

Creating and Deploying Automated Software Test Procedures with Regression Testing

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Introduction

Testing is an integral part of software development to ensure that software works as intended. However, it can also be a lengthy process, especially for larger programs, so a program that automatically tests software seems like a useful way to save time. To test the usefulness of an automated testing program, this research project involved the creation and deployment of automated tests and evaluated what they could accomplish.

Black Box Test Example	<ol style="list-style-type: none"> 1. Move cursor to (100, 250) 2. Perform left click 3. Wait 2 seconds
White Box Test Example	<ol style="list-style-type: none"> 1. Find location of start button 2. Click start button 3. Wait until window opens

Table 1. An example of a segment of a black box test compared to a segment of a white box test.

Explanation

Software tests can generally be divided into two types:

- During a **black box test**, the structure and design of the software being tested are unknown to the tester.
- During a **white box test**, the structure and design of the software being tested are known to the tester.

This project involved the creation of both black box and white box tests designed for a specific testing method known as **regression testing**, in which all tests are re-executed whenever a change is made to the software. This ensures that new changes and additions do not introduce new bugs or errors to parts of the software that have already been tested.

Test Case 5 Statistics

	Lines of Code	Avg. Time to Run	Detects Failure?
Black Box Version	158	40 sec.	No
White Box Version	355	32 sec.	Yes

Table 2. A comparison between black box and white box versions of the same test case.

Impact

Investment of resources into automated testing can save a significant amount of time and effort in the long term, as once an automated test has been created, it can be deployed an unlimited amount of times. This is especially useful for regression testing, due to how often regression testing requires the re-execution of tests. Of course, poorly implemented automated tests could end up being a waste of resources, so this research should provide some insight into how to best implement automated tests.

Key Findings

By creating both black box and white box automated tests for Dr. Delugach's own professionally developed software, Knowledge Capture Pro, the author was able to discover benefits and limitations to automated versions of both black box and white box tests:

- During black box tests, the testing program blindly executed a pre-determined list of actions. These tests were quick and simple to write, but while running one, the testing program was unaware of what its actions accomplished, and the test would break if certain arbitrary criteria, such as the positions of windows on the screen, were not met.
- During white box tests, the testing program looked to the state of the software to determine information such as where to position the cursor and when to proceed. These tests were more complex and time-consuming to create, but the testing program could use the information it gathered to verify that tests proceeded as intended.

From these findings, it was determined that for the purposes of regression testing, automated tests would be most worthwhile if white box tests were used.

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