**DEFINITION:**

[**BLACK BOX TESTING**](https://www.geeksforgeeks.org/software-engineering-black-box-testing/) **:**

[Black Box Testing](https://www.geeksforgeeks.org/software-engineering-black-box-testing/) is a software testing method in which the internal structure/design/implementation of the item being tested is not known to the tester. Only the external design and structure are tested.

[**WHITE BOX TESTING**](https://www.geeksforgeeks.org/software-engineering-white-box-testing/) :

[White Box Testing](https://www.geeksforgeeks.org/software-engineering-white-box-testing/) is a software testing method in which the internal structure/design/implementation of the item being tested is known to the tester. Implementation and impact of the code are tested.

**Differences between Black Box Testing & White Box Testing:**

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| **BLACK BOX TESTING** | **WHITE BOX TESTING** |
| * It is a way of software testing in which the internal structure or the program or the code is hidden and nothing is known about it. | * It is a way of testing the software in which the tester has knowledge about the internal structure or the code or the program of the software. |
| |  |  | | --- | --- | | * Implementation of code is not needed for black box testing. |  | | * Code implementation is necessary for white box testing. |
| * It is mostly done by software testers. | * It is mostly done by software developers. |
| * No knowledge of implementation is needed. | * Knowledge of implementation is required. |
| * It can be referred to as outer or external software testing. | * It is the inner or the internal software testing. |
| * It is a functional test of the software. | * It is a structural test of the software. |
| * This testing can be initiated based on the requirement specifications document. | * This type of testing of software is started after a detail design document. |
| * No knowledge of programming is required | * It is mandatory to have knowledge of programming. |
| * It is the behavior testing of the software. | * It is the logic testing of the software. |
| * It is applicable to the higher levels of testing of software. | * It is generally applicable to the lower levels of software testing. |
| * It is also called closed testing. | * It is also called as clear box testing. |
| * It is least time consuming. | * It is most time consuming. |
| * It is not suitable or preferred for algorithm testing. | * It is suitable for algorithm testing. |
| * Can be done by trial and error ways and methods. | * Data domains along with inner or internal boundaries can be better tested. |
| **Black-box test design techniques-**   * Decision table testing * All-pairs testing * Equivalence partitioning * Error guessing | **White-box test design techniques-**   * Control flow testing * Data flow testing * Branch testing |
| * **Types of Black Box Testing:** * Functional Testing * Non-functional testing * Regression Testing | * **Types of White Box Testing:** * Path Testing * Loop Testing * Condition testing |
| * It is less exhaustive as compared to white box testing. | * It is comparatively more exhaustive than black box testing. |
| * **Example:** Search something on google by using keywords | * **Example:** By input to check and verify loops |

**BLACK BOX TESTING:**

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| **Advantages** | **Disadvantages** |
| Well suited and efficient for large code segments. | Limited coverage, since only a selected number of test scenarios is actually performed. |
| Code access is not required. | Inefficient testing, due to the fact that the tester only has limited knowledge about an application. |
| Clearly separates user's perspective from the developer's perspective through visibly defined roles. | Blind coverage, since the tester cannot target specific code segments or error prone areas. |
| Large numbers of moderately skilled testers can test the application with no knowledge of implementation, programming language, or operating systems. | The test cases are difficult to design. |

**WHITE BOX TESTING:**

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| **Advantages** | **Disadvantages** |
| As the tester has knowledge of the source code, it becomes very easy to find out which type of data can help in testing the application effectively. | Due to the fact that a skilled tester is needed to perform white-box testing, the costs are increased |
| It helps in optimizing the code. | . Sometimes it is impossible to look into every nook and corner to find out hidden errors that may create problems, as many paths will go untested. |
| Extra lines of code can be removed which can bring in hidden defects. | It is difficult to maintain white-box testing, as it requires specialized tools like code analyzers and debugging tools.. |
| Due to the tester's knowledge about the code, maximum coverage is attained during test scenario writing. | Due to the tester's knowledge about the code, maximum coverage is attained during test scenario writing. |

**Verification & Validation :**

| Verification | Validation |
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| * It includes checking documents, design, codes and programs. | * It includes testing and validating the actual product. |
| * Verification is the static testing. | * Validation is the dynamic testing. |
| * It does *not* include the execution of the code. | * It includes the execution of the code. |
| * Methods used in verification are reviews, walkthroughs, inspections and desk-checking. | * Methods used in validation are Black Box Testing, White Box Testing and non-functional testing. |
| * It checks whether the software conforms to specifications or not. | * It checks whether the software meets the requirements and expectations of a customer or not. |
| * It can find the bugs in the early stage of the development. | * It can only find the bugs that could not be found by the verification process. |
| * The goal of verification is application and software architecture and specification. | * The goal of validation is an actual product. |
| * Quality assurance team does verification. | * Validation is executed on software code with the help of testing team. |
| * It comes before validation. | * It comes after verification. |
| * It consists of checking of documents/files and is performed by human. | * It consists of execution of program and is performed by computer. |