REVIEW OF CLOUD COMPUTING SERVICES AND SECURITY ISSUE IN IT WORLD

Pragya Shandilya
Student: Sinhgad Institute of Management and Computer Application(MCA), Pune
pragya.prg11@gmail.com

Amruta Pendkar
Student: Sinhgad Institute of Management and Computer Application(MCA), Pune
Pendkar.amruta@gmail.com

Preety Kumari
Student: Sinhgad Institute of Management and Computer Application(MCA), Pune
onlypreetykumari@gmail.com

Sujata Janbandhu
Student: Sinhgad Institute of Management and Computer Application(MCA), Pune
sujujan@gmail.com

Tathagat Kumar
Student: Sinhgad Institute of Management and Computer Application(MCA), Pune
tathagatkumarsingh@gmail.com

ABSTRACT - Cloud computing is the delivery of computing services over the Internet. Cloud services allow individuals and businesses to use software and hardware that are managed by third parties at remote locations. This research paper is describes the information about cloud computing, its services, characteristics, deployment of cloud computing as well as potential privacy risk. This research is intended towards the overview of service models of cloud computing,

I. INTRODUCTION

Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.This cloud model promotes availability and is composed of five essential characteristics, three service models, and four deployment models.

When you store your photos online instead of on your home computer, or usewebmail or a social networking site, you are using a "cloud computing" service. Ifyou are an organization, and you want to use, for example, an online invoicingservice instead of updating the in-house one you have been using for many years, that online invoicing service is a "cloud computing" service.

Doing so maygive rise to certain privacyimplications.For that reason the Office of thePrivacy Commissioner of Canada(OPC) has prepared some responsesto Frequently Asked Questions(FAQs). We have also developed aFact Sheet that provides detailedinformation on cloud computing andthe privacy challenges it presents.

II. CLOUD COMPUTING

The following definition of cloud computing has been developed by the **U.S. National Institute of Standards and Technology (NIST):**Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model promotes availability and is composed of five essential characteristics, three service models, and four deployment models.

Cloud computing refers to the delivery of computing resources over the Internet. Instead of keeping data on your own hard drive or updating applications for your needs, you use a service over the Internet, at another location, to store your information or use its applications. Examples of cloud services includeonline file storage, social networking sites, webmail, and online businessapplications. The cloud computing model allows access to information and computerresources from anywhere that a network connection is available. Cloud computingprovides a shared pool of resources, including data storage space, networks,computer processing power, and specialized corporate and user applications.

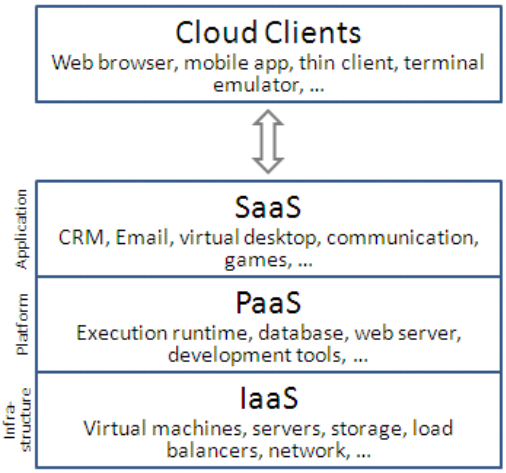
III. CHARACTERISTICS

Cloud computing exhibits the following key characteristics:

- **Agility** improves with users' ability to re-provision technological infrastructure resources.
- **Application programming interface**(API) accessibility to software that enables machines to interact with cloud software in the same way that a traditional user interface (e.g., a computer desktop) facilitates interaction between humans and computers. Cloud computing systems typically use Representational State Transfer based APIs.

