Tools and Techniques Used for Prioritizing Test Cases in Regression Testing

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*Abstract:-*Testing is a very expensive task in term of cost, effort and time and it is necessary step of software development because without testing software cannot be completed. Regression testing is a type of software testing which is widely used in software development and maintenance phase; it also occupies a large portion of the software maintenance budget. There are many software testing tools and Technique that is used to test the software program. This research paper defines some testing approach which reduced person effort and time in regression testing. Software systems are change regularly during development and maintenance face. After software is modified regression testing is applied to software to ensure that it behaves intended and modifications not negatively impacts its original functionality. This paper focus on improving the performance of regression testing by using these approach for regression testing by computing coverage data for evolving software using dataflow analysis and execution tracing .

Keywords: software testing, regression testing, test case, test suit

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1. INTRODUCTION

Testing is the process of executing a program with the intent of finding errors[6] and regression testing is a software testing approach which is used to discover uncover software errors in the existing functional and non-functional areas of a computer system. The purpose of regression testing is to ensure that a change in the existing system has not introduced new faults. The main purpose for regression testing is to determine whether a change in one part of the software affects other parts of the software. Different methods in regression testing involve rerunning previously-completed tests and checking whether program behaviour has changed and whether previously-fixed faults have re-emerged. It is used to test a system in efficient manner by selecting the appropriate minimum set of tests needed to adequately cover a particular change.

2. TESTING STRATEGIES

 Software testing [1] has three main purposes i.e. validation, verification, and defect. Testing is a set of activities that can be planned in beginning. There are lot of software testing strategies and tools have been proposed in this paper. Testing begins at the component level and works toward the integration of the entire computer-based system Each time a new module is added as part of integration testing, the software changes. In the testing process New data flow paths are established, new input/output may occur and new control logic is generated. These changes may create problems with functions that previously worked correctly. Regression testing is the re-execution of some subsets or module of tests that have already been conducted to ensure that changes have not propagated unintended side effects.

2.1 Verification and Validation: Software testing is broader topic that is often referred to as verification and validation. Verification means that 'are we building the product right' and Validation means 'Are we building the right product'. Verification and validation encompasses a wide array of

software quality activities that include technical reviews, formal review, performance monitoring, simulation, feasibility study, quality of product, configuration audits, documentation review, analysis of algorithm, development testing, and installation testing.

2.2 Unit Testing: Unit testing focuses verification [5] effort on the smallest unit of software design. Using the component level design important control paths are tested to uncover errors within the boundary of the module. Unit testing is normally considered as a part of the coding. When source level code has been developed, reviewed, and verified for component level design we start with unit test case design begins. The review of design information provides guidance for for the user to establish test cases that are likely to uncover errors in each of the categories discussed earlier. Each test case must be associated with a set of expected results.
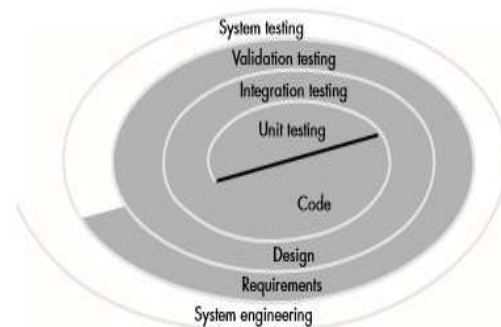

Fig1: Testing Strategies

2.3 Integration Testing: Integration testing basically used for constructing the program structure while at the same time conducting tests to uncover errors associated with interfacing. The objective of integration testing is to take unit tested components and build a program structure that

has been dictated by design there are two types of integration top down integration and bottom up integration.

2.3.1 Top-down Integration: Top-down integration testing is an incremental approach to construction of program. Modules are integrated by moving downward through the control hierarchy and beginning with the main control module. Module that subordinates to the main control module are incorporated into the structure in either a depth First or breadth first manner. Depth First integration integrates all components on a major control path of the structure.

2.3.2 Bottom-up Integration: Bottom-up integration testing begins construction and testing with atomic modules (i.e. components at the lowest levels in the program structure). Components are integrated from the bottom and processing required for components subordinate to a given level is always available and the need for stubs is eliminated.

