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A Study on Cloud Computing and Deployment Models

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ABSTRACT

This thesis focuses on cloud computing and deployment models to give a better understanding of managing infrastructures, cutting expenses, and shifting obligations to outside suppliers/customers. Cloud computing has shaped technology and business models and driven companies to adopt new technological approaches. The available cloud computing models and anticipated future trends are analysed in this thesis. Cloud service delivery (SaaS, PaaS, and IaaS) and deployment models (private, public, and hybrid) are included in this thesis. These models greatly widen the range of choices and present organisations with a choice between various cloud computing solutions.

INTRODUCTION

The term "cloud computing" has been defined and interpreted in innumerable publications. The phrase "cloud computing" itself probably originated from network diagrams in which specific network types, such as the Internet or internal networks, are represented by clouds. Cloud computing consists of a collection of apps that are provided as services along with the hardware and software used in datacenters to support the applications. Some people argue that cloud computing is more of a business strategy than it is a particular technology or service.

Actually cloud computing has both technological and commercial elements. It seems unlikely that cloud computing would have been possible without certain of the cloud-enabling technologies that made up the cloud in the first place. The building blocks of cloud infrastructure are cloud enablers including open-source software, virtualization, distributed storage, distributed databases, and monitoring systems.

The premise of cloud computing is that each piece of system software or application turns into a service or a component of a service. As a result, adapting new or existing systems to the cloud may require changing their architecture. As a result, businesses often need to undertake significant structural changes to internal IT organisations and promote cloud thinking among employees in order to recognise the potential of the cloud and enable it for an organisation. Depending on the kind of cloud a firm uses, this could potentially foster rivalry within the business. People typically oppose change, therefore cloud evangelists frequently encounter opposition within their organisations.

The public cloud deployment model is probably going to remain dominant and keep growing, according to the analysis of cloud computing models. Private and hybrid deployment models will endure for years to come, but their market share will steadily decline. Long-term, it's likely that only certain business cases will use private and hybrid cloud solutions.

Objective Of Research

The study has been carried out with the following objective:

1. To study the cloud computing and its deployment models for future use.
2. To manage infrastructures, cut expenses, and shift obligations to outside suppliers/customers of an organization using cloud computing and deployment models.
3. Comparison of different deployment models and cloud computing models.

REVIEW OF LITERATURE

The concept of offering centralised computing services across a network is not new; client-server architecture and personal computers supplanted mainframe timesharing technology in the 1960s, which was then in use. Up until about ten years ago, the conventional enterprise computer infrastructure was made up of strong, incredibly costly servers. These manufacturers' servers were expensive to buy and maintain, required a lot of time to install and upgrade, and in some cases were prone to server failures that could last for several hours until a vendor representative could deliver proprietary replacement parts. Most servers ran several programmes under the same operating system without providing physical or virtual separation since the operating system was installed directly to hardware. Server resources were not used to their full potential since it was challenging to quickly shift and rebalance programmes between servers.

Things have altered drastically since virtualization was introduced. Virtualization enhances resource utilisation and energy efficiency, which significantly lowers server maintenance costs and provides high availability and quick disaster recovery. Virtualization has proven essential for cloud computing because it separates software from hardware and provides a mechanism to quickly reallocate applications among machines based on computational demands. Although virtualization was a significant step towards cloud architecture, the service element was still lacking. Internally controlled virtualized environments and default virtualization platforms do not offer the abstraction layer required for cloud services. A layer of abstraction and on-demand provisioning must be given on top of an environment in order to cloud-enable it. This service layer is a requirement for every cloud environment since it provides users with access to a cloud management interface while concealing the complexity of the infrastructure.

The capacity to scale is one of the most crucial elements in infrastructure architecture. Systems are often designed for future expansion and resource requirements in "traditional" non-cloud infrastructure. In order to plan for future growth, organisations must commit a significant amount of money up front. System resources cannot be scaled up or down fast with non-cloud infrastructures because they lack elasticity; Because of ongoing resource overprovisioning caused by this, systems are frequently underused inefficiently. On the other hand, because cloud infrastructure is multi-tenant, computing resources are distributed among numerous applications. This shared multi-tenant system is predicated on the idea that no hosted programme can typically be active simultaneously with another application, which means that Another programme is running when the first isn't. By assigning resources as necessary, cloud service providers can more effectively utilise computer resources. The cloud architecture's pooled hardware resources are made up of servers, storage, and networks. Modern cloud management technologies track resource utilisation automatically and distribute resources as needed. The cloud service provider must ensure that there will always be enough processing power to meet the needs of every client, even during periods of high demand.

