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A REVIEW PAPER ON CLOUD COMPUTING

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ABSTRACT

Cloud computing is the development of distributedcomputing, parallel computing, grid computing and virtualization technologies which define the scenario of a new era.Cloud computing is the latest effort in delivering computing resources as a service. It represents a shift away from computing as a product that is purchased, to computing as a service that is delivered to consumers over the internet from large-scale data centres – or "clouds". Whilst cloud computing is gaining growing popularity in the IT industry, academia appeared to be lagging behind the rapid developments in this field. Cloud computing is an emerging model of business computing. In this paper, we explore the concept of cloud architecture and aims to provide an overview of the swiftly developing advances in the technical foundations of cloud computing and their research efforts. Structured along the technical aspects on the cloud agenda and also compares cloud computing with grid computing. We also address the characteristics and applications of several popular cloud computing platforms. In this paper, we aim to pinpoint the challenges and issues of cloud computing. We identified several challenges from the cloud computing adoption perspective and we also highlighted the cloud interoperability issue that deserves substantial further research and development. However, security and privacy issues present a strong barrier for users to adapt into cloud computing systems.

Keywords -Cloud computing, architecture, challenges, cloud technologies, research agenda.

I. INTRODUCTION

Cloud computing is a whole new technology. It is the development of distributed computing, parallel computing, grid computing, and is the combination of Virtualization, Software-as-a-Service (SaaS), Utility computing, Infrastructure-as-a-Service (IaaS) and Platform-as-a-Service (PaaS). Cloud is a metaphor to describe web as a space where computing has been pre-installed and exist as a service; data, operating systems, applications, storage and processing power exist on the webready to be shared. For users, cloud computing is aPay-per Use-On-Demand mode that can conveniently accessshared IT resources through the Internet. Where the ITresources includes network, server, storage, application,service and so on and they can be deployed with much quickand easy manner and least management and also interactingwith service providers.Cloud computing has recently reached popularity and developed into a major trend in IT. While industry has been pushing the Cloud research agenda at high pace, academia has only recently joined, as can be seen through the sharp rise in workshops and conferences focussing on Cloud Computing. Cloud computing has improvedthe availability of IT resources and owns many advantagesover other computing techniques. Users can use the ITinfrastructure with Pay-per-Use-On-Demand mode, thiswould benefit and save the cost of buying the physical resourcesthat may be available.

