



Value of Cloud Based Computing

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Abstract: - Cloud Computing – a relatively recent term, defines the paths ahead in computer science world. Being built on decades of research it utilizes all recent achievements in virtualization, distributed computing, utility computing, and networking. It implies a service oriented architecture through offering software's and platforms as services, reduced information technology overhead for the end-user, great flexibility, reduced total cost of ownership, on demand services and many other things. It is based on readings on "cloud" computing and it tries to address, related research topics, challenges ahead and possible applications.

Keywords: Cloud Computing, Components of Cloud, Public Cloud, Virtualization and Efficiency, Multitenancy, Private Cloud.

I. INTRODUCTION

Whether your business is involved with it yet or not, cloud computing will play a significant role in the future of IT: it has already been enthusiastically embraced by small and medium sized businesses and its potential is also being accepted and exploited by larger enterprises.

The purpose of this paper is to explore the view that any business seeking to reap the benefits of cloud environments should not only look at the cost of cloud services but the value they provide.

In those dark ages 20 or so years ago, before anyone knew what an Internet was, the business world moved at a pace we would now consider slow motion: correspondence was written, stamped and delivered, very likely the next day. And when it really mattered we'd get in the line for the fax machine, fax speed being about as close to warp speed as we could get. It would take many years for a business to build market share and even longer to break into new territories.

In the twenty-first century, however, the pace of business is somewhat quicker and it continues to increase. The constant stream of new technologies provides more ways to do business and better ways to collaborate: a product or service made available on the Internet can stimulate thousands of inquiries or sales overnight from all over the world, creating a huge spike in the IT workload. Any enterprise burdened with an IT structure that does not permit rapid adaptation to the business environment is at a clear disadvantage. Peaks and troughs in business are a fact of life: they can be seasonal in nature or created by other events, perhaps by the news, innovation, competitor activity – or even unpredictable economies, for example.

Many businesses still tend to cater to the peaks by having too many of their IT assets sitting in an expensive data center doing very little for most of the time, apart from sucking power to run and cool equipment, taking up space and depreciating in value at a quite alarming rate. Until recently, this has been a price that has had to be paid to ensure that capacity was available [2].

"Cloud computing will radically change the way organizations purchase, manage and provide computing resources."

It's not a new concept – there's been no revolution, simply an evolution – it's fundamentally similar to hosting environments that have been around for fifteen years or so. Yes, there's a lot of hype around the idea, but this time the hype is justified simply because the time is right: the technology and expertise is available to provide cost-effective IT agility and scalability to an extent that was unimaginable just a few years ago. And just as the technology has arrived in time, the unstable economic environment has helped to make cloud computing an increasingly compelling option to consider, as management cuts costs and seeks to boost productivity by outsourcing parts of IT systems that can be looked after more efficiently elsewhere, rapidly expanded according to need and, significantly, paid for on usage.

If further evidence of the bright future of cloud computing is required, Microsoft, which gained global dominance with its operating systems and software, expects 90% of its workforce to be working on cloud-related projects within a year, according to Chief Executive Steve Ballmer in a Spring 2010 speech. Ballmer also said that he was software and services.

II. CLOUD COMPUTING

Let's define cloud computing in basic terms.

Perhaps the best starting point is to think of "the cloud" as the Internet. The user simply logs on to a PC and everything needed to get work done (software and data) is available through the browser.

Behind the scenes, data and applications are held on an assortment of computing resources somewhere on the Internet or "in the cloud." As far as the user is concerned, it's business as usual.

Businesses can build and run their own cloud, with all of the associated costs, or outsource to a specialist provider and pay only for the resources they use in terms of software, bandwidth, and storage and so on.

The primary benefits of the cloud to businesses are its agility and elasticity: need more of something (computing power, memory, storage, bandwidth, people on the network, for example). These are all achievable almost immediately in a cloud environment because of technological developments like Virtualization.

Both the Internet and Virtualization (see the brief explanation of Virtualization below) are central to the concept of cloud computing, and allow applications and data to be provided, according to demand, from a pool of hardware and software resources.

