

# Cost Effective Regression Testing

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## ABSTRACT

Regression testing is costly and frequently used testing it used for modifying the software. In Regression testing also ensure that changing portion does not effect on unchanging portion. In other way , we can say that regression testing is also a software development process. It is critical part of software maintenance. it occupies a large portion of budget in the maintenance that means the regression testing is costly testing and frequently needed this testing to do changes in a software. Basically if we want to reduced the cost of regression testing so easily and comfortably we can modify our softwares. In this paper, we are planning to propose an enhanced regression test selection method in black-box environment which reduces the regression testing cost using ETL technique. Also we are using this technique in different databases.

## General Terms

Regression testing, ETL technique, Data warehouse, Black box testing

## 1. INTRODUCTION

Regression testing is a type of software testing that helps to find new software error, in both type of functional and non-functional areas of a system after changes such as enhancements or configuration changes, have been made to them. The regression testing is to ensure that changes does not effect to unchanging part. One of the main reasons for regression testing is to find whether a change in one part of the software does not affects other parts of the software.

Regression testing checks basically four things.errors,software update,fix defects and any issue regarding performance.

Regression testing followed three technique. First is reset all, select test case and the last one is prioritization of test cases. Regression testing should be time effort and money saver. Regression testing is also called method of verification. . It is critical part of software maintenance. it occupies a large portion of budget in the maintenance that means the regression testing is costly testing and frequently needed this testing to do changes in a software. There are also present non regression strategies. Basically main motive to catch error and bugs, ensure that they will fix life long. In organization, it checks software quality of different software. Many tools are used for regression testing.

It tests can be performed to test a system by systematically selecting the appropriate set of tests needed to cover a particular change. Regression testing is good for further modification of any software.

Take a example, in a message in the sequence diagram may change due to a change in its operation in the class diagram. This change directly not shown in the sequence diagram and

## 2. RELATED WORK

There are different regression testing techniques that had been purposed. Some of them are as follows:

### 2.1 Generic Algorithm

GA is a search procedures which were introduced by John Holland and studied by Goldberg ,De Jong and many other researchers. It helps to find best solutions and are varied until we get a good product.

A genetic algorithm (GA) is an important and useful technique which can be used in every type of problems.

Two main requirements are of GA:

(a) Encoding is used to shows a solution of the solution space, and

(b) An objective function like a function which measures the goodness of a solution.

### 2.2 Regression testing in Clustering Approach

Ryan Carlson et al, in this paper this approach is used to prioritize the test case for regression testing. Clustering approach makes groups of similar properties having a similar fault detection .there are different parameter like code complexity, coverage etc.

### 2.3 ETL Technique

Ananda Rao and Kiran Kumar J el at acc to these researcher etl is reduce cost of regression testing changes will be done in databases . only used the important data which is useful and extra will be reduced .the benefit of this tool is it is one time effort.

### 2.4 Cost estimation model

Srividhya. J, Dr. K. Alagarsamy el at The proposed methodology decreases the amount of regression experiments in nature's domain, autonomous of the rethgression test selection routines that are accessible.it is also one time effort but it consumes more time. Hence by utilizing the proposed approach regression testing cost can be effectively reduced but time consumed time also.

### 2.5 Regression Test Selection Technique in Class and State Diagram-Based

Farooq et al have proposed a model based technique it used UML diagrams state diagram and class diagram to select test cases and generate regression test suite. A change in one module is not effected to other module. For better understand consulting the class diagram becomes essential to obtain this change information.

## 2.6 Reducing the Cost of Regression Testing by Irreplaceable Test Cases

Chu-Ti Lin suggested an algorithm, totally based on the test irreplaceability, which reduced duplicates test cases and decrease the cost of testes by using benchmark programs.

## 2.7 Regression Testing in Cost Analysis and Tradeoffs using FSM Web

Andrewset el at The FSM (Finite State Machine ) Web testing model for online web applications in achieving this goal designed the FSM Web test model followed by the test generation process. It found that most important approach was patching by considering it's cost subject to certain assumptions and tradeoffs. Overall, performing a right comparisons among the different regression testing approaches and applying an appropriate technique analysis is a difficult task.

## 2.8 Hybrid Approach

Regression technique is the Hybrid Approach of both Regression Test Selection and Test Case Prioritization. A large number of researchers working on hybrid approach and they produced many algorithms for it. Lets take a example, Test Selection Algorithm proposed by Aggarwal et al. Three basic Implementation steps of algorithm:

- (a) Provided Input
- (b) Test Selection algorithm: Modification in module of add and reduce.
- (c) Result output.

Comparison of all Techniques:  
 It is imp technique of regression technique.

## 2.9 Test case prioritization

Rothermal and Elbaum el at Test case prioritization approaches sort existing test cases for regression testing according to achieve performance goals. The Average Percentage Of Fault Detected is frequently used for evaluating test case prioritization. Using test case prioritization, select only important and unique test cases. It is one of best technique to selecting the test cases.

## 3. The cost of Regression Testing techniques is evaluated on the basis of these parameters

### A .Reduced the test cases:

If we reduced the cost of regression testing then automatically reduce the cost also.

### B. Time factors :

We consider two time factors:

Execution Time: It also calculates the total time used for execution.

Validation Time: It calculated total time required for validating reducing the expected result and actual result.

### C. Requirement Factors:

It's based on total number of times a requirement has been changed in their development cycle. Some percentage of faults in the projects is identified in requirement phases due to changing in requirement stages. The volatility changes for all the requirements are normalized. Less no of requirement has low cost.

