Strategies of Software Testing during integration

As we already studied about integration level of testing, Integration testing is a systematic technique for constructing the program structure while at the same time conducting tests to uncover errors associated with interfacing. The objective is to take unit tested components and build a program structure that has been dictated by design.
Different Integration testing Strategies are discussed below:-
1) Top down Integration testing
2) Bottom up Integration testing

Top down Integration-Top-down integration testing is an incremental approach to construct program structure. Modules are integrated by moving downward through the structure, beginning with the main control module. Modules subordinate to the main control module are incorporated into the structure in either a depth-first or breadth-first manner.
The integration process is performed in a series of five steps:

1. The main control module is used as a test driver and stubs are substituted for all components directly subordinate to the main control module.
2. Depending on the integration approach selected subordinate stubs are replaced one at a time with actual components. 3. Tests are conducted as each component is integrated.
4. On completion of each set of tests, another stub is replaced with the real component.
5. Regression testing may be conducted to ensure that new errors have not been introduced.

It is not as relatively simple as it looks. In this logistic problem can arise. Problem arises when testing low level module which requires testing upper level. Stub replace low level module at the beginning of top down testing. So no data can flow in upward direction.

Bottom up Integration Bottom-up integration testing, as its name implies, begins construction and testing with atomic modules. Because components are integrated from the bottom up, processing required for components subordinate to a given level is always available and the need for stubs is eliminated.

A bottom-up integration strategy may be implemented with the following steps:

1. Low-level components are combined into clusters that perform a specific software subfunction.
2. A driver is written to coordinate test case input and output.
3. The cluster is tested.
4. Drivers are removed and clusters are combined moving upward in the program structure.

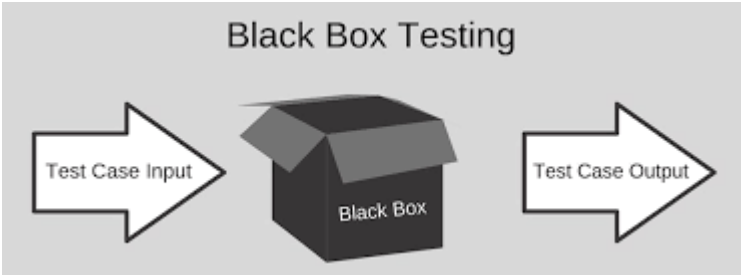
Misc.Testing Approaches

Tests can be conducted based on two approaches –
1)Functionality testing
2)Implementation testing
When functionality is being tested without taking the actual implementation in concern it is known as **black-box testing**. The other side is known as **white-box testing** where not only functionality is tested but the way it is implemented is also analyzed.

Exhaustive tests are the best-desired method for a perfect testing. Every single possible value in the range of the input and output values is tested. It is not possible to test each and every value in real world scenario if the range of values is large.

1)Black-box testing

It is carried out to test functionality of the program. It is also called 'Behavioral' testing. The tester in this case, has a set of input values and respective desired results. On providing input, if the output matches with the desired results, the program is tested 'ok', and problematic otherwise.



In this testing method, the design and structure of the code are not known to the tester, and testing engineers and end users conduct this test on the software.
Black-box testing techniques:

- **Equivalence class -** The input is divided into similar classes. If one element of a class passes the test, it is assumed that all the class is passed.

- **Boundary values -** The input is divided into higher and lower end values. If these values pass the test, it is assumed that all values in between may pass too.

