

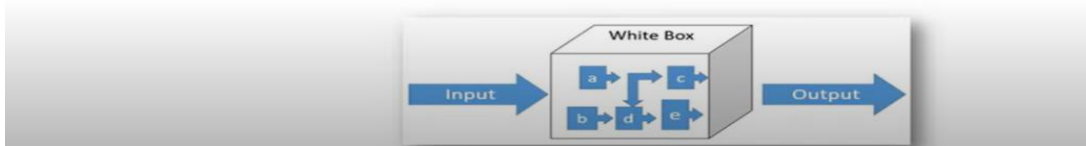
About White Box Testing

- White box testing techniques analyze Internal design, Code structure & working of the complete software product.
- It is also called Clear box testing, Open box testing, Transparent box testing, Code-based testing and Glass box testing.
- Tester has knowledge about the internal structure or the programming of the software.
- It is mostly done by software developers.
- Perform with Unit Testing & Integration Testing.
- **White Box Testing Tools:** EclEmma, Nunit, PyUnit, HTMLUnit, CppUnit



What do you verify in White Box Testing?

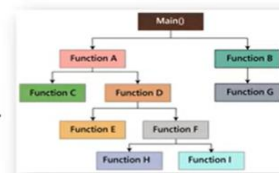
- ✓ Internal security of code
- ✓ Poorly structured paths in the coding processes
- ✓ The flow of specific inputs through the code
- ✓ Loops, Decision Conditions
- ✓ Each statement of your program
- ✓ Functions & Modules on an individual basis
- ✓ Expected output



White Box Testing Techniques

1. Path Coverage / Testing:

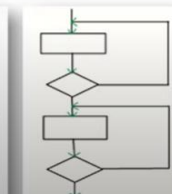
- Testing is dependent on the program's control or flow structure.
- All possible paths are defined with entry to exit points in the system.



2. Loop Testing:

- There are loops such as While, For and Do-while loops etc.
- It check all Simple, Nested & Concatenated loops.
- It check ending condition if working correctly and if the size of the conditions is enough.

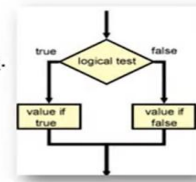
```
while(condition 1)
{
    statement(s);
}
while(condition 2)
{
    statement(s);
}
```



White Box Testing Techniques

3. Branch Coverage / Condition Testing:

- The logical conditions for every value are checked, whether it is true or false.
- This means that both the if and else conditions are verified.



4. Statement Coverage:

- Statement coverage is a testing technique in which tester traverse all statements in code.
- It ensure that each statement of the code is executed at least once.
- Hence each line of the code is verified

```

1 Prints (int a, int b) {
2   int result = a + b;
3   If (result > 0)
4     Print ("Positive", result)
5   Else
6     Print ("Negative", result)
7 }
    
```

Advantages & Disadvantages of White Box Testing

➤ Advantages of White Box Testing:

- White box testing optimizes code so hidden errors can be identified.
- Test cases of white box testing can be easily automated.
- Early detection of errors that improve code quality.
- It cover most path & code of the software.

➤ Disadvantages of White Box Testing:

- White box testing can be quite Complex, Expensive & Time-consuming.
- Requires professional resources with detailed understanding of programming.
- Missing functionalities cannot be detected.
- Redesign of code needs test cases to be written again.

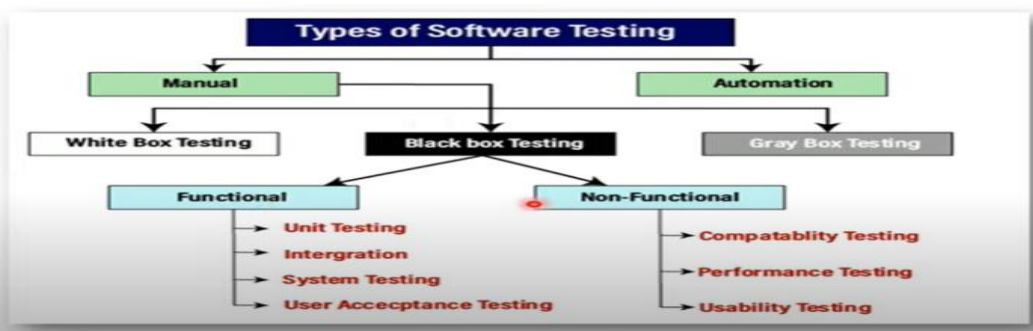
About Black Box Testing

- In Black Box Testing, the functionalities of software applications are tested without having knowledge of Internal code structure, Implementation details and Internal paths.
- Tester gives input value to examine its functionality & checks whether function is giving expected output or not.
- If the function produces correct output, then it is passed in testing, otherwise failed.
- It is also known as Behavioral Testing, Functional & Closed box Testing.
- Perform by the Software Testers.



