

6.7.1 White Box Testing

White box testing (also called **structural testing** or **glass box testing**) is performed to test the program internal structure. To perform white box testing, the tester should have a thorough knowledge of the program internals along with the purpose of developing the software. During this testing, the entire software implementation is also included with the specification. This helps in detecting errors even with unclear or incomplete software specification.

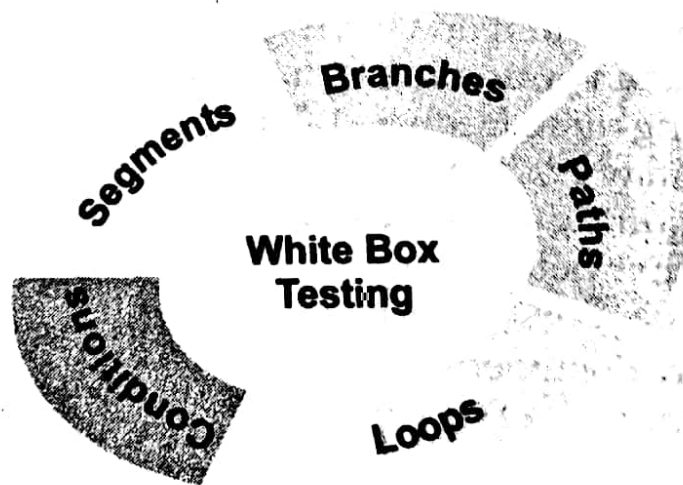


Figure 6.22 White Box Testing

The goal of white box testing is to ensure that the test cases (developed by software testers by using white box testing) exercise each path through a program. That is, test cases ensure that all internal structures in the program are developed according to design specifications (see Figure 6.22). The test cases also ensure the following.

- All independent paths within the program have been exercised at least once.
- All internal data structures have been exercised.
- All loops (simple loops, concatenated loops, and nested loops) have been executed at and within their specified boundaries.

- All segments present between the control structures (like 'switch' statement) have been executed at least once.
- Each branch (like 'case' statement) has been exercised at least once.
- All the logical conditions as well as their combinations have been executed at least once for both true and false paths.

Various advantages and disadvantages of white box testing are listed in Table 6.8.

Table 6.8 Advantages and Disadvantages of White Box Testing

| Advantages | Disadvantages |
|--|---|
| <ul style="list-style-type: none"> • Covers the larger part of the program code while testing. • Uncovers typographical errors. • Detects design errors that occur when incorrect assumptions are made about execution paths. | <ul style="list-style-type: none"> • Tests that cover most of the program code may not be good for assessing the functionality of surprise (unexpected) behaviors and other testing goals. • Tests based on design may miss other system problems. • Tests cases need to be changed if implementation changes. |