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Cloud Computing Security in IAAS

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Abstract: Cloud computing is current buzzword in the market. It is paradigm in which the resources can be leveraged on peruse basis thus reducing the cost and complexity of service providers. Cloud computing promises to cut operational and capital costs and most importantly let IT departments focus on strategic projects instead of keeping datacenters running. It is much more than simple Internet. It is a construct that allows user to access applications that actually reside at location other than user's own computer or other Internet connected devices. There are numerous benefits of this construct. For instance other company hosts user application. This implies that they handle cost of servers, they manage software updates and depending on the contract user pays less i.e. for the service only. Confidentiality, Integrity, Availability, Authenticity, and Privacy are essential concerns for both Cloud providers and consumers as well. Infrastructure as a Service (IaaS) serves as the foundation layer for the other delivery models, and a lack of security in this layer will certainly affect the other delivery models.

Keywords: Cloud Computing, IAAS, PAAS, SAAS

I. INTRODUCTION

Clouds are large pools of easily usable and accessible virtualized resources. These resources can be dynamically reconfigured to adjust to a variable load (scale), allowing Optimum resource utilization. It's a pay-per-use model in which the Infrastructure. Provider by means of customized Service Level Agreements (SLAs) offers guarantees Typically exploiting a pool of resources. Organizations and individuals can benefit from mass computing and storage centers, provided by large companies with stable and strong cloud architectures. Cloud computing incorporates virtualization, on-demand deployment, Internet delivery of services, and open source software.

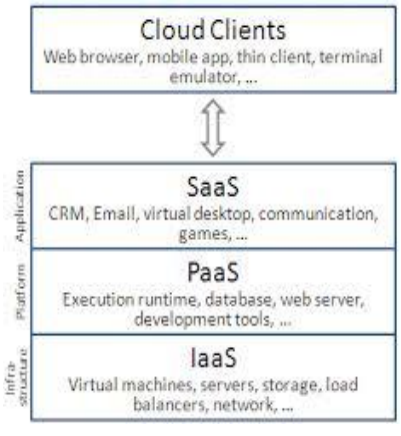

Fig.1 Overview of Cloud Framework

A. Infrastructure-As-A-Service (IaaS)

The Infrastructure as a Service is a provision model in which an organization outsourcers the equipment used to support operations, including storage, hardware, servers and networking components. The service provider owns the equipment and is responsible for housing, running and maintaining it. The client typically pays on a per-use basis. Characteristics and components of IaaS include:

1. Utility computing service and billing model.
2. Automation of administrative tasks.
3. Dynamic scaling.
4. Desktop virtualization.
5. Policy-based services.
6. Internet connective

Infrastructure-as-a- Service like Amazon Web Services provides virtual server instances with unique IP addresses and blocks of storage on demand. Customers use the provider's application program interface(API) to start, stop, access and configure their virtual servers and storage. In the enterprise, cloud computing allows a company to pay for only as much capacity as is needed, and bring more online as soon as required. Because this pay-for-what-you use model resembles the way electricity, fuel and water are consumed it's sometimes referred to as utility computing. Infrastructure as a Service is sometimes referred to as Hardware as a Service (HaaS).

B. Platform-As-A-Service(PaaS)

Platform as a Service (PaaS) is a way to rent hardware, operating systems, storage and network capacity over the Internet. The service delivery model allows the customer to rent virtualized servers and associated services for running existing applications or developing and testing new ones. Platform as a Service (PaaS) is an outgrowth of Software as a Service (SaaS), a software distribution model in which hosted software applications are made available to customers over the Internet. PaaS has several advantages for developers. With PaaS, operating system features can be changed and upgraded frequently. Geographically distributed development teams can work together on software development projects. Services can be obtained from diverse sources that cross international

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boundaries. Initial and ongoing costs can be reduced by the use of infrastructure services from a single vendor rather than maintaining multiple hardware facilities that often perform duplicate functions or suffer from incompatibility problems. Overall expenses can also be minimized by unification of programming development efforts. On the downside, PaaS involves some risk of "lock-in" if offerings require proprietary service interfaces or development languages. Another potential pitfall is that the flexibility of offerings may not meet the needs of some users whose requirements rapidly evolve.

C. Software-As-A-Service (SaaS)

No Software as a service sometimes referred to as "software on demand," is software that is deployed over the internet and/or is deployed to run behind a firewall on a localarea network or personal computer. With SaaS, a provider licenses an application to customers either as a service on demand, through a subscription, in a "pay-as-you-go" model, or at no charge. This approach to application delivery is part of the utility computing model where all of the technology is in the "cloud" accessed over the Internet as a service. SaaS was initially widely deployed for sales force automation and Customer Relationship Management (CRM). Now it has become commonplace for many business tasks, including computerized billing, invoicing, human resource management, financials, content management, collaboration, document management, and service desk management.