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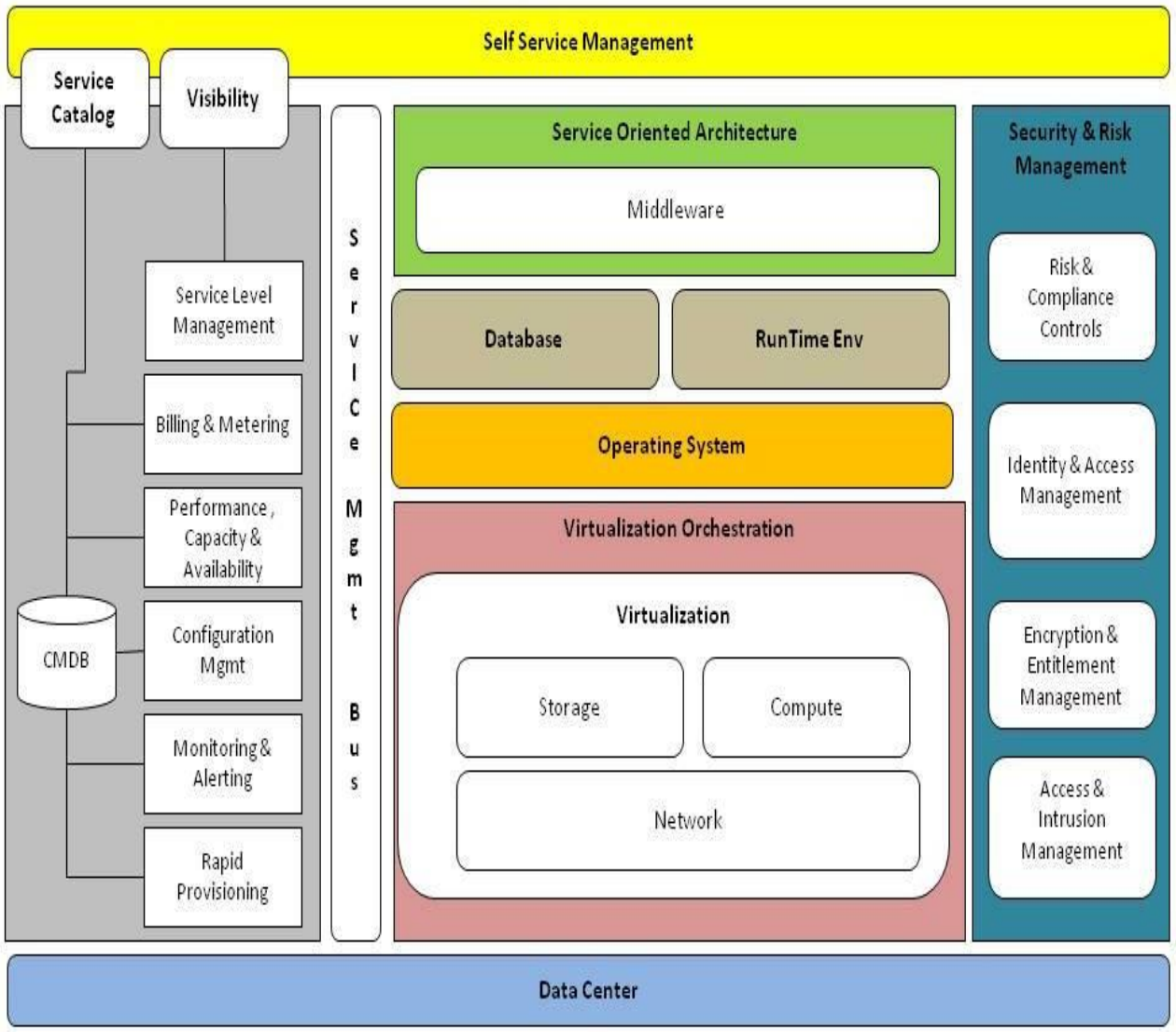
II.ARCHITECTURE AND ITS COMPONENTS

Cloud technology models are generally divided into SaaS, PaaS, and IaaS that are exhibited by a given cloud infrastructure. It is helpful to add more structure to its service model stacks: Fig. shows a cloud reference architecture that makes the most important security-relevant cloud components explicit and provides an abstract overview of cloud computing for security issue analysis.



III. SOFTWARE AS A SERVICE (SAAS)

Cloud consumers release their applications in a hosting environment, which can be accessed through networks from various clients (e.g. Web browser, PDA, etc.) by application users. Cloud consumers do not have control over the cloud infrastructure that often employs multi-tenancy systemarchitecture, namely, different cloud consumers' applications are organized in a single logical environment in the SaaS cloud to achieve economies of scale and optimization in terms of speed, security, availability, disaster recovery and maintenance. Examples of SaaS includes

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GoogleMail, Google Docs, and so forth.

II. PLATFORM AS A SERVICE (PAAS)

PaaS is a development platform supporting the full "Software Lifecycle" which allows cloud consumers to develop cloud services and applications (e.g. SaaS) directly on the PaaS cloud. Hence, the difference between SaaS and PaaS is that SaaS only hosts completed cloud applications whereas PaaS offers a development platform that hosts both completed and in-progress cloud applications. This requires PaaS, in addition to supporting application hosting environment, to possess development infrastructure including programming environment, tools, configuration management, and so forth. An example of PaaS is Google AppEngine.

