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Impact of Cloud Computing Platform Based on Several Software Engineering Paradigm

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Abstract

A Cloud is a type of parallel and distributed system consisting of a collection of interconnected and virtualised computers that are dynamically provisioned and presented as one or more unified computing resources based on service-level agreements established through negotiation between the service provider and consumers. [UNI_MELB_08] Traditional business applications have always been very complicated and expensive. The amount and variety of hardware and software required to run them are daunting. We need a whole team of experts to install, configure, test, run, secure, and update them. When you multiply this effort across dozens or hundreds of apps, it's easy to see why the biggest companies with the best IT departments aren't getting the apps they need. Small and mid-sized businesses don't stand a chance. In today's era with cloud computing, you eliminate those headaches because you're not managing hardware and software that's the responsibility of an experienced vendor like salesforce.com. The shared infrastructure means it works like a utility: You only pay for what you need, upgrades are automatic, and scaling up or down is easy. In this paper we analyze several aspect and impact of software engineering parameter like design, modularity, testing etc.

Keywords

Cloud Computing, Cloud Model, Security Model, Cloud

1. Introduction

Cloud-based apps can be up and running in days or weeks, and they cost less. With a cloud app, you just open a browser, log in, customize the app, and start using it. Businesses are running all kinds of apps in the cloud, like customer relationship management (CRM), HR, accounting, and much more. Some of the world's largest companies moved their applications to the cloud with salesforce.com after rigorously testing the security and reliability of our infrastructure. As cloud computing grows in popularity, thousands of companies are simply rebranding their non-cloud products and services as "cloud computing." Always dig deeper when evaluating cloud offerings and keep in mind that if you have to buy and manage hardware and software, what you're looking at isn't really cloud computing but a false cloud. Cloud computing is poised to revolutionize Information Technology (IT) acquisition and service models. Delivering massively scalable computing resources as a service with Internet technologies, resources are shared among a vast number of consumers allowing for a lower cost of IT ownership. Cloud computing provides on-demand computing resources dynamically, which allows companies to fundamentally change their information technology strategy. As with any new technology, this new way of doing business brings with it new challenges, especially when considering the security and privacy of the information stored and processed within the cloud. In the era of semantic web or Web 2.0 [1], [2], [3], [4] emergence of several web technologies are enabling innovative use of the web. In Web 2.0, metadata written in XML (extensible markup language) describing the web content can be read and processed by the computers automatically. Other XML based web protocols like service oriented architecture (SOA), simple object access protocol (SOAP), web service description language (WSDL) and universal description, discovery and integration (UDDI) of web are capable of integrating applications developed on heterogeneous computing platforms, operating systems and with varieties of programming languages. Requirements gathering phase so far included customers, users and software engineers. The cloud providers can help in answering these questions on: 1) How many developers are needed, 2) Component Reuse, 3) Cost estimation, 4) Schedule Estimation, 5) Risk Management, 6) Configuration Management, 7) Change Management, and 8) Quality Assurance. Utility cloud computing allows users to rent Virtual Machine (VMs) from a service provider, placing an organization's sensitive data in the control of a third party. This situation places a significant level of risk on the privacy and security of the data processed by the VMs in the cloud. We propose a new management and security model for utility cloud computing called the Private Virtual Infrastructure (PVI) that shares the responsibility of security in cloud computing between the service provider and client, decreasing the risk exposure to both. In the rapidly changing computing environment with web services and cloud platform, SW development is going to be very challenging. SW development process will involve heterogeneous platforms, distributed web services, multiple enterprises geographically dispersed all over the world. In this paper we analyze several aspects of software components in cloud environment.We provide here an overview of executing data mining services on grid. The rest of this paper is arranged as follows: Section 2 introduces Impact of Cloud Computing; Section 3 describes about Technical Analysis; Section 4 shows the Recent Scenario and Proposed Method; Section 5 describes the several threats. Section 6 describes conclusions. Finally References are given in section 7.

