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Avenues for Regression Testing of Applications when run in Cloud: A need

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ABSTRACT: It is universally accepted fact that, software has become the most important aspect of every application. Due to globalization and scientific revolutions technology has brought in major changes to run the applications in industries. Cloud is one such evidence to prove the above claim. However, sustaining the desired quality level of applications demands efficiently testable schemes. This paper therefore, put forth the need for modified regression testing of applications when run in cloud based environments.
KEYWORDS: Software engineering, software testing, cloud technology, software quality, regression testing.

I. INTRODUCTION

The need of the hour is to satisfy the customers by delivering quality software through quality assurance and quality check, such that defect free software will reach the customer. This is achieved with the help of several techniques of which software testing is most acceptable and beneficial.

Software testing is process of verifying whether software is up the required standard, such that it improves the quality of software. There are various types of testing used in industry to assure the quality of the software against various parameters. Among all types of testing regression testing plays a major role in delivering quality software, so it has become an integral part of software development process in all IT industry.

With the wide application of IT in various industries, software systems have became very important. The consistency of the system is playing plays a key supporting role for the application business development. Development and maintenance are always accompanied the entire life cycle of application systems. As a result, there is a growing demand for regression testing

However, the trend of the day is cloud computing and it is very important and necessary to move regression testing of applications on to cloud computing, so that the objective of delivering a quality software is achieved in a higher level of satisfaction. Therefore, regression testing is most common and defacto type of testing in cloud paradigm to deliver quality software. Hence, this paper is towards emphasizing upon filling the gap between conventional regression testing and cloud regression testing. This is because cloud testing is a new area where there is wide scope for research.

Further, it is a Greenfield and there is a scope for work to ensure regression testing is a worthy candidate to move on to the cloud platform as it increases the efficiency of testing by sharing hardware resources with respect to, cost effectiveness, maintainability of test scripts and use of automation tools.

II. LITERATURE SURVEY

Authors of [1] provide an overview of cloud computing (different service models and deployment models). They suggest the research in the area of SaaS, PaaS and IaaS in order to enhance the business performance.

They further focuses on the key issues associated with the cloud computing such as, how will cloud computing be defined, how will it evolve, when, where, how and why should companies migrate to the cloud for services, how will cloud computing affect the strategy and direction of IT and business and what vendors, markets and industries will be transformed by the cloud-computing phenomenon.

Authors of [2] state that, testing is a challenging activity for any software engineering project and specifically for a large scale system. They put forth the expensive nature of automation testing at in-house environment indicating the potential benefit of cloud computing to address this issue. They feel that migrating testing to cloud is not without cost, nor necessarily the best solution to all testing problems. They emphasize on migrating software testing to the cloud from two perspectives such as, characteristic of an application under test and type of testing performed on an application. Thus, authors suggest migration of Software Company to cloud

environment in order to overcome several issues related to automation testing.

Author of [3] tells that, state of the art business require a fast, reliable and secure IT infrastructure to flourish. Author expresses the inability of small and medium scale enterprises to meet the huge capital investment thereby directing them to migrate to cloud based business since it enables them to focus on their core activities, instead of worrying about maintaining their IT infrastructure. Author has indicated various challenges and risk associated with migrating business to cloud namely, data integrity, security, privacy, business acceptability, etc., Finally the author has suggested, effective testing to overcome the challenges and issues related to cloud based environment and effective testing practices.

Authors of [4] state that, testing the cloud is considered as a model in order to test an application as a service provided to customers across the internet. They feel that software testing model for cloud enables effective performance of daily operation, maintenance and testing support through web-based browsers, testing frameworks and servers for all cloud based applications. The authors further provide various cloud based testing tools namely, D-cloud, YETI (York Extensible Testing Infrastructure), Cloud9 and RNL (Remote Network Labs). However the authors brings out various research issues in testing cloud which includes issues related to applications, legal and finance.

Authors of [5] recommend cloud testing as an effective method for software testing in cloud computing technology. They put forth various reasons for using cloud computing for testing such as, cost saving, improve the test efficiency, performance etc. Authors have further indicated appropriate environment for testing namely, hardware environment, software environment (operating systems, database and browsers).

Authors of [6] express that, currently the cloud based software testing focuses on testing services provided in the cloud. According to them the testing process has to be given more significance rather than considering only on infrastructure. They have further proposed taxonomy of five patterns for testing in the cloud and have suggested seven criteria for effective infrastructure. Therefore they have recommended the research on testing cloud and its services.

