**Difference between white box testing and black box testing in software Testing**

White-box testing and black-box testing are two distinct software testing methodologies, differing in their focus, approach, and the perspective they adopt when testing software applications.

**White-box Testing:**

* **Focus**: Internal structure, logic, and code implementation of the software.
* **Approach**: Requires access to the internal code and logic of the software being tested.
* **Testing Techniques**: Code coverage (statement, branch, path), control flow testing, data flow testing, etc.
* **Knowledge Requirement:** Testers need programming and system architecture knowledge.
* **Design Stage:** Mainly used in unit testing and integration testing.
* **Advantages:** Unveils logical errors, coding errors, and aids in improving code quality.

**Black-box Testing:**

* **Focus**: External behavior and functionality of the software.
* **Approach**: Doesn’t require access to the internal code; tests based on specifications and requirements.
* **Testing Techniques:** Equivalence partitioning, boundary value analysis, decision tables, etc.
* **Knowledge Requirement:** No need for programming knowledge; focuses on user perspective.
* **Design Stage:** Primarily used in system testing and acceptance testing.
* **Advantages:** Tests against user expectations, identifies functional errors.

**Differences:**

1. **Perspective:**

* White-box: Tests based on internal knowledge of code and structure.
* Black-box: Tests based on external specifications and user expectations.

1. **Access to Code:**

* White-box: Requires access to the code and understanding of the implementation.
* Black-box: Doesn’t require access to the code; tests based on requirements and specifications.

1. **Focus of Testing:**

* White-box: Focuses on logic, paths, conditions, and internal workings.
* Black-box: Focuses on inputs, outputs, and system behavior without considering internal structure.

1. **Test Design:**

* White-box: Tests designed based on code structure and internal logic.
* Black-box: Tests designed based on functional requirements and user expectations.

1. **Knowledge Requirement:**

* White-box: Requires programming and system architecture knowledge.
* Black-box: Doesn’t necessarily require programming knowledge; relies on functional specifications.

1. **Stage of Testing:**

* White-box: Typically used in unit testing and integration testing.
* Black-box: Commonly used in system testing and acceptance testing.

**Summary:**

Both methodologies are crucial in ensuring software quality. White-box testing targets internal errors and logic flaws, while black-box testing validates against functional specifications and user requirements. Combining these methodologies offers comprehensive test coverage, ensuring software reliability and functionality