III. INFRASTRUCTURE AS A SERVICE (IAAS)

Cloud consumers directly use IT infrastructures (processing, storage, networks and other fundamental computing resources) provided in the IaaS cloud. Virtualization is extensively used in IaaS cloud in order to integrate/decompose physical resources in an ad-hoc manner to meet growing or shrinking resource demand from cloud consumers. The basic strategy of virtualization is to set up independent virtual machines (VM) that are isolated from both the underlying hardware and other VMs. Notice that this strategy is different from the multi tenancy model, which aims to transform the application software architecture so that multiple instances (from multiple cloud consumers) can run on a single application (i.e. the same logic machine). An example of IaaS is Amazon's EC2.

IV. DATA AS A SERVICE (DAAS)

The delivery of virtualized storage on demand becomes a separate Cloud service - data storage service. Notice that DaaS could be seen as a special type IaaS. The motivation is that on-premise enterprise database systems are often tied in a prohibitive upfront cost in dedicated server, software license, post-delivery services and in-house IT maintenance. DaaSallows consumers to pay for what they are actually using rather than the site license for the entire database. In addition to traditional storage interfaces such as RDBMS and file systems, some DaaS offerings provide table-style abstractions that are designed to scale out to store and retrieve a huge amount of data within a very compressed timeframe, often too large, too expensive or too slow for most commercial RDBMS to cope with. Examples of this kind of DaaS include Amazon S3, Google BigTable, and Apache HBase, etc.

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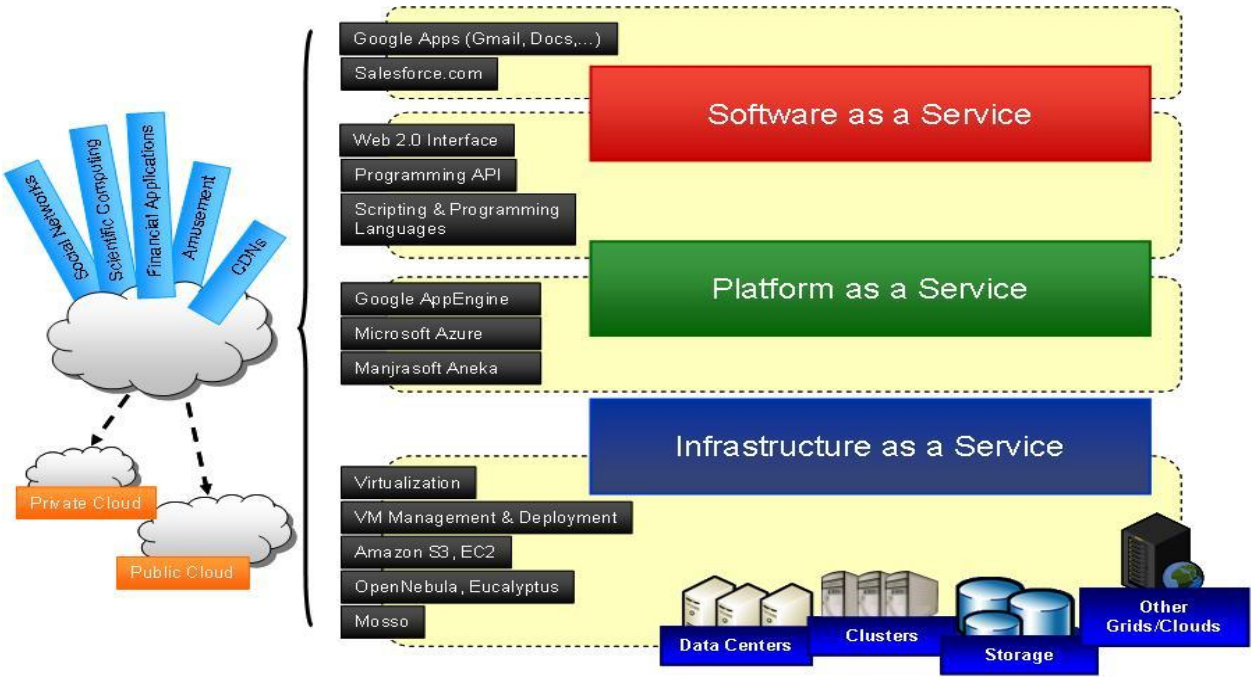

V.CLOUD APPLICATIONS

There are a few applications of cloud computing as follows:

1) Cloud computing provides dependable and secure data storage center.