2. Impact of Cloud Computing

In a functional oriented organization different departments work isolated. This leads to disturbed communication, badly defined processes and important differences in the way things are done. It also invokes hidden costs and misunderstandings. This explains why organizations switch more and more to cross-departmental, end-to-end business processes. The exponential growth in software applications and accelerating customer or in house requirements have an enormous impact on IT infrastructure. IT organizations are always on the lookout for approaches to increase capacity or add on-demand capabilities without investing in expensive new infrastructure. This need has led to the advent of cloud computing - a style of computing where scalable and elastic IT enabled capabilities are delivered 'as a service' to external customers using Internet technologies. The concept incorporates Infrastructure as a Service (IaaS), Software as a Service (SaaS) and Platform as a Service (PaaS). Current economic conditions make the "as a service" model very attractive to many organizations. Cloud Computing enables the availability of infinite infrastructure and resource capacity. The biggest advantage here is that there are no initial resource commitments, rather, organizations pay "per use." Organizations can forget about upfront infrastructure costs and migrate their applications to the cloud.

We can also apply the V-model which represents a software development process (also applicable to hardware development) which may be considered an extension of the waterfall model. Instead of moving down in a linear way, the process steps are bent upwards after the coding phase, to form the typical V shape. The V-Model demonstrates the relationships between each phase of the development life cycle and its associated phase of testing. The horizontal and vertical axes represent time or project completeness (left-to-right) and level of abstraction.

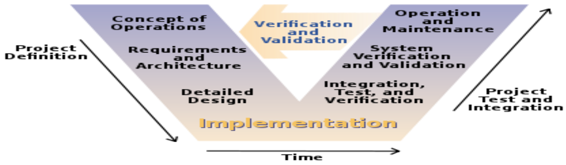

Fig 1 Software analysis in cloud computing

In the Requirements analysis phase, the requirements of the proposed system are collected by analyzing the needs of the user(s). This phase is concerned about establishing what the ideal system has to perform. However it does not determine how the software will be designed or built. Usually, the users are interviewed and a document called the user requirements document is generated. The user requirements document will typically describe the system's functional, interface, performance, data, security, etc requirements as expected by the user. It is used by business analysts to communicate their understanding of the system to the users. The users carefully review this document as this document would serve as the guideline for the system designers in the system design phase. The user acceptance tests are designed in this phase there are different methods for gathering requirements of both soft and hard methodologies including; interviews, questionnaires, document analysis, observation, throw-away prototypes, use cases and status and dynamic views with users.

System Design
Systems design is the phase where system engineers analyze and understand the business of the proposed system by studying the user requirements document. They figure out possibilities and techniques by which the user requirements can be implemented. If any of the requirements are not feasible, the user is informed of the issue. A resolution is found and the user requirement document is edited accordingly. The software specification document which serves as a blueprint for the development phase is generated. This document contains the general system organization, menu structures, data structures etc. It may also hold example business scenarios, sample windows, reports for the better understanding. Other technical documentation like entity diagrams, data dictionary will also be produced in this phase. The documents for system testing are prepared in this phase.

Architecture Design
The phase of the design of computer architecture and software architecture can also be referred to as high-level design. The baseline in selecting the architecture is that it should realize all which typically consists of the list of modules, brief functionality of each module, their interface relationships, dependencies,

database tables, architecture diagrams, technology details etc. The integration testing design is carried out in the particular phase.

Module Design

The module design phase can also be referred to as low-level design. The designed system is broken up into smaller units or modules and each of them is explained so that the programmer can start coding directly. The low level design document or program specifications will contain a detailed functional logic of the module, in pseudo code:

- database tables, with all elements, including their type and size
- all interface details with complete API references
- all dependency issues
- error message listings
- complete input and outputs for a module.

3. Technical Analysis

The buzz around cloud computing has reached a fever pitch. Some believe it is a disruptive trend representing the next stage in the evolution of the Internet. Others believe it is hype, as it uses long established computing technologies. As with any new trend in the IT world, organizations must figure out the benefits and risks of cloud computing and the best way to use this technology. One thing is clear: The industry needs an objective, straightforward conversation about how this new computing paradigm will impact organizations, how it can be used with existing technologies, and the potential pitfalls of proprietary technologies that can lead to lock-in and limited choice.