**D. Complexity Factor:** The complexity factor show the effort used for execute the test cases. It is one of important factors.

Techniques	Number of Test Cases	Complexity	Features of Technique	Time Taken
Generic Algorithm	Less	High	Easily reuse of test cases	More
Clustering Approach	More	High	Make groups of same properties	More
ETL Technique	Less	Low	One time effort	Less
Cost Estimation Model	More	High	pre-project stage estimates can be prepared	Less
Class and State Diagram	More	High	Changing part does not effect others	More
Irreplaceable Test Cases	Less	High	Remove duplicacy	Less
Cost Analysis and Tradeoffs using FSM Web	More	High	Cost estimated at starting project	More
Hybrid Approach	More	Low	Easily can modify the module	More
Test case prioritization	More	High	Select unique or important test case	Less

## 4. PROPOSED METHODOLOGY

Many researcher researches new techniques for reducing the cost of regression testing. Some of few techniques already discussed in related work. But, in this paper, we introduced a regression test selection method using ETL technique in black

box technique which helps to reduce the cost of testing. ETL represents extraction transformation and loads. We extract data from different databases through seletion technique and transfer it from data transformation technique and load into central database.

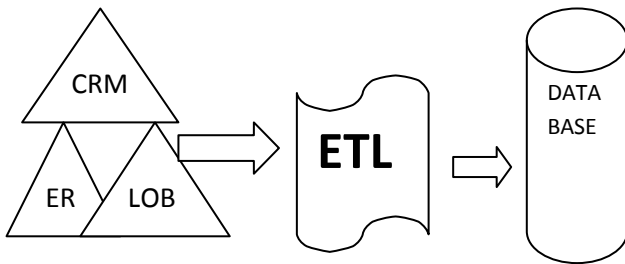


Fig1. ETL PROCESS

We can extract data from two ways: data files and flat files. Transform file from Pipelined Data Transformation or Multistage Data Transformation. Also security will be held on first phase of extraction process of ETL.

In this paper, we also check this technique on different databases it is working or not.

## 5. CONCLUSION

Some trials have been done to address the regression testing, most of them facing a specific problem. All these papers have some limitations. We are tried to cover all limitations in one paper. We are planning to propose an enhanced regression test method to reduce the cost of regression testing using ETL technique.

In this paper, we have studied different techniques for reducing the cost of regression testing. Among all of these techniques ETL technique is most convenience technique the reason behind this because it is one time effort and it reduces the time and effort both.

## 6. REFERENCES

- [1] **Prof. A. Ananda Rao and Kiran Kumar J-** volume 3, May 2011“An Approach to Cost Effective Regression Testing in Black-Box Testing Environment”- International Journal of Computer Science
- [2] **Matteo Golfarelli, Stefano Rizzi** – “A Comprehensive Approach to Data Warehouse Testing”- DEIS - University of Bologna 3 ,Italy
- [3] **Igor Mekterovi´c, Ljiljana Brki´c, Mirta Baranovi´c** – year 2011, ISSN 0005-114, 169–178 “ A Generic Procedure for Integration Testing of ETL Procedures”
- [4] **G. Rothermel, M.J Harrold**, May 1994,”A framework for evaluating regression Test Selection Techniques”on International Conference on Software Engineering
- [5] **H. Do and G. Rothermel**,’08,July 2008. “Using Sensitivity Analysis to Create Simplified Economic Models for Regression Testing.”.
- [6] **Tao Xie, David Notkin-**“ Checking Inside the Black Box: Regression Testing by Comparing Value Spectra-IEEE TRANSACTIONS ON SOFTWARE ENGINEERING, VOL. 31, OCTOBER 2005
- [7] **XiangFeng Meng**, China2011"XiangFeng Meng"Weinan Teachers University Weinan Shanxi
- [8] **Satkaur, Anuj Mehta** Volume 3, May 2013” A Review Paper on scope of ETL in retail domain”- International Journal of Advanced Research in Computer Science and Software Engineering
- [9] **H. DO and G. Rothermel**, SIGSOFT ’06/FSE,14 November 2006, “An Empirical Study of Regression Testing Techniques Factors and Improved Cost-Benefit Models”
- [10] **Qin Hanlin; Jin Xianzhen**, oct, 2012 “ Research on ETL in land and Resources Star Schema data Warehouses” Computational Intelligence and design (ISCID) fifth International IEEE Symposium on Volume1
- [11] **SRIVIDHYA. J,DR. K. ALAGARSAMY** year 2014” A Novel Method for Reduction of Regression Testing Cost” International Journal of Inventions in Computer Science and Engineering ISSN: 2348 – 3539, Volume 1
- [12] **Kiran Kumar J,A. Ananda Rao and M. Gopi Chand, and K. Narendar Reddy** march 2009” An Approach to Test Case Design for Cost Effective Software Testing” Proceedings of the International MultiConference of Engineers and Computer Scientists Vol 1
- [13] **Swarnendu Biswas and Rajib Mall**” Regression Test Selection Techniques: A Survey” Informatica 35 (2011) 289–321-289.
- [14] **Ravinder Kumar,Mr. Karambir Singh** on 2012 March,”-X1 Literature Survey on black box testing in component based software engineering” International Journal of Advanced Research in Computer Science and Software Engineering-Vol2
- [15] **Seif Azghandi**,JULY 2014”Cost Analysis and Tradeoffs in Regression Testing using FSM Web- JOURNAL OF SOFTWARE ENGG,VOL 9.