

OFFERING A NEW APPROACH OF CLOUD SECURITY IN EDUCATIONAL INSTITUTIONS.

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Abstract — Cloud computing as an emerging technology becomes a solution due to its specific attribute like scalability and cost reduction for many educational organizations which are under the pressure of budget shortage. In the last few years it has a dramatic change from being a business concept to the general concept of growing IT industries and educational institution's parts. However, security as one of the most important issues decrease the development of cloud computing. From security point of view, a number of challenges and risks have been introduced from its protection mechanism. A new model desired result at improving the features of an existing model must be in contrast with the pivotal features of current model. As the purpose of this paper is twofold: first of all presenting a new model for the basic infrastructure of cloud with its unique security models and requirements that can be utilized in our educational institutions. Secondly, it is argued that it can be viable solution for many educational establishments in difficult financial time where the use of computer by students and teachers is immense. Furthermore, some especial aspect of cloud and its security is highlighted and then some light shed on the current constrains and concerns.

Index Terms — Cloud Computing, Security, IT.

I. INTRODUCTION

Nowadays, the term "cloud computing" becomes the indispensable part of the Information Technology (IT) world. Cloud computing can be elucidated as a new type of computing in which dynamically scalable and virtualized recourses are provided as a service in internet. In [1] cloud computing offers several benefits like fast deployment, pay-for-use, lower costs, scalability, rapid provisioning, rapid elasticity, ubiquitous network access, greater resiliency, hypervisor protection against network attacks, low-cost disaster recovery and data storage solutions, on-demand security control, real time detection of system tampering and rapid re-constitution of services. Although it offers divergent benefits, some of the risks are better understood especially cloud computing moves all of the application software and databases to the large centers where the managing of the data and services are not reliable. These concerns are in different part of the businesses even in educational sectors which have a lot of data that are

private. In this paper, it is focused on the educational usage of cloud services and applications base on proposed structure with its especial security structure and how security merits and demerits shows themselves up in our educational systems. We will also peer through different cloud computing services in different educational cases and mention all of the noticeable aspects of it.

II. PROPOSED MODEL

A. purpose

The model we will try to offer in this study has one of the most complete structures of cloud computing with its especial features and parts and can easily meet the needs of educational institutions, administrative staff, students, researchers, developers and admin, staff and lecturers. Moreover, many aspects that can migrate to the cloud are demonstrated in the first stage of figure 1. The second stage as mentioned is the illustration of the most fundamental standpoints that can be discussed in security of cloud. This complete graph of cloud in the first stage with its specific security one in the second stage identify our question in the third stage that how can this especial structure of cloud play a significant role in our educational system and can be a good paradigm of cloud and its use in our educational area. In continues we have a quick review on different definitions of cloud computing as illustrated in figure1, divergent aspects like different types, models, attributes, services, technologies and features were examined.

B. Quick review on cloud computing

Four types of cloud computing deployed in architecture solutions: (1) public cloud (or external cloud) computing resources are dynamically provisioned over the Internet via Web applications or Web services from an off-site third-party provider. (2) Private cloud (or internal cloud) refers to cloud computing on private networks. Private clouds are built for the exclusive use of one client, providing full control over data, security, and quality of service. (3) A hybrid cloud environment combines multiple public and private cloud models. Hybrid clouds introduce the complexity of

determining how to distribute applications across both a public and private cloud. (4) Community cloud which is shared by several organizations and supports a specific community that has especial concerns like mission, security requirement policy and compliance consideration [2].

Beside these architecture solutions we have four delivery models in cloud computing: the first one is Software as a Service (SaaS) that is top of the all layers let users to run applications remotely from the cloud. The second one is Infrastructure as a Service (IaaS) or Hardware as a Service (HaaS) refers to computing resources as a service; in most case when SaaS and PaaS are providing applications to customers, HaaS doesn't, they simply help customers to rent recourses like server space, network equipment like racks, memory, CPU cycles and storage space instead of purchasing them. The third one is Platform-as-a-Service (PaaS) is similar to IaaS, but also includes operating systems and required services for a particular application. The fourth one is data-Storage-as-a-Service (dSaaS) which provides storage that the consumer is used including bandwidth requirements for the storage. The next model is Customer-as-a-Service (CaaS) is an outsourced enterprise communications solution. Providers of this type of cloud-based solution (known as CaaS vendors) are responsible for the management of hardware and software required for delivering Voice over IP (VoIP) services, Instant Messaging (IM), and video conferencing capabilities to their customers. As the most fundamental feature that is provided by cloud computing we can mention scalability, guaranteed Quality of Service (QoS), autonomous system, pricing.