II. INFRASTRUCTURE AS A SERVICE

Infrastructure as a Service (IaaS) is one of the three fundamental service models of cloud computing alongside Platform as a Service (PaaS) and Software as a Service (SaaS). As with all cloud computing services it provides access to computing resource in a virtualized environment, “the Cloud”, across a public connection, usually the internet. In the case of IaaS the computing resource provided is specifically that of virtualized hardware, in other words, computing infrastructure. The definition includes such offerings as virtual server space, network connections, bandwidth, IP addresses and load balancers. Physically, the pool of hardware resource is pulled from a multitude of servers and networks usually distributed across numerous data centers, all of which the cloud provider is responsible for maintaining. The client, on the other hand, is given access to the virtualized components in order to build their own IT platforms.

In common with the other two forms of cloud hosting, IaaS can be utilized by enterprise customers to create cost effective and easily scalable IT solutions where the complexities and expenses of managing the underlying hardware are outsourced to the cloud provider. If the scale of a business customer’s operations fluctuate, or they are looking to expand, they can tap into the cloud resource as and when they need it rather than purchase, install and integrate hardware themselves.

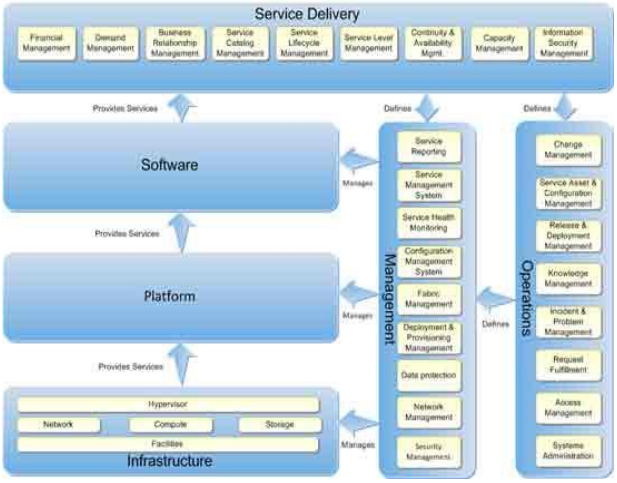

Fig. 2. IaaS Framework

The following are salient examples of how IaaS can be utilized by enterprise

- **Enterprise infrastructure:** by internal business networks, such as private clouds and virtual local area networks, which utilize pooled server and networking resources and in which a business can store their data and run the applications they need to operate day-to-day. Expanding businesses can scale their infrastructure in accordance with their growth whilst private clouds (accessible only by the business itself) can protect the storage and transfer of the sensitive data that some businesses are required to handle.
- **Cloud hosting:** the hosting of websites on virtual servers which are founded upon pooled resources from underlying physical servers. A website hosted in the cloud, for example, can benefit from the redundancy provided by a vast network of physical servers and on demand scalability to deal with unexpected demands placed on the website.
- **Virtual Data Centers (VDC):** a virtualized network of interconnected virtual servers which can be used to offer enhanced cloud hosting capabilities, enterprise IT infrastructure or to integrate all of these operations within either a private or public cloud implementation.

A typical Infrastructure as a Service offering can deliver the following features and benefits

- **Scalability:** Resource is available as and when the client needs it and, therefore, there are no delays in expanding capacity or the wastage of unused capacity
- **No investment in hardware**: The underlying physical hardware that supports an IaaS service is set up and maintained by the cloud provider, saving the time and cost of doing so on the client side
- **Utility style costing:** The service can be accessed on demand and the client only pays for the resource that they actually use

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- **Location independence:** the service can usually be accessed from any location as long as there is an internet connection and the security protocol of the cloud allows it
- **Physical security of data centre locations:** services available through a public cloud, or private clouds hosted externally with the cloud provider, benefit from the physical security afforded to the servers which are hosted within a data centre
- **No single point of failure:** if one server or network switch, for example, were to fail, the broader service would be unaffected due to the remaining multitude of hardware resources and redundancy configurations. For many services if one entire data center were to go offline, never mind one server, the IaaS service could still run successfully.