Regression Testing: Each time a new module is added as part of integration testing, the software changes and new independent paths are established, new input output may occur, and new control structure is invoked. These changes may cause problems with functions that previously worked correctly. Regression testing is the re-execution all tests that has already been conducted to ensure that changes have not unintended effects. In a broader context, successful tests will find the maximum errors and errors must be corrected. Whenever software is modifying, some feature of the software configuration is changed. Regression testing is the part of integration testing that helps to ensure that changes do not produce instinctive performance or additional errors.

This is the verification method. Verifying that the errors are fixed and the newly added characteristics have not created problem in previous working version of software. Regression testing [2] cost estimation shown in table below.

Sr. No   Testing activity   Avg. Estimated Effort
1   Environment setup for testing   3 Hrs
2   Verification of the fixed bugs   20 min / bug
3   Test Suite execution   1.2 min
4   Test case Test Report Generation   9 min
5   Test Report Analysis 20   20 min
6   Reporting the Bugs   18 min / bug

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Table 1: Regression Testing Cost Estimation

Classes of test cases for Regression Testing:
• A representative sample of tests that will implement all software functions.
• Supplementary tests that focus on software functions that are likely to be affected by the change.
• Tests that focus on mechanism of software that have been changed.

3. REGRESSION TESTING TOOLS

There are many automatic and manual regression testing tools are available. Automated Regression Testing is the testing area where we can automate most of the testing strategy. We re-run all the previously executed test cases on new build. This means we have test case set available and running these test cases manually is time consuming. We know the expected results so that automating these test cases are time saving as well as efficient in regression [4] testing method. Extent of automation depends on the number of test cases that are going to remain applicable over the time. Most of the regression test tools are record and playback type. You will record the test cases by navigating through the AUT (application under test) and verify whether expected results are coming or not. Some regression testing tools describe below.

(i) Regression Tester: Regression testing is mainly used when we change some module or some part of the program or we can say that we require retest the program after code modification. This often requires hundreds or thousands of new tests to retest the program, it checks and rectify the newly written code and it's integrated with the original developed code. Regression testing allows users to manage the ever increasing number of test cases and suites, while ensuring both reliability as well as affordability.

(ii) Quick Test Professional (QTP): HP Quick Test Professional software provides functional and regression test automation for software applications and environments. Part of the HP Quality centre tool suite, HP QuickTest Professional can be used for enterprise quality assurance.

(iii) Selenium: Selenium is a set of different software tools each with a different approach to supporting test automation. Selenium's key features are the support for executing one's tests on multiple browser platforms.

(iv) Rational Functional Tester (RFT): IBM Rational Functional Tester is an automated functional testing and regression testing tool. Rational Function Tester supports a range of applications, such as Java, Siebel, SAP, terminal emulator-based applications web-based.

(v) Watir: Watir, can be pronounced as water, it is an open-source software testing family of Ruby libraries for automating testing it is the one of the robust tools for web base application testing.

(vi) Winrunner: Win Runner is widely used Automated Software Testing Tool. Features of Win Runner are Developed by Mercury Interactive Functionality testing tool

Supports web technologies such as (Visual Basic, VC++, D2K, Java, HTML, Power Builder, Delphe, and Cibell. To Support .net, xml, SAP, People soft, Oracle applications, Multimedia we can use QTP. Winrunner run on Windows only. Runners run only UNIX and Linux. Tool developed in C on VC++ environment. To automate our manual test win runner used TSL (Test Script language like c)

(vii) ActiWATE: It is freely available Java-based tool for automated regression testing of web based applications which supports JavaScript.

(viii) Silktest: Silk Test is the automated testing tool for regression testing needs, it support multiple software technology technologies like AJAX, Web 2.0, .NET and JAVA.

(ix) Vtest: Automated functional and regression testing software tool which is suitable for testing web based applications programs.

(x) AdventNet QEngine: It is used for Load Testing and Functional Testing for Web based Applications, Web Services and Supports HTTP, SOAP Web Services Testing.