- **Cost** reductions claimed by cloud providers. A public-cloud delivery model converts capital expenditure to operational expenditure.[1] This purportedly lowers barriers to entry, as infrastructure is typically provided by a third party and does not need to be purchased for one-time or infrequent intensive computing tasks. Pricing on a utility computing basis is fine-grained, with usage-based options and fewer IT skills are required for implementation (in-house).[2] The e-FISCAL project's state-of-the-art repository[3] contains several articles looking into cost aspects in more detail, most of them concluding that costs savings depend on the type of activities supported and the type of infrastructure available in-house.
- **Device and location independence** [4] enable users to access systems using a web browser regardless of their location or what device they use (e.g., PC, mobile phone). As infrastructure is off-site (typically provided by a third-party) and accessed via the Internet, users can connect from anywhere.[2]

IV. SERVICE MODELS OF CLOUD COMPUTING:



The cloud computing service models are Software as a Service (**SaaS**), Platform as aService (**PaaS**) and Infrastructure as a Service (**IaaS**).

InSoftware as a service(**SaaS**), a pre-made application, along with any required software, operating system,hardware, and network are provided.The pricing model for SaaS applications is typically a monthly or yearly flat fee per user,[19] so price is scalable and adjustable if users are added or removed at any point.[20]

In Platform as a service(**PaaS**), an operating system, hardware, andnetwork are provided, and the customer installs or develops its own software andapplications.

The Infrastructure as a service(**IaaS**) model provides just the hardware and network; the customerinstalls or develops its own operating systems, software and applications.IaaS clouds often offer additional resources such as a virtual-machine disk image library, raw block storage, and file or object storage, firewalls, load balancers, IP addresses, virtual local area networks (VLANs), and software bundles.[21]

V. DEPLOYMENT OF CLOUD SERVICES:

Private cloud

Private cloud is cloud infrastructure operated solely for a single organization, whether managed internally or by a third-party, and hosted either internally or externally.[5] Undertaking a private cloud project requires a significant level and degree of engagement to virtualize the business environment, and requires the organization to reevaluate decisions about existing resources. When done right, it can improve business, but every step in the project raises security issues that must be addressed to prevent serious vulnerabilities.[6]Self-run data centers[7] are generally capital intensive. They have a significant physical footprint, requiring allocations of space, hardware, and environmental controls. These assets have to be refreshed periodically, resulting in additional capital expenditures. They have attracted criticism because users "still have to buy, build, and manage them" and thus do not benefit from less hands-on management,[8] essentially "[lacking] the economic model that makes cloud computing such an intriguing concept".[9][10]

Public cloud

A cloud is called a "public cloud" when the services are rendered over a network that is open for public use. Public cloud services may be free or offered on a pay-per-usage model.[11] Technically there may be little or no difference between public and private cloud architecture, however, security consideration may be substantially different for services (applications, storage, and other resources) that are made available by a service provider for a public audience and when communication is effected over a non-trusted network. Generally, public cloud service providers like Amazon AWS, Microsoft and Google own and operate the infrastructure at their data center and access is generally via the Internet. AWS and Microsoft also offer direct connect services called "AWS Direct Connect" and "Azure ExpressRoute" respectively, such connections require customers to purchase or lease a private connection to a peering point offered by the cloud provider.

Hybrid cloud

Hybrid cloud is a composition of two or more clouds (private, community or public) that remain distinct entities but are bound together, offering the benefits of multiple deployment models. Hybrid cloud can also mean the ability to connect collocation, managed and/or dedicated services with cloud resources.[5]

Gartner, Inc. defines a hybrid cloud service as a cloud computing service that is composed of some combination of private, public and community cloud services, from different service providers.[12] A hybrid cloud service crosses isolation and provider boundaries so that it can't be simply put in one category of private, public, or community cloud service. It allows one to extend either the capacity or the capability of a cloud service, by aggregation, integration or customization with another cloud service.

Varied use cases for hybrid cloud composition exist. For example, an organization may store sensitive client data in house on a private cloud application, but interconnect that application to a business intelligence application provided on a public cloud as a software service.[13] This example of hybrid cloud extends the capabilities of the enterprise to deliver a specific business service through the addition of externally available public cloud services.