The key characteristics of the cloud are the ability to scale and provision computing power dynamically in a cost efficient way and the ability of the consumer to make the most of that power without having to manage the underlying complexity of the technology. The cloud architecture itself can be private or public. These characteristics lead to a set of core value propositions. Although the cloud presents tremendous opportunity and value for organizations, the usual IT requirements (security, integration, and so forth) still apply. In addition, some new issues come about because of the multi-tenant nature (information from multiple companies may reside on the same physical hardware) of cloud computing, the merger of applications and data, and the fact that a company's workloads might reside outside of their physical on-premise datacenter. This section examines five main challenges that cloud computing must address in order to deliver on its promise. Customers expect that the cloud services they use will be as open as the rest of their IT choices. As an open cloud becomes a reality, business leaders will benefit in several ways.

Choice

As an organization chooses a provider or architecture or usage model, an open cloud will make it easy for them to use a different provider or architecture as the business environment changes. If the organization needs to change providers because of new partnerships, acquisition, customer requests or government regulations, they can do so easily. If the organization deploys a private cloud, they can choose between providers as they extend their capacity and/or functional capabilities. Resources that would have been spent on a difficult migration can instead be spent on innovation.

Flexibility

No matter which cloud provider and architecture an organization uses, an open cloud will make it easy for them to work with other groups, even if those other groups choose different providers and architectures. An open cloud will make it easy for organizations to interoperate between different cloud providers.

Speed and Agility

One of the value propositions of cloud computing is the ability to scale hardware and software as needed. Using open interfaces allows organizations to build new solutions that integrate public clouds, private clouds and current IT systems. As the conditions of the organization change, an open cloud will let the organization respond with speed and agility.

Skills

A side effect of an open cloud is the availability of skilled professionals. If there are many proprietary programming models, a given IT professional is unlikely to know more than a few of them. With an open cloud, there will be a smaller set of new technologies to learn (especially when existing technologies are utilized), greatly enhancing the chances that the organization can find someone with the necessary skills of course, many clouds will continue to be different in a number of important ways, providing unique value for organizations. It is not our intention to define standards for every capability in the cloud and creates a single homogeneous cloud environment. Rather, as cloud computing matures, there are several key principles that must be followed to ensure the cloud is open and delivers the choice, flexibility and agility organizations demand:

1. Cloud providers must work together to ensure that the challenges to cloud adoption (security, integration, portability, interoperability, governance/management, metering/monitoring) are addressed through

open collaboration and the appropriate use of standards.

2. Cloud providers must not use their market position to lock customers into their particular platforms and limit their choice of providers.
3. Cloud providers must use and adopt existing standards wherever appropriate. The IT industry has invested heavily in existing standards and standards organizations; there is no need to duplicate or reinvent them.
4. When new standards (or adjustments to existing standards) are needed, we must be judicious and pragmatic to avoid creating too many standards. We must ensure that standards promote innovation and do not inhibit it.
5. Any community effort around the open cloud should be driven by customer needs, not merely the technical needs of cloud providers, and should be tested or verified against real customer requirements.
6. Cloud computing standards organizations, advocacy groups, and communities should work together and stay coordinated, making sure that efforts do not conflict or overlap. We can deduce the architecture as shown in fig2. The conceptual diagram is shown in fig 3.

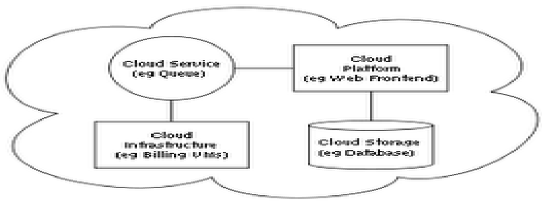

Fig 2 Cloud computing architecture

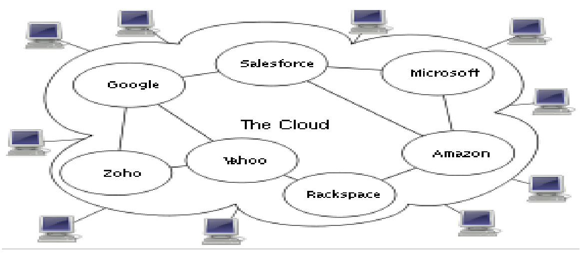

Fig 3 Conceptual Diagram

4. Recent Scenario and Proposed Method

In 2009, Börje Ohlman et al. [5] analyze how cloud computing and NetInf canbe combined to make cloud computing infrastructures easier to manage, and potentially enable deployment in smaller and more dynamic networking environments. NetInf should thus be understood as an enhancement to the infrastructure for cloud computing rather than a change to cloud computing technology as such.