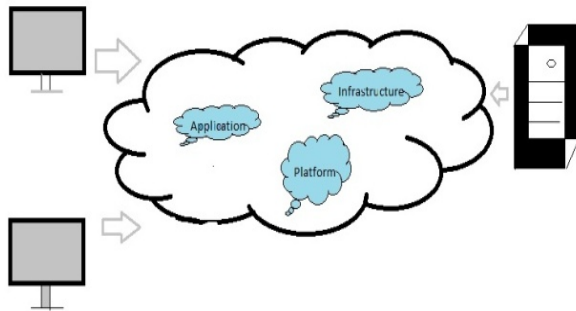


Figure2: Cloud Computing

III. SPEED, AGILITY AND EXPERTISE

Until recently, it made sense to plan an in-house data center to cope with business growth and increased storage needs – expensive over-capacity which reduces the cost-effectiveness of the whole IT operation. And what happens when they eventually run out of space –build, provision and staff another data center?

The modular nature of the cloud allows businesses to buy exactly what they need today, rather than speculate with a costly IT solution that they hope the business will grow into at some point in the future. Cloud computing means that IT can be delivered by specialists as a leased service with predictable costs from bottom to top: the timing and scale of necessary investments in IT, hardware or software, can be aligned usually within hours, to business requirements. It's entirely possible to roll out new services or provide additional capacity in a matter of hours, rather

than days or weeks. Adding extra storage, increasing network bandwidth, memory, computing power, for example, can be achieved, often instantaneously, just by asking for it. The cloud also presents an opportunity for enterprises to wean themselves off complex and possibly outdated legacy equipment which draw much of the available IT budget –

IT professionals spend an inordinate amount of time simply keeping things running rather than adding value to the business.

The significant capital reinvestment needed to replace hardware every three to five years disappears, along with the expense of operating costs, maintenance, software licenses and power and so on. Instead, customers can pay for what they use – "pay as you grow" – and buy results, not assets. IT can be deployed dynamically, to run with the curve of the business, rather than sitting waiting to be used.

Small and medium sized businesses, those with relatively small investments tied up in legacy computing, have been quickest to take up the services offered by cloud providers. The cloud provides them with applications, capacity, scalability and agility that they otherwise would not be able to afford – allowing them to focus on their business, not their IT.

IV. THE COMPONENTS OF THE CLOUD

The components of cloud computing and how, in the right hands, they are brought together are what makes the cloud such an attractive proposition [8]:

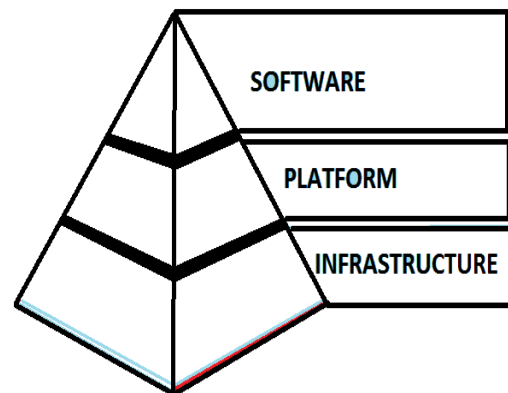


Figure3: Components of Cloud

- a. **Infrastructure as a Service (IaaS)** refers to hardware for hire, in terms of servers, storage capacity, and network bandwidth, with the application and the maintenance of that application layer remaining the responsibility of the customer. The servers are virtualized to provide agility and flexibility. IaaS is typically billed on a utility computing basis and amount of resources consumed (and therefore the cost) will typically reflect the level of activity.

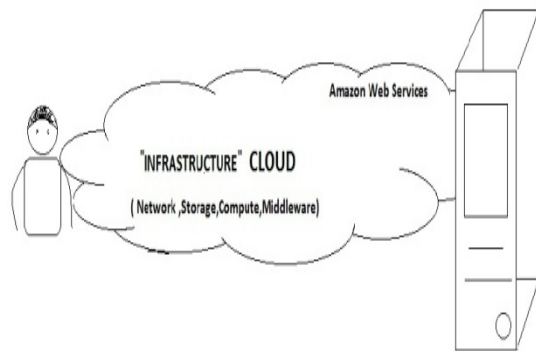


Figure 3.1: Infrastructure as a Service

- b. **Platform as a Service (PaaS)** allows for the creation and deployment of applications and services and includes the infrastructure to host the built application. It facilitates the quick roll-out and/or modification of operating system features.