Another example of hybrid cloud is one where IT organizations use public cloud computing resources to meet temporary capacity needs that can not be met by the private cloud.[14] This capability enables hybrid clouds to employ cloud bursting for scaling across clouds.[5] Cloud bursting is an application deployment model in which an application runs in a private cloud or data center and "bursts" to a public cloud when the demand for computing capacity increases. A primary advantage of cloud bursting and a hybrid cloud model is that an organization only pays for extra compute resources when they are needed.[15] Cloud bursting enables data centers to create an in-house IT infrastructure that supports average workloads, and use cloud resources from public or private clouds, during spikes in processing demands.[16]

Community cloud

Community cloud shares infrastructure between several organizations from a specific community with common concerns (security, compliance, jurisdiction, etc.), whether managed internally or by a third-party, and either hosted internally or externally. The costs are spread over fewer users than a public cloud (but more than a private cloud), so only some of the cost savings potential of cloud computing are realized.[5]

Distributed cloud

Cloud computing can also be provided by a distributed set of machines that are running at different locations, while still connected to a single network or hub service. Examples of this include distributed computing platforms such as BOINC and Folding@Home. An interesting attempt in such direction is Cloud@Home, aiming at implementing cloud computing provisioning model on top of voluntarily shared resources [17]

Inter cloud

The Inter cloud[18] is an interconnected global "cloud of clouds" and an extension of the Internet "network of networks" on which it is based. The focus is on direct interoperability between public cloud service providers, more so than between providers and consumers (as is the case for hybrid- and multi-cloud).

VI. WHY CLOUD SERVICES ARE POPULAR?

Cloud services are popular because they can reduce the cost and complexity of owning and operating computers and networks. Since cloud users do not have to invest in information technology infrastructure, purchase hardware, or buy software licenses, the benefits are low up-front costs, rapid return on investment, rapid deployment, customization, flexible use, and solutions that can make use of new innovations. In addition, cloud providers that have specialized in a particular area (such as e-mail) can bring advanced services that a single company might not be able to afford or develop.

Some other benefits to users include scalability, reliability, and efficiency. Scalability means that cloud computing offers unlimited processing and storage capacity. The cloud is reliable in that it enables access to applications and documents anywhere in the world via the Internet. Cloud computing is often considered efficient because it allows organizations to free up resources to focus on innovation and product development.

Another potential benefit is that personal information may be better protected in the cloud. Specifically, cloud computing may improve efforts to build privacy protection into technology from the start and the use of better security mechanisms. Cloud computing will enable more flexible IT acquisition and improvements, which may permit adjustments to procedures based on the sensitivity of the data. Wide spread use of the cloud may also encourage open standards for cloud computing that will establish baseline data security features common across different services and providers. Cloud computing may also allow for better audit trails. In addition, information in the cloud is not as easily lost (when compared to the paper documents or hard drives, for example).

VII. POTENTIAL PRIVACY RISKS

While there are benefits, there are privacy and security concerns too. Data is travelling over the Internet and is stored in remote locations. In addition, cloud providers often serve multiple customers simultaneously. All of this may raise the scale of exposure to possible breaches, both accidental and deliberate.

Concerns have been raised by many that cloud computing may lead to “function creep” — uses of data by cloud providers that were not anticipated when the information was originally collected and for whichconsent has typically not been obtained. Given how inexpensive it is to keep data,there is little incentive to remove the information from the cloud and more reasonsto find other things to do with it.

Security issues, the need to segregate data when dealing with providers that servemultiple customers, potential secondary uses of the data—these are areas thatorganizations should keep in mind when considering a cloud provider and whennegotiating contracts or reviewing terms of service with a cloud provider. Given thatthe organization transferring this information to the provider is ultimately accountable for its protection, it needs to ensure that the personal information is appropriate handled.

Privacy is not a barrier but it must be taken into consideration:

The Personal Information Protection and Electronic Documents Act (PIPEDA) do not prevent an organization from transferring personal information to an organization in another jurisdiction for processing. However, PIPEDA establishes rules governing those transfers — particularly with respect to obtaining consent for the collection, use and disclosure of personal information, securing the data, and ensuring accountability for the information and transparency in terms of practices.

VIII. CONCLUSION

Cloud computing offers several benefits for organizations and individuals. There are also privacy and security concerns. If you are considering a cloud service, you should think about how your personal information, and that of your customers, can best be protected. Carefully review the terms of service or contracts, and challenge the provider to meet your needs.
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