Scalability and on-demand services, Cloud computing provides resources and services for users on demand. The resources are scalable over several data centers [4,5]. New nodes can be added or dropped from the network as can physical servers, with limited modifications to infrastructure set up and software. Price and cost effectiveness regarded as one of the most noticeable factors among others, Cloud computing does not require up-from investment. No capital expenditure is required.

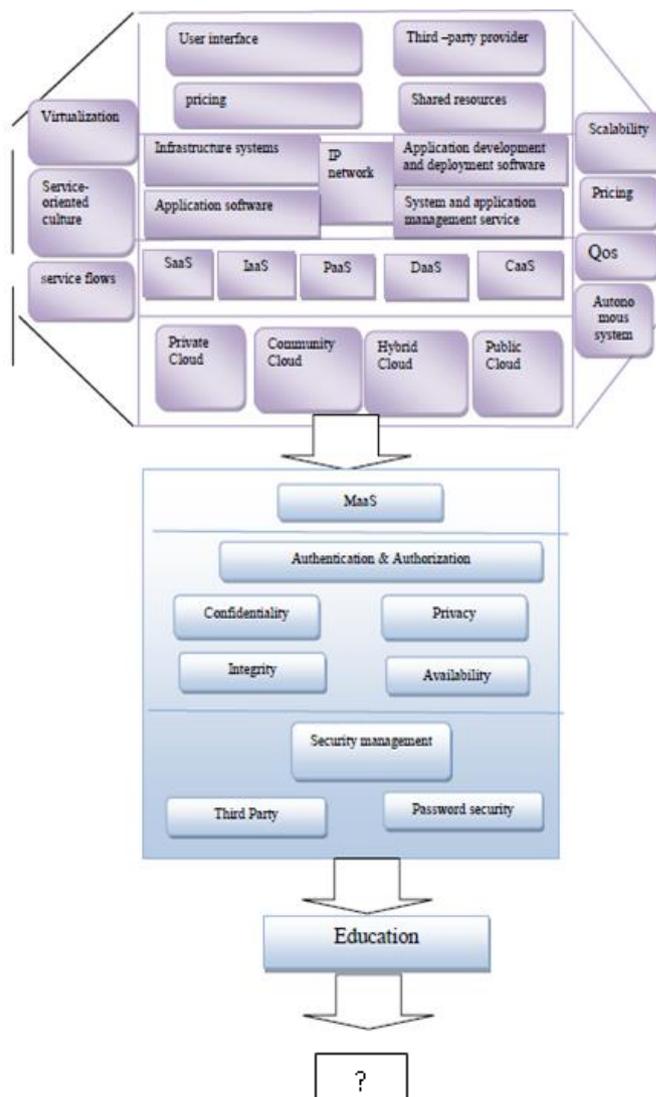


Figure 1. The proposed model

C. Security

Monitoring-as-a-Service (MaaS) is the outsourced provisioning of security, primarily on business platforms that leverage the Internet to conduct business. MaaS has become increasingly popular over the last decade. Since the advent of cloud computing, its popularity has grown even more. Gradually as the cloud is becoming the common operating platform, every service is going to require a secure authentication and authorization process. Nowadays Single-Sign-On as a critical solution is needed in order to differentiate between the organizations own service's and outsourced services. Cloud computing involves the sharing or storage by users of their own information on remote servers owned or operated by others and accesses through the Internet or other connections. Whenever an individual, a business, a government agency, or any other entity shares information in the cloud, privacy or confidentiality questions arise [1].

One of the most important parts of security is integrity. The simplest meaning of it is that data can be accessed by authorized parties. Integrity in data means protecting it from unauthorized deletion, modification or fabrication. Integrity and authorization are two subjects with close bond. Authorization as a system which determines what level of access a user should have. As [2] said a cloud computing provider is trusted to maintain data integrity and accuracy. Exploitation of the vulnerability of applications and lack of strong identification, in many cases cannot introduce additional confidentiality and privacy risks. For instance in an organization due to dealing with privacy, data of personnel needed to obey to a countries legal framework that can guarantee the privacy.

Availability refers to the property of a system being accessible and usable upon demand by an authorized entity. System availability includes a system ability to carry on operations even when some authorities misbehave. In case of availability information and information processing, availability according to clients upon demand is one of the concerns. Security management as a tangible issue in any network is always under attention. Security always plays an important role in distributed computing systems. To ensure high QoS, we focus on the security problems causes by various sorts of components, and unpredictable execution processes.