In 2009, Vincenzo D. Cunsolo et al. [6] present the Cloud@Home paradigm, highlighting its contribution to the actual state of the art on the topic of distributed and Cloud computing. We detail the functional architecture and the core structure implementing such paradigm, demonstrating how it is really possible to build up a Cloud@Home infrastructure.

In 2010, Li Guo et al. [7] propose and present the design and implementation of Imperial College Cloud (IC Cloud). The goal of IC Cloud is to provide a generic design space where various cloud computing architectures and implementation strategies can be systematically studied. The IC Cloud design strictly follows the SOA principle and incorporates a highly flexible system design approach.

In 2010, Radha Guha et al. [8] analyses how cloud computing on the background of Web 2.0 is going to impact the software engineering process to develop quality software. As the cloud provider is an external entity or third party, how difficult will be the interaction with them? How to separate the roles of SW engineers and cloud providers? SW engineering should include framework activities to leverage all the benefits of cloud computing systematically and strategically. We design a cloud environment where SW process models should incorporate this new dimension of interaction with the cloud provider and separate roles of SW engineers and cloud providers. We will mitigate all the challenges of software development on cloud computing platform and make it more advantageous to develop and deploy software on the cloud computing platform. We can analyze several aspect of software engineering with their data values store in the database. We can then deduce some of the analytical aspects related to those particular phenomena discuss above.

5. Several Threats

The following are some of the notable challenges associated with cloud computing, and although some of these may cause a slowdown when delivering more services in the cloud, most also can provide opportunities, if resolved with due care and attention in the planning stages.

- **Security and Privacy:** perhaps two of the more “hot button” issues surrounding cloud computing relate to storing and securing data, and monitoring the use of the cloud by the service providers. These issues are generally attributed to slowing the deployment of cloud services. These challenges can be addressed, for example, by storing the information internal to the organization, but allowing it to be used in the cloud. For this to occur, though, the security mechanisms between organization and the cloud need to be robust and a Hybrid cloud could support such a deployment.

- **Lack of Standards:** Clouds have documented interfaces; however, no standards are associated with these, and thus it is unlikely that most clouds will be interoperable. The Open Grid Forum is developing an Open Cloud Computing Interface to resolve this issue and the Open Cloud Consortium is working on cloud computing standards and practices. The findings of these groups will need to mature, but it is not known whether they will address the needs of the people deploying the services and the specific interfaces these services need. However, keeping up to date on the latest standards as they evolve will allow them to be leveraged, if applicable.
- **Continuously Evolving:** User requirements are continuously evolving, as are the requirements for interfaces, networking, and storage. This means that a “cloud,” especially a public one, does not remain static and is also continuously evolving.
- **Compliance Concerns —** The Sarbanes-Oxley Act (SOX) in the US and Data Protection directives in the EU are just two among many compliance issues affecting cloud computing, based on the type of data and application for which the cloud is being used.

When in the cloud, communications services can extend their capabilities, or stand alone as service offerings, or provide new interactivity capabilities to current services. Cloud-based communications services enable businesses to embed communications capabilities into business applications, such as Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) systems. For “on the move” business people, these can be accessed through a smartphone, supporting increased productivity while away from the office. These services are over and above the support of service deployments of VoIP systems, collaboration systems, and conferencing systems for both voice and video. They can be accessed from any location and linked into current services to extend their capabilities, as well as stand-alone as service offerings. In terms of social networking, using cloud-based communications provides click-to-call capabilities from social networking sites, access to Instant Messaging systems and video communications, broadening the interlinking of people within the social circle.

6. Conclusion

When you multiply this effort across dozens or hundreds of apps, it’s easy to see why the biggest companies with the best IT departments aren’t getting the apps they need. Small and mid-sized businesses don’t stand a chance. In today’s era with cloud computing, you eliminate those headaches because you’re not managing hardware and software that’s the responsibility of an experienced vendor like salesforce.com. The shared infrastructure means it works like a utility: You only pay for what you need, upgrades are automatic, and scaling up or down is easy. In this paper we analyze several aspect and impact of software engineering parameter like design, modularity, testing etc. In future we concentrate on the real time scenario with their implementation with the use of java environment.

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