

Unit: IV
Lecture: 9
Debugging

Debugging occurs as a consequence of successful testing i.e. **when a test case uncovers an error, debugging is the process that results in the removal of the error.**

Debugging Process: Steps involved in debugging are:

- Problem identification and report preparation.
- Assigning the report to software engineer to the defect to verify that it is genuine.
- Defect Analysis using modeling, documentations, finding and testing candidate flaws, etc.
- Defect Resolution by making required changes to the system.
- Validation of corrections.

Debugging Strategies:

1. Study the system for the larger duration in order to understand the system. It helps debugger to construct different representations of systems to be debugging depends on the need. Study of the system is also done actively to find recent changes made to the software.
2. Backwards analysis of the problem which involves tracing the program backward from the location of failure message in order to identify the region of faulty code. A detailed study of the region is conducting to find the cause of defects.
3. Forward analysis of the program involves tracing the program forwards using breakpoints or print statements at different points in the program and studying the results. The region where the wrong outputs are obtained is the region that needs to be focused to find the defect.
4. Using the past experience of the software debug the software with similar problems in nature. The success of this approach depends on the expertise of the debugger.

Difference between Debugging and Testing:

Debugging is different from testing. Testing focuses on finding bugs, errors, etc whereas debugging starts after a bug has been identified in the software.

Testing is used to ensure that the program is correct and it was supposed to do with a certain minimum success rate. Testing can be manual or automated. There are several different types of testing like unit testing, integration testing, alpha and beta testing, etc.

Debugging requires a lot of knowledge, skills, and expertise. It can be supported by some automated tools available but is more of a manual process as every bug is different and requires a different technique, unlike a pre-defined testing mechanism.