

A Survey on Cloud Computing and its Services

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Abstract— Cloud computing creates a virtual paradigm for sharing data and computations over a scalable network of nodes [1] [2]. In this article we have surveyed various aspect of cloud and their development tools. This paper also attention to the current development cloud with their QoS measures.

Keywords- Cloud, CloudSim, eXo-IDE, IaaS, PaaS, SaaS,

I. INTRODUCTION

Cloud computing is fast growing as an alternative to conventional computing. However, the paradigm is same as cluster computing, distributed computing, utility computing and grid computing in general [11].

Cloud computing creates a virtual paradigm for sharing data and computations over a scalable network of nodes [1] [2].

Examples of such nodes include end user computers, data centers, and web services. Such a scalable network of nodes is called cloud. An application based on such clouds is taken as a cloud application.

Cloud computing is modern TCP/IP integrations of computer and network technologies such as fast micro processor, gigantic memory, high-speed network and reliable system architecture [3][4]. Generally cloud computing services are classified into three categories: Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), and Software-as-a-Service (SaaS) [5] [6].

Cloud computing also is divided into five layers including clients, applications, platform, infrastructure and servers. The five layers look like more reasonable and clearer than the three categories [7].

In this paper we have tried to summarize the universal characteristics of cloud computing which will help the development and implementation of this growing technology. As a technical characteristic, the loose coupling is the key technical feature of all kinds of cloud computing systems.

Rest of the paper organized as follow, section 2 describes related terminology and background of cloud and its services, and section 3 focuses on related work in the field of cloud and its development. Section 4 gives the conclusion of this paper.

II. TERMINOLOGY AND BACKGROUND

In October 2007, IBM and Google announced collaboration in cloud computing [4]. The term “cloud computing” become popular from then on. Beside the web email, the Amazon Elastic Compute Cloud (EC2) [8], Google App

Engine [9] and Salesforce’s CRM [10] largely represent a promising conceptual foundation of cloud services.

L. Ellison the CEO of Oracle believes that cloud computing is nothing more than “everything that we currently do” [12]. According to author of [3] cloud computing has following characteristics they are agility, low cost, device and location independence, multi-tenancy, high reliability, high scalability, security and sustainability.

According to Jianfeng Yang and Zhibin Chen [13] “Cloud” is a virtualized pool of computing resources”.

Cloud can:

1. Managing of different workloads like set of back-end operations and user-oriented interactive applications.
2. Fast deployment
3. Enhanced recovery mechanism for workload like support for redundancy, self-healing and highly scalable programming model, from a variety hardware/software failure
4. Real-time monitoring of resources and allocation of them [14].

II. (A) Types of Services

According to [15], cloud computing combines known technologies (such as virtualization) in ingenious ways to provide IT services “from the conveyor belt” using economies of scale. Core technologies of cloud computing are –

Software as a service (SaaS) and platform as a service (PaaS) are not possible unthinkable without the support of the Web services and application [15].

A. Software as a Service (SaaS) – According to the author of [16] Cloud computing offers the applications as services over WWW and the hardware and systems software in the datacenters which provides services on the a pay basis [17]. Cloud computing influence with the word elasticity means ability to create a patchy number of virtual machine occurrences depends on the requested application [17] [18].

SaaS is a software liberation standard model in which software is hosted off-premises, developed by cloud service providers and launch and distribute through Internet following the payment based on the subscription [19]. SaaS providers capable of scaling up or down the service provided [17].

The good thing about SaaS is that clients only focus on the use of the software and do not have to be bothered about the software price cost nor the managing of software updates. Though, SaaS clouds are not without risks related to as mention above. It is decided by the service providers themselves. Therefore, if a client incompatible with software offered to him, he is free to switch SaaS provider or adopt the software [20].