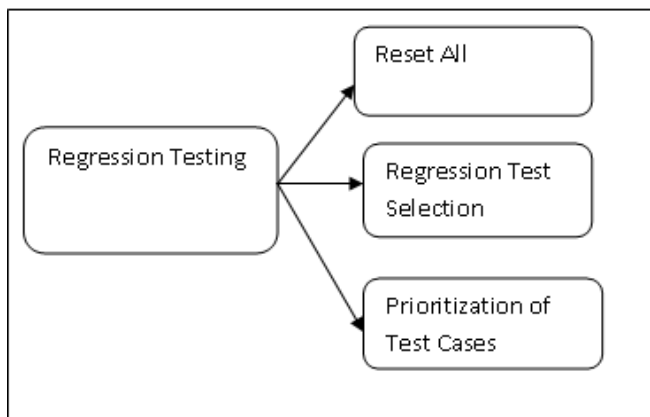(xi)ATAC: an Automatic Testing Analysis tool [3] in C.

Fig 2. Regression Techniques

4. NEEDS AND FEATURES OF REGRESSION TESTING

Regression testing is mainly used for testing the load and performance of the system in web and networking based application.

4.1 Load Testing: ManageEngine QEngine Load testing tool [7] helps ensure your web applications and web sites can handle the load conditions that it will face in production. It ensures to critical information and services are available at speeds your end-users expect.

4.2Performance Testing: ManageEngine QEngine performance testing tool allows you to load test / stress test your web applications or web sites with accurate results and ease to use. Comprehensive reports help you to identify critical performance issues and optimize the user experience of your web applications/web sites before it goes into

production. Features of Regression Testing are described below.

Test Setup and Execution: It is the Time taken to install the testing software in regression test machine is vastly reduced as it takes only seconds to install the toolbar.

Powerful Suite Component: It Provides set of interfaces that enables you to perform fine tuning of the test according to specific operating needs.

Easy Test Maintenance: Object repository to accommodate changes that are made for the application's user interface. Test Selection is Provision to configure and activate filters to select individual or a group of tests to run in the test machine.

Test Scheduling: It is Easy-to-use in web application and user interface to schedule test suite execution.

Distributed Testing: It Provides facility to run regression tests on multiple machines and different platforms at the same time.

5. EXPERIMENTAL RESULTS
Regression testing values are used in linear regression exactly the same way as they are in hypothesis testing, only instead of working with z-tables you'll be working with t-tables. This article shows you how to compute a linear regression[4] test value in a few east steps.

Sample question: Given a set of data with sample size 8 and r = 0.454, compute the test value.
Step 1: Compute r, the correlation coefficient, unless it has already been given to you in the question (e.g., r = .0454).
Step 2: Following formula is used to compute the test value (n is the sample size):

$T = 1.24811026$
change the variables with user defined numbers:
$T = .454\sqrt{((8-2)/(1-[.454]^2))}$
o   Subtract 2 from n:
$8 - 2 = 6$
o   Square r:
$.454 \times .454 = .206116$
o   Subtract step (3) from 1:
$1 - .206116 = .793884$
o   Divide step (2) by step (4):
$6 / .793884 = 7.557779$
o   Take the square root of step (5):
$\sqrt{7.557779} = 2.74914154$
o   Multiply r by step (6):
$.454 \times 2.74914154 = 1.24811026$

CONCLUSION
In this paper we have proposed the different regression testing strategy which can be used when performing the regression testing. These techniques save the huge amount of testing time, person effort and money of the organization. It can be used effectively if there are large number of test

conditions and sequences. The derived test cases are less expensive and less critical then other conventional test cases. We can extend performance of regression testing for dynamic analysis.

REFERENCES

[1] Singh Ashima ,” Prioritizing Test Cases in Regression testing using Fault Based Analysis:”, IJCSI International Journal of Computer Science Issues, Vol. 9, Issue 6, No 1, ISSN (Online): 1694-0814 www.IJCSI.org, November 2012.

[2] Rao Ananda and Kumar Kiran J “An Approach to Cost Effective Regression Testing in Black-Box Testing Environment” IJCSI International Journal of Computer Science Issues, Vol. 8, Issue 3, No. 1, ISSN (Online): 1694-0814 www.IJCSI.org, May 2011.

[3] Wong W. Eric, Horgan J. R., Saul London, Hira Agrawal Bell Communications Research” A Study of Effective Regression Testing in Practice”.

[4] Prasad Machani Siva” An Efficient Regression Testing By Computing Coverage Data For Software Evolution” Available online at www.interscience.in.

[5] Software Engineering by Roger S Pressmen 5th edition.

[6] Software Engineering by KK Agarwak Yogesh Singh.

[7] www.telerik.com/automated-testing-tools