III. EDUCATION

Cloud computing is currently is one of the new technology trends (broadband, Internet, fast connection and visualization) will likely have a significant impact on teaching and learning environment [6]. Today's "cloud" platform such as "Microsoft" and "Google" are providing free services to students and staff at educational institutions which include email, contact lists, calendars, document storage, creation and sharing documents and the ability to create website [7].

Many see huge potential of the technology in reducing the cost of IT to organizations and freeing them from the expense and hassle of having to install or maintain applications locally. After doing the experiment, the majority of respondents (65%) said the main reason for using cloud is reduction in their cost [25].

Due to this reason our academia institutions are willing to use it. Colleges and universities are always looking for effective ways to upgrade their software and hardware in order to attract students and keep their space with digital technologies. Moreover, managing software and hardware infrastructures could also result in cost saving. It is undeniable that because of its especial characteristics like efficiency and convenience is used in many educational sectors. University of California (UC) at Berkley use cloud computing in especial courses that were focused on SaaS application. Storing data with network servers on the other hand help students not to use USB memories anymore. Furthermore, one of the most

important issues at universities is authentication or personal security is under attention by protecting passwords [3].

IV. SOLUTION

This paper attempts to give a short insight from the main cloud architecture, apart from it , it's brief security model consists of challenges, especial models and requirements.

Cloud computing as an emerging service has its own scale of complexity, fears and uncertainties. Chief concerns are security and performance issue, take security as an example. Since it is acceptable for consumers to turn to Amazon Elastic Compute Cloud (EC2) and Simple Storage Service (S3) for on demand compute recourses and storage, it is difficult matter to store customer's information in a third -party. The most concerns can be recognized as controlling, vendor lock performance, latency, privacy and reliability. Like every breakthrough, it has its own proponents, Richard Stallman is one of them who believe we don't have to judge the book from its cover, even though cloud provides a lot of benefit, in future it will be proven it is just a trap with high marketing that turns out to have high cost. Recent survey indicates that most of IT executives and chief information officers are worried about security. Complain ting privacy information center from Google, strict privacy regulation from some governments like European Union [EU] are all sample of current concerns. Cloud computing is not suitable for all institutions or organizations; for example loss of service in companies can cause of losing their customers. When you want to use cloud in organization, the first step is considering many factors cost, benefit ratio, speed of delivery, capacity, data regulation and organizations corporate and structure. Since your data and application are located on a series of servers geographically disparate from your place, it takes time for data to reach you. Compute clouds like Amazon's EC2, Google App Engine, and Berkeley Open Infrastructure for network computing (BOINC) allow access to highly scalable, inexpensive and on-demand sources. Some providers are building data centers in various locations in order to address this issue and many are already using state-of-the-art encryption technologies [3].

Among organizations which are seeking for possible solutions, we can mention Cloud Security Alliance (CSA) like Cloud Standard Website is collecting information about cloud related standards or information assurance. Moreover,[26] changed the security architecture of cloud in order to imply a security facet in the process.[27] mentioned that keeping patches updated and decreasing permissions and accessing rights of applications and users can be a useful way too. Using encrypted protocols for evading IP spoofing was another suggestion by [28]. [29] Utter one solution for it that is to use private clouds. Building a secure credential for each user on a reverse proxy that is situated in front of a web servers can be another solution. Dynamo that is a back end for most of the services and prepare by Amazon has been designed to run in a trusted environment so there is no structure in place to handle security concerns. By its design each services that uses it has

its own separate instance running, because of this, user have some sense of security and there is some natural separation of data.

CONCLUSION

Cloud computing is a disruptive technology with profound implications not only for Internet services but also for IT security as a whole. As the next paradigm shift for IT industry, cloud computing is still in its early stage. It has had a tremendous impact on IP networking. We can allocate resources more flexible and productive in order to create and operate. Moreover, it has significant impact even in our educational organizations and institutions. Students and users can use various applications that were provided on different platforms. Useful information that was reported from universities and organizations help us to consider whether to use this technology or not. Removal of software license cost and hardware, and its maintenance provides great flexibility to the university or corporate management. Generally many educational establishments are likely to use clouds which are suffering from economical situation [6].

There are many tradeoffs in making the right decision in choosing a computer system architecture and best approach to conduct a specific benchmark test with a customer application to determine the overall system effectiveness and performance. The cost performance characteristics of the cloud in addition to suitability, flexibility, scalability must be considered too. This article started with certain challenges to define a type of primary model with its specific security construction that can

be appropriate for adoption in educational institute. We proposed a model of cloud with its especial features, applications, definitions, services, technologies and different types then with its security architecture we highlight its challenges with concerns, constraints and on the other hand its profit for using it in educational institutions.

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