- B. Platform as a Service (PaaS)** – PaaS offers development and runtime environments for Web applications and services [15]. According to [20] The PaaS category represents clouds that access to a range of compute, database and storage functions within a specified framework provided over the Internet. The advantage of PaaS services in clouds is that clients can develop their own requisite services without worrying about provisioning and retaining the hardware and software. PaaS is same as SaaS except clients has freedom to create software as well as use it
- C. Infrastructure as a service (IaaS)** – It offers, administrators usually implementation of related APIs and services, such as the execution and accessing supervision for Web application/ service technologies to the customers [15]. PaaS capability provided to the end user is to prerequisite processing, storage, networks, and other computing resources for deployment and on condition that arbitrary software can run by the clients, which can include operating systems and applications.

II (B). TOOLS FOR CLOUDS

There are so many tools available for development of cloud and operations of its service. Some of them are free and some are takes minimal amount to the client. For example, microsfst Azure, Amazon, Google, Ubuntu and many more. We have divide clouds tools into two categories – Development tools and Simulation tools. In this paper we have discuss one from each category.

- A. CloudSim and CloudAnalyst** – These clouds tools are the simulator type tools. They are important for developers to evaluate the requirements of large-scale cloud applications in terms of geographic distribution of both computing servers and user workloads. The former was developed with the purpose of studying the behavior of applications under various deployment configurations whereas the latter helps developers with insights in how to distribute applications among cloud infrastructures and value added services. Initial releases of CloudSim used SimJava as discrete event simulation engine [21] [22] that supports several core functionalities, such as queuing and processing of events, creation of Cloud system entities (services, host, data center,

broker, virtual machines), communication between components, and management of the simulation clock. However in the current release, SimJava layer has been removed in order to allow some advanced operations that are not supported by it. We provide finer discussion on these advanced operations in the next section.

The *CloudSim* simulation layer provides support for modeling and simulation of virtualized Cloud-based data center environments including dedicated management interfaces for virtual machines (VMs), memory, storage, and bandwidth. The fundamental issues such as provisioning of hosts to VMs, managing application execution, and monitoring dynamic system state are handled by this layer. A Cloud provider, who wants to study the efficiency of different policies in allocating its hosts to VMs (VM provisioning), would need to implement their strategies at this layer. Such implementation can be done by programmatically extending the core VM provisioning functionality. There is a clear distinction at this layer related to provisioning of hosts to VMs. A Cloud host can be concurrently allocated to a set of VMs that execute applications based on SaaS provider's defined QoS levels. This layer also exposes functionalities that a Cloud application developer can extend to perform complex workload profiling and application performance study. The top-most layer in the CloudSim stack is the User Code that exposes basic entities for hosts (number of machines, their specification and so on), applications (number of tasks and their requirements), VMs, number of users and their application types, and broker scheduling policies. By extending the basic entities given at this layer, a Cloud application developer can perform following activities: (i) generate a mix of workload request distributions, application configurations; (ii) model Cloud availability 7 scenarios and perform robust tests based on the custom configurations; and (iii) implement custom application provisioning techniques for clouds and their federation.

According to [22] CloudSim has following functionalities:

1. support for modeling and simulation of large scale Cloud computing data centers
2. support for modeling and simulation of virtualized server hosts, with customizable policies for provisioning host resources to virtual machines
3. support for modeling and simulation of energy-aware computational resources
4. support for modeling and simulation of data center network topologies and message-passing applications

5. support for modeling and simulation of federated clouds
6. support for dynamic insertion of simulation elements, stop and resume of simulation
7. support for user-defined policies for allocation of hosts to virtual machines and policies for allocation of host resources to virtual machines

B. **eXo Cloud-IDE** - eXo IDE [23] is a powerful Web application which offers provides a rich environment for developing different content, scripts, and services. The good thing about eXo is that it does not require any additional installations, it runs in a browser and consent to accessing and manipulation on files via online from anywhere. It offers following