One important advantage of the cloud is elasticity. It permits adjusting computing resources dynamically in accordance with current demand. With "traditional" infrastructure, organisations would have to predict the need for computing resources up front, but the basic goal of cloud computing is to automatically change computer resources in response to demand. Cloud infrastructure becomes more cost-effective when resource utilisation approaches actual demand. To make them compatible with the cloud, large centralised components that are hard to scale may need to be re-architected. For instance, huge centralised databases may need to be de-normalized and divided into smaller chunks. Additionally, newly added components must have easy access to configuration data and other shared information amongst cloud server instances.

MATERIALS AND METHOD

1. SaaS services

A subscription to on-demand internet software is available through the cloud service delivery mechanism known as "software as a service." Similar to other cloud delivery models, SaaS gives businesses the hance to save internal IT support expenses while shifting maintenance responsibility to the SaaS provider. Since practically every software seller strives to implement its offering on the SaaS rails, SaaS is by far the most popular cloud delivery model. Since there are SaaS offers in every category of software goods, it would probably take days to identify every SaaS software vendor.As a result, we only include a few categories and particular groupings of providers in our SaaS taxonomy.The SaaS approach likewise provided centralised hosting for third party applications, but the ASP model was different in that hosting and operations still required manual labour. Furthermore, SaaS applications are typically accessed through web browsers or mobile apps, whereas ASPs occasionally needed the installation of a thick desktop client (locally running software that conducts the majority of the computing activities on the user's machine, not on the server side).

SaaS systems use multi-tenant architectures, which allow numerous clients to utilise the same platform's infrastructure and software. SaaS providers may keep service expenses down thanks to multi-tenancy hosting and service automation. Some

application modification is frequently possible depending on the SaaS provider and type of application, but this is typically more constrained than with PaaS and IaaS cloud options. Initial SaaS concepts raised serious issues with regard to performance, security, and service availability. Although many of these original concerns were unfounded, SaaS business models and technology have substantially developed over time. SaaS is being actively used by businesses, and this is unlikely to change.

2.PaaS Services

Platform as a Service (PaaS) is a cloud service model that offers consumers an application platform that may be customised and comes with a pre-installed software stack. Above the hardware, operating system, and virtualization stack, PaaS can be seen as an additional abstraction layer. Because it simplifies infrastructure and application maintenance and enables concentration on core software development skills, the PaaS paradigm has substantial value for businesses.

Large organisations often find that the cost of software creation is less than the cost of software and infrastructure maintenance. Unsurprisingly, businesses are becoming more and more interested in streamlining their middleware and application infrastructures in order to increase productivity and reduce associated operational costs.There are only a few sizable PaaS providers, coupled with numerous smaller-market niche competitors; this market segment is less developed than IaaS. When opposed to IaaS, PaaS and SaaS may require more technical know-how to construct, but they also don't require as much initial infrastructure expenditure.

Innovators have a lot of potential prospects because the PaaS market is still very much in development. We may anticipate some degree of market consolidation in this space since many application and middleware software services that are currently provided internally will likely be moved to the public cloud in the coming years. The disparate, specialised PaaS products will start to come together over the course of the next two years to form suites of services aimed at the prevalent PaaS usage patterns. Instead of the cumbersome traditional on-premises construction of middleware capabilities in support of a project, using such preintegrated, focused suites will be a more appealing option. By 2015, full PaaS suites will be created that combine the most specialised PaaS offerings into a single, seamless solution. - Gartner Group (2011). Integration, development and quality assurance, data analytics, databases, and "general" (providers that offer various PaaS services) are the five main branches of cloud platform services that have been recognised and are selectively assessed.

3.IaaS Services

With the same level of control as in a conventional on-premise datacenter, infrastructure as a service enables businesses to relocate their physical infrastructure to the cloud. In comparison to other service kinds, IaaS offers the most resemblance to the internal datacenter. Storage, servers (or processing units), the network itself, and management tools for infrastructure upkeep and monitoring make up the core elements of a datacenter's infrastructure. Every one of these elements has produced a unique market niche. While some small businesses exclusively focus on a single IaaS cloud niche, major cloud providers like Amazon or Oracle have services available in all IaaS categories. Technically, there isn't much of a barrier to entry for the IaaS industry, but setting up and maintaining the cloud infrastructure could cost a lot of money. OpenStack is one of many mature open-source cloud management frameworks that are available to users and provide a strong software basis for companies wishing to build their own private clouds or enter the public cloud market.

