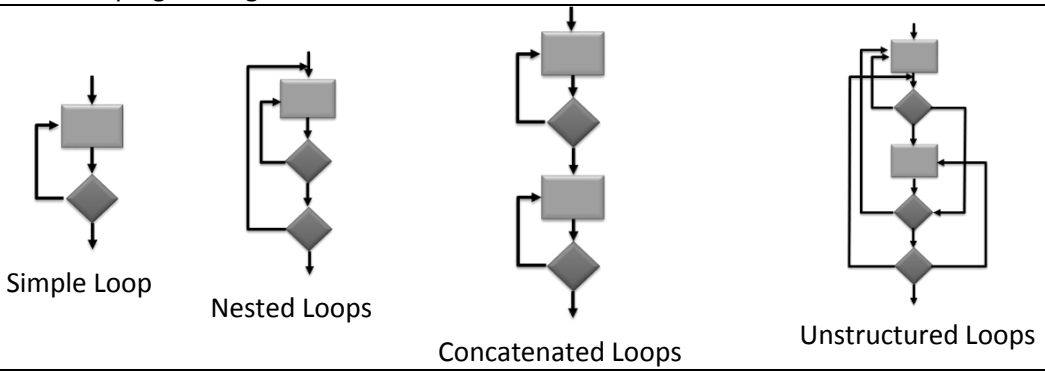
Retrieved from *http://hackingig.com/what-is-basis-path-testing-in-software-testing*

- **Control Structure Testing**

It is a white-box testing technique that tests three (3) types of program controls such as:

- Condition Testing
- Data Flow Testing
- Looping Testing

- **Four Classes of Iteration**



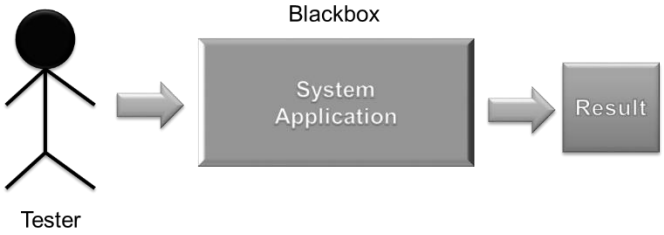
- **Advantages of White-Box Testing:**

- Introspection
- Stability
- Thoroughness

- **Disadvantages White-Box Testing:**
  - Complexity
  - Fragility
  - Integration

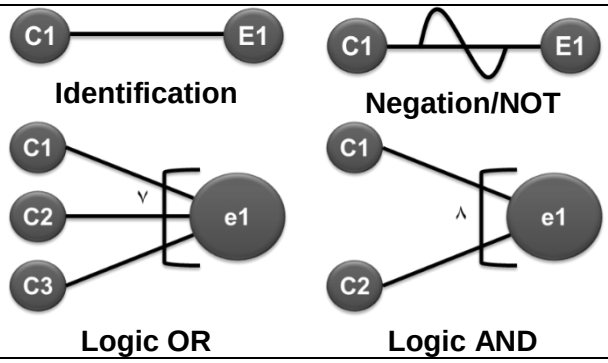
- **Black-Box Testing**

It is a test case design method that focuses on testing the functional aspect of the software whether it complies with functional requirements.



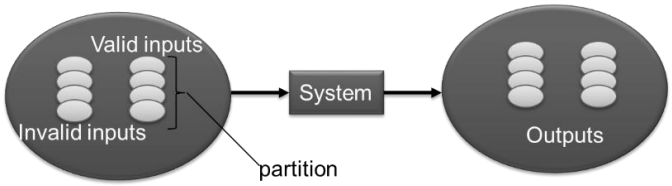
- **Black-Box Testing Forms:**
  - Graph Based Testing

It is a black-box testing technique that uses objects that are modeled in software and establishing the relation between the effect and its causes.



  - Equivalence Testing

It is a black-box testing technique that divides the input domain of the program into partitions of data from which test cases can be derived.



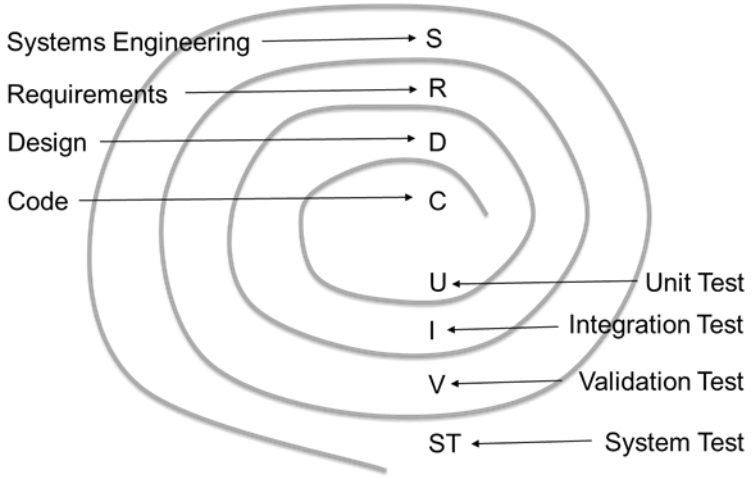
  - Boundary Value Testing

It is a black-box testing technique that uses the boundaries of the input domain or where the extreme boundary values are chosen to derive test cases.