- Black Box Testing Tools:** QTP, Selenium, Loadrunner & Jmeter

Types of Black Box Testing



Black Box Testing Techniques

1. Equivalence Partitioning:

- Here, input values that provide to system are divided into different classes or groups based on its similarity in the outcome.
- Instead of using each & every input value, use any one value from the group to test outcome.

AGE * Accepts value from 18 to 60

Equivalence Class Partitioning		
Invalid	Valid	Invalid
<=17	18-60	>=61

2. Boundary Value Analysis:

- It test, boundary values are those that contain the upper and lower limit of a variable.
- It tests, while entering boundary value whether the software is producing correct output or not.

AGE * Accepts value 18 to 56

BOUNDARY VALUE ANALYSIS		
Invalid (min - 1)	Valid (min, + min, - max, max)	Invalid (max + 1)
17	18, 19, 55, 56	57

Black Box Testing Techniques

3. Decision Table Testing:

- Various input combinations & their respective system behavior are captured in tabular form.
- Check logical relationship between two and more than two inputs. Ex. Gmail Account

Email (condition1)	T	T	F	F
Password (condition2)	T	F	T	F
Expected Result (Action)	Account Page	Incorrect password	Incorrect email	Incorrect email

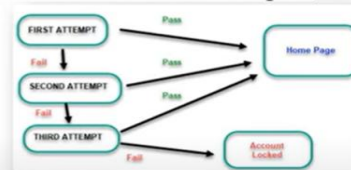
4. Error Guessing:

- It is based on the experience of the tester, where tester uses experience to guess the problematic areas of the software.
- Examples:** Divide by zero, Handling null values in text fields, Accepting the Submit button without any value, File upload without attachment, File upload with less than or more than the limit size.

Black Box Testing Techniques

5. State Transition Testing:

- It is used to capture behavior of the software application when different input values are given to the same function.
- Applies to those types of applications that provide specific number of attempts to access application.



6. All Pairs Testing Techniques:

- It is used to test all the possible discrete combinations of values.
- This combinational method is used for testing the application that uses checkbox input, radio button input, list box, text box etc.

Advantages & Disadvantages of Black Box Testing

➤ Advantages of Black Box Testing:

1. The tester does not need to have more functional knowledge or programming skills.
2. It is efficient for implementing the tests in the larger system.
3. Tests are executed from the user's or client's point of view.
4. It is used in finding the ambiguity and contradictions in the functional specifications.

➤ Disadvantages of Black Box Testing:

1. Without clear programming knowledge, test cases are difficult to implement.
2. It does not reveal the errors in the control structure.
3. Working with a large sample space of inputs can be exhaustive and consumes a lot of time.

Black Box VS White Box Testing

No.	Black Box Testing	White Box Testing
1	The <u>internal structure & working of the software did not known</u> to the tester. Focus on <u>Input & Output</u> of Product.	The <u>internal structure & working of the software is known</u> to the tester.
2	Is also known as <u>Functional Testing, Data-driven testing, Closed-box testing & Behavioral Testing.</u>	It is also known as <u>Structural testing, Glass box testing, Code-based testing, and Transparent testing.</u>
3	<u>Less programming knowledge</u> is required.	Requirement of <u>complete programming knowledge.</u>

Black Box VS White Box Testing

No.	Black Box Testing	White Box Testing
4	It is done at <u>higher levels of testing</u> that are system and acceptance testing.	It is done at <u>lower levels of testing</u> that are unit testing and integration testing.
5	Mainly performed by <u>Software Testers.</u>	Mainly performed by <u>Developers.</u>
6	<u>Less time-consuming</u>	<u>More time-consuming</u>
7	The base of this testing is <u>external expectations.</u>	The base of this testing is coding which is responsible for <u>internal working.</u>

Black Box VS White Box Testing

No.	Black Box Testing	White Box Testing
8	Its main objective is to fulfill customer need.	Its main objective is to check the code quality.
9	Defects are identified once the code is ready.	Defects are identified at early stage
10	Types of black-box testing: Functional & Non-Functional Testing and Regression testing.	Types of white box testing: Path testing, Loop testing and Condition testing.

Black Box VS White Box Testing

No.	Black Box Testing	White Box Testing
11	Can be done by trial and error ways and methods.	Data domains along with inner or internal boundaries can be better tested.
12	Example: Search something on Google by using keywords	Example: By input to check and verify loops