Journal of Theoretical and Applied Information Technology
15 May 2012. Vol. 39 No.2

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

CLOUD COMPUTING SOLUTION - BENEFITS AND TESTING CHALLENGES

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ABSTRACT

Modern day Software companies needs fast, secure and scalable IT infrastructure, in order to catch up with their ever growing needs of business. But, the challenge lies in setting up this setup in their own premise. They have to spend huge amount of money towards the growing needs of the IT infrastructure, personnel and the expertise to administer. As a result the focus will be shifted from their core business towards handling this burden. Here comes the Cloud computing, a solution which helps organizations to focus on their core business rather than worrying about the investment and maintenance of their IT infrastructure. This paper focuses on the challenges faced by companies in moving to a cloud environment, with respect to security, reliability, and manageability, which the organizations should focus on only through rigorous testing. The paper starts explaining the benefits of cloud computing and move towards the testing challenges faced by testers.

Keywords: *Testing, Cloud Testing, Cloud Testing Challenges*

1. INTRODUCTION

Cloud Computing comes as a great deal of relief to businesses with lots of benefits. Some can be of immediate and some can be of long time, from reductions in cost of without the ownership to location independence.

But it is not possible to enjoy these benefits without the expense of anything so here comes a few concerns

; Security, privacy, availability, performance and integrity. Appropriate testing must be at the top priority of any Cloud solution to ensure the delivery of a safe, integrated solution which guarantees the needs of the business it is indented to serve.

The purpose of this paper is to understand the benefits of a Cloud Computing solution and the concerns of how suitable testing can assist in realizing the full potential of investment.

Cloud computing the buzzword is the single largest trend in computing infrastructure today. Cloud Computing is a much more generalized term in which little or no centralized infrastructure exists. Sets of loosely coupled data centers work together achieving high utilization levels to perform a common task, presenting GUI interfaces to users through Virtualization or thin clients via the 'Cloud'.

2. CLOUD COMPUTING THROUGH SaaS

Typically, Software as a Service (SaaS) is a type of cloud computing, which is a software delivery model [1]. Software and its associated data are hosted centrally (typically in the (Internet) cloud) and are typically accessed by users using a thin client, normally using a web browser over the Internet [1]. Customers are not expected to buy software licenses or additional infrastructure equipment, and are expected to only pay monthly fees (also referred to as annuity payments) for using the software [2] based on their usage.

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3. CLOUD COMPUTING THROUGH PaaS

Another common type of Cloud Computing is Platform as a Service (PaaS). Cloud computing has evolved to include platforms for building and running custom applications, a concept known as "platform as a service" (or PaaS) PaaS can be considered as the next step in the SaaS model, where the on demand delivery is not simply the specific item of software required, but the users' platform. PaaS provides the entire infrastructure needed to run applications over the Internet. It is delivered in the same way as a utility like electricity or water. Users simply "tap in" and take what they need the complexities are hidden behind the scenes. And like any other utility, PaaS is based on a metering or subscription model, so users only pay for what they use [3] again the delivery route in this model is the 'Cloud.'

HOW CLOUD COMPUTING ADDS VALUE TO BUSINESS?

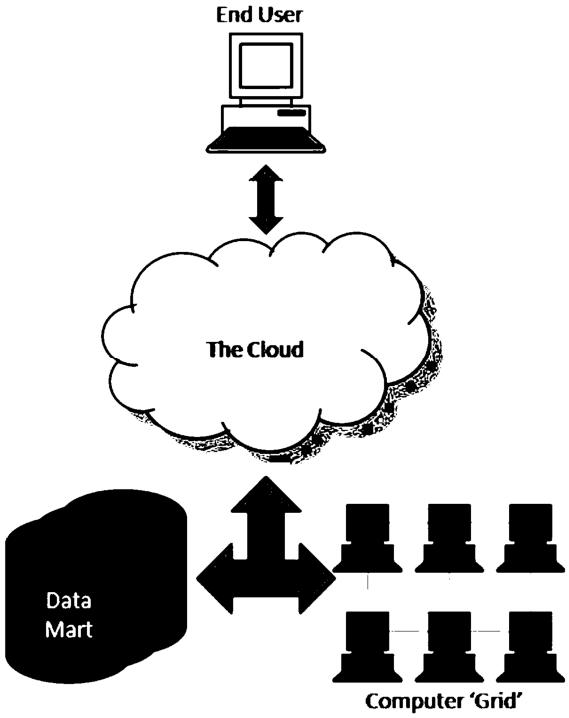

FIGURE I

Now the big question of why business community globally running towards Cloud Computing Solutions is easily answerable. It is for the following reasons.