- **Advantages of Black-Box Testing:**
  - Ease of use
  - Quicker test case development
  - Simplicity

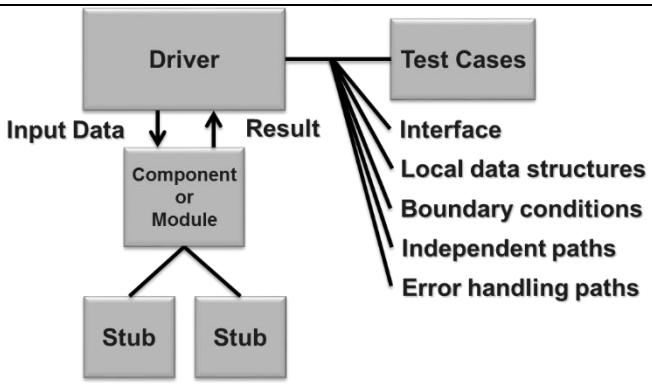
- **Disadvantages Black-Box Testing:**
  - Script maintenance
  - Fragility
  - Lack of introspection

- **Spiral View of Software Engineering Process and Testing Strategy**



- **Unit Testing**

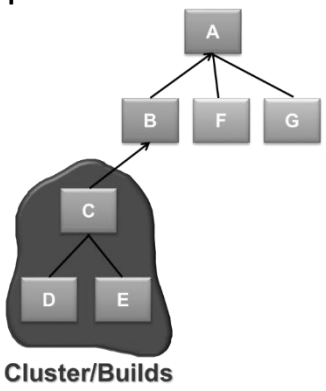
It is the basic level of testing that has an intention to test the smaller building blocks of a program and concentrates on each unit of the software as implemented in the source code to confirm that each performs its assigned function.



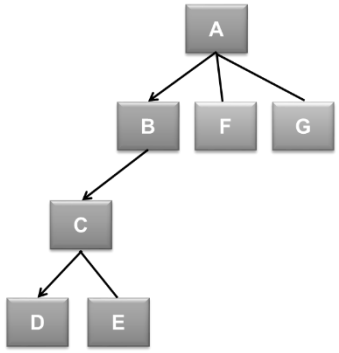
- **Integration Testing**

It is where individual software modules that have been through the unit testing phase are combined and tested as a group to verify if each module performs correctly within collaboration and that each interface is correct.

Approaches:



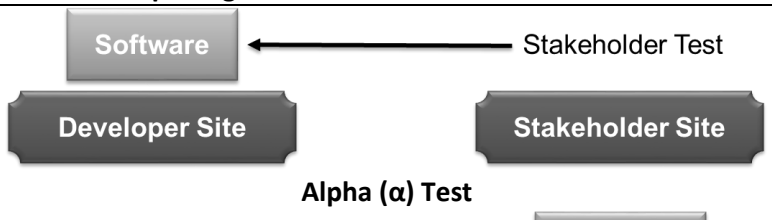
Bottom-Up Integration



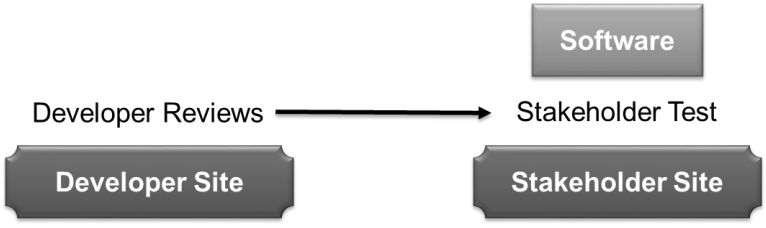
Top-Down Integration

- **Validation Testing**

It is accomplished through a series of black-box tests that show conformity with requirements.



Alpha (α) Test

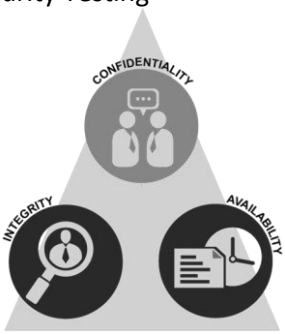


Beta (β) Test

- **System Testing**

  It is a series of different tests of an integrated hardware and software system whose main objective is to evaluate the system's compliance with its specified requirements.

  - Security Testing



CIA Triad

Retrieved from: http://www.zenithtechnologies.com/wp-content/uploads/2016/01/CIA-Graphics.png

  - Stress Testing
  - Robustness Testing
  - Performance Testing
  - Usability Testing
  - GUI Software Testing
  - Reliability Testing

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