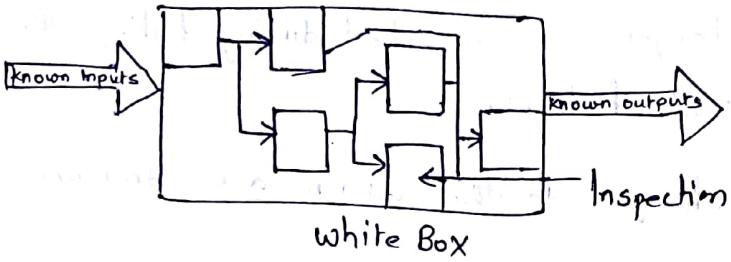
White-Box Testing:- * white box testing is also called as Glass Box testing.
* focus:- Thoroughness (Coverage). Every statement in the component is executed at least once.

*White box testing is also known as structural testing or code-based testing.

* The major objective of white box testing is to focus in internal program structure, and discover all internal program errors.



Advantage of White Box Testing :-

* Helps optimizing the code.
* Helps removing extra line of code
* All possible code path ways can be tested including error handling, resource dependencies & additional internal code logical flow.
* Enables tester to find programming errors quickly.
* Good quality of coding work and coding standards.

Disadvantage of White-Box Testing:-

* knowledge of code & internal structure is a prerequisite, a skilled tester is needed to carry out this type of testing, which increase the cost.
* Impossible to look into every bit of code to find out hidden error
* Very expensive technique.
* Requires knowledge of target system, testing tools and coding language.
* Requires specialized tools such as source code analyzer, debugger and fault injectors.

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Traditional White Box Testing:-

* White box testing is further divided into 2 types:-

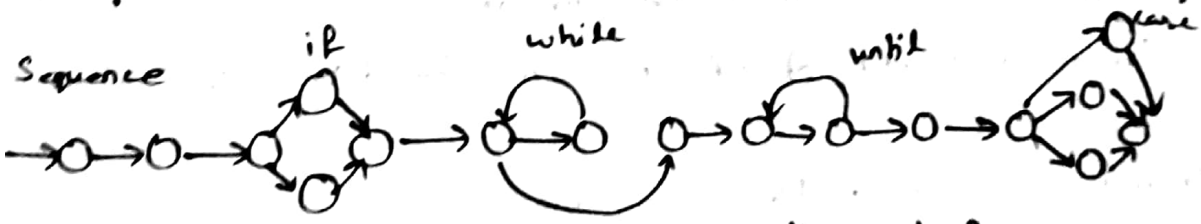
1) Basic Path testing
   a) Flow graph
   b) Cyclomatic complexity
   c) Graph matrix
2) Control Structure
   a) Condition testing
   b) Data flow testing
   c) Loop testing.

1) Basis Path Testing:-

* It is a white box testing technique that enables the designer to have a derive a logical complexity measure of a procedural design.
* Test cases based on Basis path testing grantee to execute every statement in program at least once.

a) Flow Graph:-

* A flow graph depicts the logical control flow using the following notations.
* Every structural construct has a corresponding flow graph symbol.



The structured constructs in flow graph form:

where each circle represents one or more non branching PDL or source code statements

* Each circle, called flow graph node, represents one or more procedural statements.

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* the arrows called as links
* Areas bounded by edges are called regions. While
regions the area outside the graph is also taken as a region.
* Each node containing a condition is called a predicate node and has 2 or more edges out of it.

2) Control Structure Testing:-
* Although basic path testing is simple and highly effective, it is not sufficient in itself.
* Other variations on control structure improve quality of white-box testing.
* Control structure testing controls over the order in which the instructions in program are executed.
* One of the major objective of control structure testing includes the selection of the test case to meet various criteria for covering the code.
* Test cased are derived to exercise control over the order of the execution of the code.
* Coverage based testing works by choosing test cases according to well defined coverage criteria.
* The more common coverage criteria are the following:
* Statement Coverage or Node Coverage:-
    1) Every statement of the program should be exercised atleast once.
* Branch Coverage or Decision Coverage:-
    1) Every possible alternative in a branch of the program should be exercised atleast once.
* Condition Coverage:-
    1) Each condition in a branch is made to evaluate to true and

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* Decision / Condition Coverage:-

1) Each condition in a branch is made to evaluate to both true and false and each branch is made to evaluate to both true and false.

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