

# Chapter 109

## Research and Development on Software Testing Techniques and Tools

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### ABSTRACT

*Software testing is the pre-eminent part of the software development life cycle process. It is the process of evaluating system or its components with the specified requirements or not. It is important process by means of accessing the quality of software, reusability, and traceability of the requirements specified. There are many number of testing techniques and tools available for this task. Software testing is an essential part of research and lot of development has been made in this field. In this chapter, testing techniques and tools including test design tools, load, and performance testing tools, test management tools, test implementation tools, test evaluation tools, static analysis tools, basic path testing, loop testing, control structure testing, code-based techniques, path testing, data flow testing, syntax testing has been described. Some distinctive latest research and development in testing strategy have been summarized.*

### INTRODUCTION

Software testing is the process of executing the program with the intent of finding the error. It is done to check if the system meets the requirements specified and be executed successfully in the intended environment. Testing checks the system whether it is “Fit for Purpose”, also verifies whether the system does what it is expected to do. Software testing techniques are the different approaches and ways of ensuring that a software application is fully tested. Now days we can get lots of Software Testing Tools in the market. Selection of tools is totally based on the project requirements & commercial or free tools (Open Source Tools) you are interested. Off Course, free Testing Tools may have some limitation in the features list of the product, so it’s totally based on what are you looking for & is that your requirement fulfil in free version or go for paid Software Testing Tools.

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## **BACKGROUND**

As software applications get more ever complex and intertwined and with the large number of different platforms and devices that need to be tested. Software testing techniques encompass everything from unit testing individual modules, integration testing an entire system to specialized forms of testing such as security and performance [1]. Testing is a process used to help identify the correctness, completeness and quality of developed computer software. With that in mind, testing can never completely establish the correctness of computer software. One definition of testing is “the process of questioning a product in order to evaluate it”, where the “questions” are things the tester tries to do with the product, and the product answers with its behavior in reaction to the probing of the tester.

## **SOFTWARE TESTING TECHNIQUES**

### **Testing Outlook**

Testing outlook has an impact on the software testing process. Consider the following definition:

*Testing is the process to prove that the software works correctly.*

This definition sounds good, but the person who developed the software will only try to show that the software works correctly. This is the typical psychology of testing. The software will work correctly for the inputs that are given by that person which will obtain correct results. If some other input was given, the software will obtain wrong results which is not acceptable in a commercial environment.

Now consider this definition:

*Testing is a process to prove that the software does not work.*

If the aim of the test engineer is to prove that the software does not work, then the process can be considered as good. If the software performs well, then you can say that the software is very reliable. If the software works efficiently, after some days of testing, it does not mean that the software has no bugs at all.

So the definition would be:

*Testing is the process to detect the defects and minimize the risk associated with the residual defects.*

### **Verification and Validation**

While going for testing, the two terms verification and validation have to be differentiated. Barry Boehm defines these terms as follows:

- **Verification:** “Are we Building the product right?”
- **Validation:** “Are we building the right product?”

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