Author of [7] provides the detailed information about the problem of accuracy and quality control in regression testing of application in engineering practice and presents the regression testing for industry oriented applications to address the issues like, low degree of automation, defining test coverage. Author also proposes a practical regression model which combines, change-impact-analysis, business rules model, cost risk assessment and test case management. Further author, stresses on the methodology ie. structure and business rules model in order to cope up with the problems faced by the large scale IT industries.

Authors of [8] introduces the concept of traditional software testing, and the need of cloud testing along with the cloud testing types such as, functional, multi-tenancy, security , performance ,compatibility and negative testing. Further, authors present the characteristics of applications say, test case independence, known operational environment and programmatic interface. In continuation to this author brings the forms of cloud based software testing, advantages, challenges. Later , they focuses on the regression testing and its challenges such as, software change and bug fixing, dynamic software validation methods and solutions to address the dynamic features of SaaS along with cloud testing life cycle.

Author of [9] provides the basic idea of cloud computing, its benefits, challenges and limitations associated with it. Further author expresses the importance of performance of the cloud services offered by the service providers. Author has detailed about the different companies providing cloud services and the tools used for performance testing. The author further feels that there exists a direct correlation between performance and revenue. Hence, they emphasize on performance also to be considered as an important characteristic of cloud than the existing strategy of emphasizing upon only security issues.

Authors of [10] indicate the importance and benefits of cloud technology in large data computation, storage capacity, scalability, high availability and etc. Further, authors suggest testing the performance of cloud services based on metrics. They state few of the metrics incorporated in cloud environment that measures the various resources of cloud are overhead of acquiring and releasing the virtual computing resources metric, and the overhead on virtualization and network communications metric. Additionally, authors have evaluated different scheduling algorithms to determine the costs.

III. RESEARCH BACKGROUND

The invent of cloud has made most of the IT industry's to move their service requirement to cloud environment, such that the software testing is not compromised. The testing of varieties of applications in on-premises is a resource consuming activity for any IT firm, so that it increases the capital investment regularly. Therefore, by taking the advantage of cloud paradigm it is a wise decision to move the testing process to cloud environment.

The traditional regression testing is carried out in IT like, by taking the basic test cases, which validate the functionality of a software module and those that have data flowing from one module to other. These test cases are run whenever a change is made to the code or functionality of the module in order to make sure that the features which were hitherto working in order continue to function normally.

Regression test cases normally form a bucket which are run regularly in order to test the basic functionality. These are good candidates for automation since, they may be multiple times in every release. Therefore, performing regression testing on all modules of an application is common process to make sure that the software is free from defects from every release.

It is very important to study the behavioral aspects with regard to accessing applications, test cases, and tools on the cloud. It is also important to study several attributes such as, availability, performance, and security of these applications, tools and work products on the cloud.

IV. RESEARCH AVENUES

This paper aims to bring in awareness towards emphasizing on importance of testing in cloud environment through regression testing tactic. Since regression testing is considered to be one of the most common testing techniques carried out every day for all application in any software industry, it is important to pay an attention towards applications when run in cloud to be regressively tested.

From the literature survey it is evident that, testing is always carried out in compliance with stake holder's specifications, design flow, coding standards as well as in compliance with desired level of quality.

However, the day to day scenarios of IT industry do not go according to the prescribed guidelines but, it incorporates strategies which are customized as well reactive to the situation. Hence, adopting the normal mode of regression testing, when moved to cloud testing is not advisable. Further, the modalities of regression testing are bound to vary for applications run on on-permises versus cloud environment.

Though, this fact is well accepted yet, modified and enhanced regression in cloud is not yet achieved. This paper thus put forth the benefits that on would gain in case of tailoring regression testing modalities for cloud, which are briefed as below

- Cost reduction to test
- Reduced time to test
- Accurate prediction of test resources
- Improved business performance
- Increased customer satisfaction
- Reflection of continual process improvement.

In order to achieve this, there is always a scope for improving the modes of regression testing when carried out in cloud either in the form of models or metrics. It is worth to note that, metrics that takes care of quality of regression testing in cloud is a yet another are for research.

This work limits to emphasize on need for modifying modalities of regression testing conventionally to cloud based.

V. CONCLUSION

Evolution of Science and Engineering has led to the growth of several commercial applications. Advancement of technology in the IT industry requires development of optimal software in addition to consumption of large scale infrastructure, advanced operating platforms and heavy capital investment by the organization. Cloud computing is an emerging technology, which enables to achieve the above specified objective.

However, effective cloud performance is one of the core challenges of the day. The main objective of this paper is therefore to emphasize on modifying regression testing tactics for the applications in cloud. This is because due to the varied uses of cloud in current industrial atmosphere, it is imperative to ensure efficiency of

regression testing of applications.

The future work is to come out with modified regression testing methods, polices and principles along with effective models and metrics which ensures efficient testing.

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