Infrastructure as a Service (IaaS) is the most straightforward of the four models for delivering cloud services. IaaS is the virtual delivery of computing resources in the form of hardware, networking, and storage services. It may also include the delivery of operating systems and virtualization technology to manage the resources. Rather than buying and installing the required resources in their own data center, companies rent these resources as needed.

Many companies with a hybrid environment are likely to include IaaS in some form because IaaS is a highly practical solution for companies with various IT resource challenges. Whether a company needs additional resources to support a temporary development project, an on-going dedicated development testing environment, or disaster recovery, paying for infrastructure services on a per-use basis can be highly cost-effective.

To help you make sense of the IaaS delivery model, the following sections examine some of its key characteristics, including dynamic scaling, agreed-upon service levels, renting, licensing, metering, and self-service. All of these characteristics are the same in both public and private IaaS environments.

III. CHARACTERISTICS OF IAAS

As with the two previous sections, SaaS and PaaS, IaaS is a rapidly developing field. That said there are some core characteristics which describe what IaaS is. is generally IaaS accepted to comply with the following

- Resources are distributed as a service
- Allows for dynamic scaling
- Has a variable cost, utility pricing model
- Generally includes multiple users on a single piece of hardware

There are a plethora of IaaS providers out there from the largest Cloud players like Amazon Web Services and Rack space to more boutique regional players. As mentioned previously, the line between PaaS and IaaS is becoming more blurred as vendors introduce tools as part of IaaS that help with deployment including the ability to deploy multiple types of clouds.

Where IaaS Makes Sense

IaaS makes sense in a number of situations and these are closely related to the benefits that Cloud Computing bring. Situations that are particularly suitable for Cloud infrastructure include;

- Where demand is very volatile – any time there are significant spikes and troughs in terms of demand on the infrastructure.
- For new organizations without the capital to invest in hardware
- Where the organization is growing rapidly and scaling hardware would be problematic
- Where there is pressure on the organization to limit capital expenditure and to move to operating expenditure.
- For specific line of business, trial or temporary infrastructural needs.

Where IaaS May Not be the Best Option

While IaaS provides massive advantages for situations where scalability and quick provisioning are beneficial, there are situations where its limitations may be problematic. Examples of situations where we would advise caution with regards IaaS include;

- Where regulatory compliance makes the off shoring or outsourcing of data storage and processing difficult
- Where the highest levels of performance are required, and on-premise or dedicated hosted infrastructure has the capacity to meet the organization's needs.

IV. ADVANTAGES OF IAAS

Utility Service: IaaS follows a pay per use/pay-as-you-go subscription based model. Vendors will often allow their customers to have the availability of ready to go IaaS offerings with limited time for implementation and customization.

Dynamic Elasticity: You don't have to wait to buy a new server, install, configure then deploy it onto your network. The Iaas Provider does this for you in seconds & you can or expand your storage as required.

Multiple Tenets: Iaas vendors allow customers to have multiple server instances and users accessing the same piece of infrastructure at the same time.

Fixed costs: Fixed costs as well a metered service is great for keeping costs visible & under control.

Flexible access: users have accessible infrastructure from anywhere and any location and on any device.

Security: is the most common objection to moving to an IaaS model as there is the worry that you have lost total control of your data. Many IaaS companies offer a Private Cloud environment to host your own dedicated servers in an attempt to counter this argument.

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Outages: By now we all know of the famed outages or network crashes of the IaaS providers that have appeared in the news. If a customer cannot get access to their systems, because of a fault with the service from the IaaS vendor, then this is a huge issue.

V. CONCLUSION

Cloud Computing is a term that doesn't describe a single thing – rather it is a general term that sits over a variety of services from Infrastructure as a Service at the base, through Platform as a Service as a development tool and through to Software as a Service replacing on-premise applications. For organizations looking to move to Cloud Computing, it is important to understand the different aspects of Cloud Computing and to assess their own situation and decide which types of solutions are appropriate for their unique needs. Cloud Computing is a rapidly accelerating revolution within IT and will become the default method of IT delivery moving into the future – organizations would be advised to consider their approach towards beginning a move to the clouds sooner, rather than later.

VI.FUTURE DEVELOPMENT

The term cloud computing is well defined and no longer merits rigorous taxonomies to furnish a definition. Instead this survey paper considers the past, present and future of cloud computing. As an evolution of previous paradigms, we consider the predecessors to cloud computing and what significance they still hold to cloud services. Additionally we examine the technologies which comprise cloud computing and how the challenges and future developments of these technologies will influence the field. Finally we examine the challenges that limit the growth, application and development of cloud computing and suggest directions required to overcome these challenges in order to further the success of cloud computing.

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