1. Capability of Work with the Remote File System through Virtual File System including Browsing, File Locking, File Search, and Versioning.
2. Provides Code Editor with Syntax Highlighting and checking for many popular languages and advanced features such as: Code Autocomplete, Code Outline and WYSIWYG Editor for HTML and Google Gadget.
3. Support for multiple programming and descriptive languages such as: JavaScript, HTML, XML, CSS, Java, Groovy, PHP, Ruby, JSP, etc.
4. Tools for developing client side applications including technologies such as Netvibes Widgets, Google Gadgets, Groovy Templates.
5. Ready to use project set consists of Java Project, Java Spring Project and Ruby on Rails Project.
6. Development of server-side applications, running, debugging, and interaction with the client side via REST Service.
7. Powerful GIT Version Control System support including most usage operations with local and remote repository.
8. Deployment into several Platforms as a Service: Heroku, OpenBees, OpenShift, CloudFoundry.

The eXo IDE User Guide aims at providing explanations and step-by-step instructions of functions in eXo IDE. eXo IDE serves two types of J2EE roles: administrators and developers. Before working with the eXo IDE, make sure (ask your system admin) that your credentials contain one of the listed roles. eXo IDE offers pretty the same functionality for them except that developers cannot deploy their REST services on common

environment and uses kind of "sandbox" to deploy them.

III. RELATED WORK

Author [24] has reviewed about cloud computing operating systems and platform like from famous companies like Author listed following cloud operating platform by famous companies – (i) Barrelfish [25][26][27][28] system developed by Microsoft Research Cambridge in the UK and ETH Zurich in Switzerland. Designed for supporting multi-core and many-core processors, and the nuclear communication is achieved through message. (ii) FOS [33][34] (iii) Microsoft Azure[35] (iv) Google App Engine (GAE) [36].

Author of [3] surveyed the the key characteristics of cloud computing are agility, low cost, device and location independence, multi-tenancy, high reliability, high scalability, security and sustainability [7] [17]. D. Malcolm [29] observed five characteristics of cloud computing: dynamic computing infrastructure, IT service-centric approach, self-service based usage model, minimally or self-managed platform and consumption-based billing [3].

Author of [30] defines four characteristics of cloud that suite to an application: needing flexibility, growing exponentially or demanding scalability, wanting to run economically and independent in nature [30]. D. Amrhein thinks defining cloud computing has proven to be nearly impossible and offers up 5 cloud computing solution characteristics: shared, virtualized infrastructure, self-service access, elastic resource pools, consumable output and user-based usage tracking [31].

Naidila Sadashiv [32] focused on the challenges of cloud computing. According to Author following challenges keep in mind while deploying a cloud: Dynamic scalability, Multi-tenancy, Querying and access, Standardization, Reliability and fault-tolerance, Debugging and profiling, Security and Privacy and power management and maintenance for smooth running of cloud services.

Amit Nathani [37] focused on IaaS and its management, according to [37] cloud is a managed pool of resources which includes storage, compute power and software services. It gives scalability via virtualization and host applications which bear high load at certain times. Resources provided to an application can be reconfigured to adjust to a variable load. In IaaS cloud the resources (compute capacity and storage) are provided in the form of virtual machines to users. For optimization and utilization of resource on cloud provider's side, it is compulsory to handle the following two things:

1. Where to place newly created virtual machine?
2. When to dispatch newly created virtual machine to a particular physical machine?

Dan Svantesson and Roger Clarke [38] address the privacy and consumer risk on the cloud.

Sean Marston [39] and friends revealed the cloud perspective in business.

IV. CONCLUSION

In this article we surveyed on emerging future generation system “cloud” and its application. This article also insight on different terminologies used in cloud computing. This article also addressed about various cloud operating and their vendors. This paper also addresses two essential tools eXo IDE and Cloudsim. eXo IDE provides a development environments for both cloud providers and consumers without any additional cost. Later provides a simulation environment for testing validation of cloud system and its service, it is very much useful for researchers to evaluate and optimize the cloud system.

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