Scalability – On demand scaling is the basic advantage of cloud solutions. This can be achieved through their distributed nature; this allows utilization to be spread evenly amongst available servers.

Location independent access – Achieved through thin clients or virtualization. The only limitation is being an internet access.

Reduced ownership cost – Achieved using the service providers with currently existing Cloud deployments this in turn eliminates the need to own hardware to provide any sort of support to the Cloud solution

Server efficiency/utilization – Server efficiency and utilization has been drastically improved through the even distribution of workload. so lesser used servers producing greater ROI.

Infrastructure friendly –

The goals of green computing are similar to green chemistry; reduce the use of hazardous materials, maximize energy efficiency during the product's lifetime, and promote the recyclability or biodegradability of defunct products and factory waste[4].The reduced requirement for hardware, implementations and location dependence brings in the benefits of clean and pollution free environment for business. Currently lot of research is in progress to play with a safe IT infrastructure. Luckily cloud Computing offers it at ease.

Instantly deployable environments – Environments can be built and deployed for specific needs such as test or deployment. The use of virtualization using the Cloud guarantees that these environments can be scalable to production size and deployed within far reduced timescales.

Have checks on maintenance cost – The centralization of all IT components offers a great impact on maintenance which can be carried out centrally on a one time only basis. The maintenance is then mirrored in all end user instances of that Cloud solution. Along with the list of advantages

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

listed above there are also a few concerns which are worth considered by companies before adapting themselves to Cloud Solutions.

4. PROBLEMS THAT CLOUD BRINGS TO TABLE:

Lack of control – The whole IT infrastructure itself is outsourced to an external third party. This definitely is alarming and a big question of how does the business maintain control over their data, which lies beyond their boundaries

Security – How can business ensure the potentially sensitive information which traverses the cloud is safe and secure?

Securing cloud computing environments will be a major focus of vendor efforts over the next year, says Jonathan Penn, an analyst at Forrester Research. In the short term, he sees users having to do a lot of the legwork, but over time, "cloud providers themselves will see the opportunity to differentiate themselves by integrating security."[5]

But organizations such as the Cloud Security Alliance (CSA) are working to put some shape around the security issues and the ways to address them [5].

Privacy concerns – How businesses ensure that the privacy of their users and information is maintained when using the cloud?

Data Integrity – When using third party solutions for Cloud Computing what assurances do businesses have for their valuable data remains intact?

Availability – Cloud computing solutions rely heavily on the availability of their infrastructure and the necessary business applications for their customers to be able to function effectively. Imagine a scenario where a business critical Cloud Solution be unavailable for some time, what will be its impact on business.

Acceptability – How sure can a business be that their third party solution is suitable for its intended use?

5. CLOUD TESTING CHALLENGES:

5.1 Non-Functional Testing

Before opting out for a Cloud Computing solution it is vital for businesses and the cloud solution provider to have a precise understanding of the requirements within that business' context. The business must carefully analyze and document what they require from such a solution clearly and unambiguously.

Fulfilling the business requirements are the key for the success of any software solution since business' look more and more often to third parties to deliver these solutions in the Cloud Computing set up, the foundations for the delivery must be solid. Business requirements are these foundations.

Thorough testing on business requirements will definitely ensure that these are precise and complete. This understanding of what is being asked for in requirements can be achieved through reviews, periodical customer meets and workshops. This will save time and money, later in the software development lifecycle by removing potential software defects before they are built.

Scalability is another major area of concern where adequate amount of testing is needed. Cloud Computing solutions always claim to be scalable on demand. But how do businesses make sure that the solution delivered?

Is the solution smart enough of coping up with the workload which it is required to undertake? Load or Stress testing can be used to prove that the developed solution can scale as required. Software testing tools like the Load Runner and other testing techniques can be used for this purpose.

HP LoadRunner can emulate hundreds or thousands of concurrent users to put the application through the rigors of real-life user loads. [6]

Hence Cloud can be accurately measured and its capacity is verified.

Performance testing techniques allow us to measure the systems performance accurately. Performance testing and load testing techniques in tandem allows us to get an accurate image of the solution's ability on the cloud to be created.

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

This in turn provides the comfort that a perfect system is constructed which is capable of delivering the business requirements.

Security testing which is an indispensable part of testing applications due to increase in security breaches in business [7]. This can provide assurance that business critical data is stored and transported safely. It's worth considering techniques such as Penetration Testing can be used for this purpose this is a proven technique to identify methods of gaining access to a system by using common tools and techniques used by hackers[8] can very well guarantee the security of Cloud solutions.