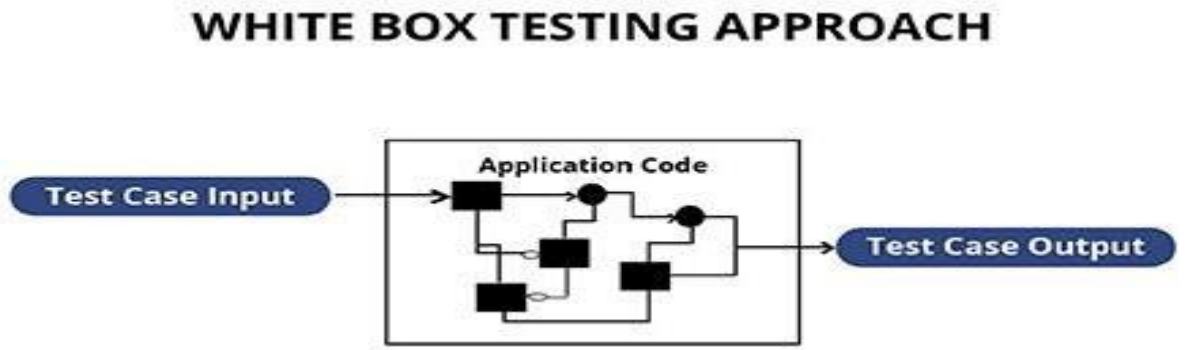
- **Cause-effect graphing -** In both previous methods, only one input value at a time is tested. Cause (input) – Effect (output) is a testing technique where combinations of input values are tested in a systematic way.

- **Pair-wise Testing -** The behavior of software depends on multiple parameters. In pairwise testing, the multiple parameters are tested pair-wise for their different values.

- **State-based testing -** The system changes state on provision of input. These systems are tested based on their states and input.

2- White-box testing

It is conducted to test program and its implementation, in order to improve code efficiency or structure. It is also known as 'Structural' testing.



In this testing method, the design and structure of the code are known to the tester. Programmers of the code conduct this test on the code.

The below are some White-box testing techniques:

- **Control-flow testing -** The purpose of the control-flow testing to set up test cases which covers all statements and branch conditions. The branch conditions are tested for both being true and false, so that all statements can be covered.

- **Data-flow testing -** This testing technique emphasis to cover all the data variables included in the program. It tests where the variables were declared and defined and where they were used or changed.

UNIT-5

Software Project Management

The job pattern of an IT company engaged in software development can be seen split in two parts:

- Software Creation
- Software Project Management

A project is well-defined task, which is a collection of several operations done in order to achieve a goal (for example, software development and delivery). A Project can be characterized as:

- Every project may has a unique and distinct goal.
- Project is not routine activity or day-to-day operations.
- Project comes with a start time and end time.
- Project ends when its goal is achieved hence it is a temporary phase in the lifetime of an organization.
- Project needs adequate resources in terms of time, manpower, finance, material and knowledge-bank.

Software Project

A Software Project is the complete procedure of software development from requirement gathering to testing and maintenance, carried out according to the execution methodologies, in a specified period of time to achieve intended software product.

Need of software project management

Software is said to be an intangible product. Software development is a kind of all new stream in world business and there's very little experience in building software products. Most software products are tailor made to fit client's requirements. The most important is that the underlying technology changes and advances so frequently and rapidly that experience of one product may not be applied to the other one. All such business and environmental constraints bring risk in software development hence it is essential to manage software projects efficiently.

The image above shows triple constraints for software projects. It is an essential part of software organization to deliver quality product, keeping the cost within client's budget constrain and deliver the project as per scheduled. There are several factors, both internal and external, which may impact this triple constrain triangle. Any of three factor can severely impact the other two.

Therefore, software project management is essential to incorporate user requirements along with budget and time constraints.

Software Project Manager

A software project manager is a person who undertakes the responsibility of executing the software project. Software project manager is thoroughly aware of all the phases of SDLC that the software would go through. Project manager may never directly involve in producing the end product but he controls and manages the activities involved in production.

Let us see few responsibilities that a project manager shoulders -

Managing People

- Act as project leader
- Liaison with stakeholders
- Managing human resources
- Setting up reporting hierarchy etc.

Managing Project

- Defining and setting up project scope

- Managing project management activities
- Monitoring progress and performance
- Risk analysis at every phase
- Take necessary step to avoid or come out of problems
- Act as project spokesperson

Assignment

1-Differentiate between white Box Testing and Black Box Testing.

2- What are responsibilities of Software Project Manager.

Note-write the assignment in your software engineering copy only.

For web reference-https://nptel.ac.in/courses/106/105/106105182/
For video use module number 9,10 of above link..