2) Cloud computing can realize data sharing between different equipments.

3) The cloud provides nearly infinite possibility for users to use the internet.

4) Cloud computing does not need high quality equipment for the user and it is easy to use.

VI. SECURITY AND PRIVACY ISSUES OF CLOUD COMPUTING

Cloud computing can provide infinite computing resources on demand due to its high scalability in nature, which eliminates the needs for Cloud service providers to plan far ahead on hardware provisioning. Many companies, such as Amazon, Google, Microsoft and so on, accelerate their paces in developing cloud computing systems and enhancing its services providing to a larger amount of users.

In this paper, we investigate the security and privacy concerns of current cloud computing systems provided by an amount of companies. As cloud computing refers to both the applications delivered as services over the Internet and the infrastructures (i.e., the hardware and systems software in the data centers) that provide those services.

Based on the investigation security and privacy concerns provided by companies nowadays are not adequate, and consequently result in a big obstacle for users to adapt into the cloud computing systems. Hence, more concerns on security issues, such as availability, confidentiality, data integrity, control, auditand so on, should be taken into account.

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VII.SECURITY ON DEMAND

Cloud services are applications running somewhere in the cloud computing infrastructures through internal network or Internet. Cloud computing allows providers to develop, deploy and run applications that can easily grow in capacity (scalability), work rapidly (performance), and never (or at least rarely) fail (reliability), without any concerns on the properties and the locations of the underlying infrastructures.

Cloud computing systems can achieve the following five goals together:

7.1 Data integrity

In the cloud system means to preserve information integrity (i.e., not lost or modified by unauthorized users). As data are the base for providing cloud computing services, such as Data as a Service, Software as a Service, Platform as a Service, keeping data integrity is a fundamental task.

7.2 Confidentiality

It means keeping users' data secret in the cloud systems. There are two basic approaches (i.e., physical isolation and cryptography) to achieve such confidentiality, which are extensively adopted by the cloud computing vendors.

7.3 Audit

It means to watch what happened in the cloud system. Auditability could be added as an additional layer in thevirtualized operation system (or virtualized applicationenvironment) hosted on the virtual machine to providefacilities watching what happened in the system. It is muchmore secure than that is built into the applications or into thesoftware themselves, since it is able watch the entire accessduration.

7.4 Availability

The goal of availability for cloud computing systems (including applications and its infrastructures) is to ensure its users can use them at any time, at any place. As its web-native nature, cloud computing system enables its users to access the system (e.g., applications, services) from anywhere. This is true for all the cloud computing systems (e.g., DaaS, SaaS, PaaS, IaaS, and etc.). Required to be accessed at any time, the cloud computing system should be severing all the time for all the users (say it is scalable for any number of users). Two strategies, say hardening and redundancy, are mainly used to enhance the availability of the cloud system or applications hosted on it.

7.5 Control

In the cloud system means to regulate the use of the system, including the applications, its infrastructure and the data

VIII.CONCLUSION

This paper discussed about the architecture and popular platforms of cloud computing technology. It also addressed the challenges and issues of cloud technology. In spite of the several limitations and the need for better methodologies processes, cloud computing is emerging as a hugely attractive paradigm, especially for large enterprises.

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Cloud Computing initiatives could affect the enterprises within two to three years as it has the potential to significantly change IT Sector totally.

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