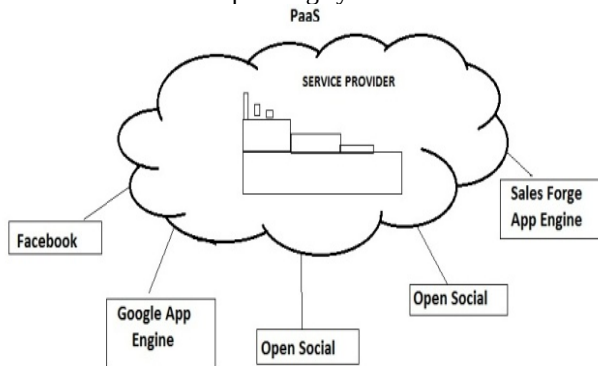


Figure 3.2: Platform as a Service.

- c. **Software as a Service (SaaS)** is a way of providing the same software to different customers via a network, usually the Internet. The software is not hosted on the customers' individual computers, nor is the customer responsible for the hardware that delivers the service. In this instance a supplier takes care of the creation, updating, and maintenance of the software and, again, customers pay for what they use.

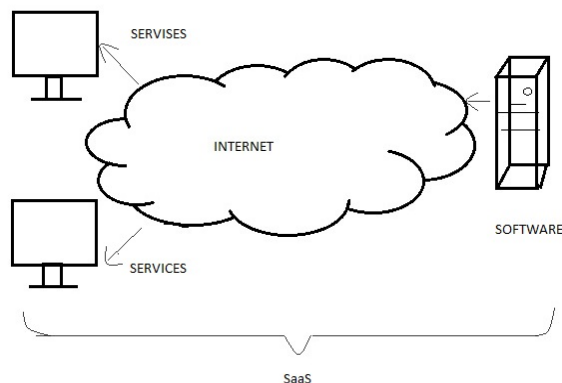


Figure 3.3: Software as a Service (SaaS)

V. PUBLIC LEADS THE WAY

The cloud comes in many flavors: market growth to date has been fuelled by the ready acceptance of public clouds. In a public cloud multiple customers share servers, storage and connectivity, as well as the operating environment, and resources are dynamically allocated according to levels of demand. It enables the deployment of an entire IT infrastructure without the capital costs associated with “owned” systems and offers pay-as-you-go usage and elastic capacity.

In a public cloud, access is usually through standard, and that means shared, Internet connections and all management of the, again, shared environment is in the hands of the service provider. It works, it's cost-effective and if your data isn't mission critical, what's not to like? It's arguably possible to be up and running on a cloud service quicker than it is to do the cost-benefit analysis – and still save money.[6]

VI. VIRTUALIZATION AND EFFICIENCY

Traditionally, data centers have operated on a “one server one task” basis, which often means that the server is massively under-utilized, running at around 15-20% of its capacity [9]. Virtualization allows multiple applications to run on the same server which radically improves server utilization and can result in a significant reduction in the number of servers a business needs. Virtualization is not only efficient, it reduces costs in terms of capital outlay, rack space, power and is a “greener” technology.[10]

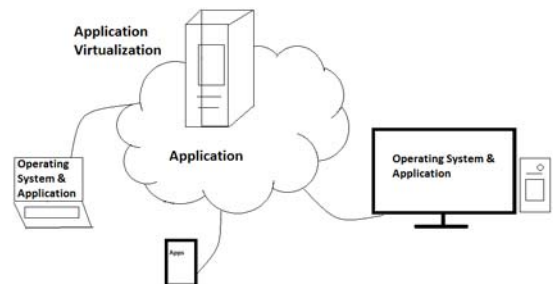


Figure 3.4: Virtualization

VII. MULTI-TENANCY

Many larger organizations can see the inherent benefit of the public cloud, such as shared servers, storage and connectivity, but are concerned with the levels of support and service guarantees available in this environment. Many of the major public cloud providers offer truly global solutions, resulting in concerns over the stored location of mission-critical data. Multi-tenancy clouds take the benefits of the public cloud, delivering the services provided on enterprise-class infrastructure under a Service Level Agreement. Most multi-tenancy cloud providers will offer engineering and operational resources under support agreements, and under pre-agreed monthly charges, thus acting as an extension of your IT department