5.2 Functional Testing

It is testing all the features and functions of a system which includes the hardware, software and it is conducted on a complete, integrated software system to check it's compliance with the requirements[9]

Now In this scenario is there any means through those businesses validate that the system will behave within the specified requirements? System testing techniques allow the proving of the systems behavior within its own entity. Before consideration of any deployment it is critical to prove that the system functions as it has been designed, that the system components work together, inputs and outputs are as expected and the overall resulting system is a high quality system. Before any deployment, how do the businesses verify that the integrated solution will behave as intended to facilitate

business continuity? Integration testing allows the business to verify that the Cloud solution will work within the current infrastructure and environments, proving that the implementation of a Cloud solution does not detrimentally impact any existing systems.

Finally, the business requirements must be verified and validated to prove that the end result of the Cloud solution will meet the documented needs of the business.

User Acceptance Testing will use business requirements to prove that the delivered Cloud solution meets those needs.

The location independence element of Cloud Computing solutions makes these types of applications the most versatile in terms of test.

The benefits of offshore testing are well documented and present as an instant option for testing Cloud Computing solutions. Likewise, on-site testing allows immediate control and monitoring of test progress.

6. TESTING VIA TOOLS

Major technology vendors such as HP, Intel and Yahoo are presently collaborating to create huge cloud 'test beds' consisting of many thousands of processors working together as centres of excellence in Cloud Computing[11]. These test beds will allow users to test their cloud deployments at internet scale and also understand how their systems and software actually behave within the cloud. With such huge investment by some of the largest technology and Internet Service Providers globally today, indicators are clearly pointing at cloud computing to be a major focus point for the industry in the coming years.

Current test tool offerings by the likes of HP and IBM are ideal for non functional and automated testing in a cloud environment [6]. Already well established software such as HP's Quick Test Pro or IBM's Rational Robot can be used to full effect within a cloud environment to perform automated testing tasks such as regression tests.

Taking into account the quickly evolving nature of Cloud Computing in today's technology sector it is critical that any tester who is expected to test cloud solutions has a good understanding of what makes a Cloud Computing application and distributed architecture, as well as a good understanding of the tools available and their strengths and weakness for testing different types of cloud applications.

7. CONCLUSION

Cloud Applications for business are still in their early stages. But already lot of analysts has predicted that the future is going to be Cloud computing solutions for large as well as small

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

businesses. And that will bring a major wave in technology infrastructure.

But still a more matured Cloud Computing architecture is expected to arrive since it has got its roots from distributed Computing. The benefits are already realized by many IT majors worldwide thanks to cloud providers like Amazon [12], Netmagic and others who are offering public as well as private cloud [10] and its impact cannot be ignored by businesses striving to overcome the constraints of their current IT hardware whilst struggling to justify the cost of investing in major upgrades. But the challenge lies in understanding the requirements and suitably testing that requirement lies at the core of solid Cloud Computing deliveries.

8. LIM ITATIONS AND FUTURE WORK:

Only a few advantages and a few testing challenges of the cloud computing solutions have been identified in this paper. In future, as we are getting more matured architecture for cloud computing, and more and more testing on the cloud applications there is every possibility of more testing challenges which can be explored by researchers.

REFERENCES:

[1]. ”Getting started with cloud through right business Based IT Strategy” – IBM Global Business Services,http://public.dhe.ibm.com/common/ssi/ecm/en/gbs03048usen/GBS03048USEN.PDF

[2]. ”SaaS”,http://www.wikinvest.com/concept/Software_as_a_Service

[3]. “PaaS”,http://www.salesforce.com/paas/

[4]. “Green Computing – Microsoft Research “ - research.microsoft.com/pubs/78813/aj18_en.pdf

[5]. “Cloud network world” www.networkworld.com/news/2010/061510-cloud-security-the.html

[6]. ” HPLoadRunner software in the cloud” - www8.**hp**.com/in/en/software/software-product.html?compURI

[7]. “Security testing” - www.testree.com/FA_security_testing.html

[8]. ”Software Penetration Testing”, http://www.testinggeek.com/software-testing-Penetration-testing

[9]. “What is Unit and Functional Testing” – Chapter 15, *The Definitive Guide to symphony, http://www.symfony-project.org/book/1_0/15-Unit-and-Functional-Testing*

[10]. http://www.netmagicsolutions.com/cloud-computing-service-provider-in-india.html

[11]. http://www.hpl.hp.com/open_innovation/cloud_collaboration/projects.html

[12]. ”Cloud drive” - ”https://www.amazon.com/clouddrive/learnmore.