while keeping tight control of your costs. Organizations can therefore make the move into the cloud driving their cost efficiencies while knowing that the data resides in their jurisdiction [6].

VIII.PRIVATE CLOUD

Some enterprises have already embraced the cloud and its benefits, operating their own model – but it still leaves them with the costs associated with running their own IT environment.

There are a few caveats that have delayed acceptance of outsourcing cloud operations amongst larger organizations, with undeniable issues of security, privacy and regulatory requirements topping the list, but that's where private clouds differ significantly from public clouds, particularly the new breed of enterprise-quality services that are becoming available.[5]

A private cloud offers a closed operating environment with applications and resources dedicated to one customer. With extremely secure Internet connections, data never shares space with data from any other business. In addition to offering the benefits of a public cloud in terms of elasticity, dynamic provisioning, multiplexing and pay-as you-go billing, private clouds offer a more complete solution and can be configured to provide whatever components of security, control and auditing are required.

In short, quality of service and the value it delivers is everything in a private cloud – and this means much more than the cost-per-hour value. It's about providing agility and scalability, but with added security, efficiency, resilience and accountability.

“And that brings us back to the suppliers of Infrastructure as a Service – they are not all created equal in terms of their facilities, capabilities and experience.”

Enterprise-class providers are specialists and can afford to use the best of the best when it comes to data centers, infrastructures and networks. Look for a supplier with a strong balance sheet, a track record of innovation and success and a demonstrable long-term commitment to the market.

Then examine how the company will guarantee the confidentiality, integrity and availability of your data. Reassure yourself that extensive, efficient and sophisticated measures and controls can be built in as you require. Only then should the price, or value, of a service be considered.

Successful managed service providers that already have in-depth experience operating corporate networks can add value to the relationship in numerous ways:

- a. Compliance, governance and jurisdiction – they will be aware of current and emerging standards and legislation.
- b. They should be able to migrate data to and from the cloud and integrate with “home” data centers efficiently.

- c. Service Level Agreements (SLAs) should be as adaptable as the services they provision.
- d. They should certainly provide robust business continuity and disaster recovery measures from the beginning.
- e. Storage is a growing issue – the cloud provides a very efficient environment for the safe storage of data and the responsibility to provision additional capacity lies with the service provider.
- f. The provider should understand that every enterprise will have its own priorities and offer a comprehensive “menu” of services that can be adapted according to its customers’ needs[1].

IX. INFRASTRUCTURE AS A SERVICE (IAAS)

In the IaaS model, customers are simply paying for an IT infrastructure as a service –buying their usage per unit, as agreed. Similar to the Managed Services example above, the customer benefits from the service provider taking complete responsibility for the entire IT infrastructure. In this instance the sole annual cost to consider is Service charge.[6]

X. CONCLUSION

Businesses are under continuing pressure to reduce costs and produce more, yet enterprise data centers are, more often than not, populated by a broad yet inflexible range of servers and operating systems, based on different types of processors acquired at different times and for different purposes in the company's history. Modifying or upgrading such complex environments is a slow, labor-intensive process requiring significant capital outlay.

Secure cloud computing has been around for some time and the range of benefits it can provide have long been a sought after ideal:

- a. Reduces costs, allowing capital expenditure to be converted into more manageable operating expenses on a “pay as you grow” model.
- b. It is highly automated and therefore more efficient.
- c. It offers unmatched flexibility and agility.
- d. the cloud provides increased storage options.
- e. It permits IT to focus on revenue-generating projects rather than performing endless maintenance on legacy systems.

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