The IaaS industry has minimal entry barriers, and new players can cause disruptions by introducing cutting-edge technologies and fiercer competition. For established cloud service providers, this presents a hurdle and makes it harder to retain clients. Prepaid services prevent consumer attrition to startup services and guarantee long-term customer loyalty.

The commoditization of cloud computing IaaS services like virtual machines and storage is another current trend. Therefore, I think that the businesses that will survive will probably be the ones who offer the highest-quality services. I'm referring to cloud-management, PaaS, and SaaS services that are built on top of IaaS.

4.Public cloud

The public cloud deployment model is probably going to remain dominant and keep growing, according to the analysis of cloud computing models. Public cloud service providers might provide fair service-level commitments (SLAs) and take care of any liability issues that business CIOs might experience. A public cloud is a collection of computing resources made available by outside companies. The most well-known public clouds are Microsoft Azure, Google AppEngine, and Oracle Cloud. Several companies have reached the pinnacle of the market for public cloud services. These providers went well beyond simply creating the biggest public clouds in the world by successfully defining the massive cloud eco-systems that have developed into platforms for additional enterprise clouds.

Interestingly, a lot of businesses have constructed their own clouds inside of significant public clouds. These organisations came to the conclusion that constructing their cloud within a third-party cloud offers greater advantages than constructing their own.

5.Private cloud

A single organisation creates and maintains a private cloud. To maintain the IT infrastructure, some companies contract with external providers. In this case, the services offered by the third-party provider may or may not be cloud-enabled. With the exception of being hosted or managed by a different company, these deployment techniques often resemble private clouds. CMSs are frequently used with public cloud services, but some also support private cloud options like Citrix or VMware. For particular use cases, the private cloud will exist as a segmented market.

Platforms for cloud integration assist businesses in integrating data from many sources. On premise private cloud databases.

6. Hybrid cloud

An amalgam of computing resources from both private and public clouds is referred to as a hybrid cloud. Integrating data from an organization's own datacenter with data from an external, public cloud might be technically challenging. Data integration issues may arise for businesses considering employing a hybrid cloud, as data is dispersed over both private and public Clouds. Learning new cloud management technologies requires work, much like learning a new programming language, to reach a high level of proficiency. This learning curve is even higher because there are additional technologies to learn when businesses use hybrid clouds or cloud technologies from different providers. The transparent management abstraction layer that CIS provides allows the exact same capabilities to govern several clouds, which is one of their main advantages. The ability to offer hybrid cloud solutions and integrate many clouds reduces reliance on particular public cloud providers and provides some defences against the hazards associated with provider technology overlap.

RESULT AND DISCUSSION

The future of cloud computing market is the disruptive methodology of cloud computing which quickly altering how computing is done. Companies will frequently adopt a dominant design as a reference standard for their product implementations once it has been identified by market participants. The predominant design often meets the needs of the majority of clients, even though there may be some edge cases and they may not all be satisfied. It is not always possible to foresee when a dominant design will emerge because it depends on a number of technical and commercial market developments that take place over a specific period of time. upon initial introduction, a disruptive product attracted a number of players, but after market participants settled on a dominant product design, companies that couldn't adopt this design either left the market or merged with other players. It is important to keep in mind that the dominant product design may not always be the most advanced, cutting-edge solution; rather, it may simply be a solution that appeals to the majority of customers and offers suppliers respectable investment returns.

We might presume that the industry hasn't peaked yet, but given the large number of market competitors, it is undoubtedly approaching that point as the competition in cloud computing intensifies. We should anticipate several market exits and consolidations after the market top. After that, the market structure for cloud computing ought to settle down, with the few remaining major players controlling the market. The state of cloud computing technology today is undoubtedly not set in stone. A few of product innovation iterations will be followed by a lengthier period of process innovation as cloud technology and related business models continue to develop. norms for cloud computing are still being created, and it will take time for them to become global norms.

IaaS, PaaS, and SaaS are the three main delivery methods, and they will all continue to exist in the near future. As ustomers learn that software and platform services offer greater value and resource savings than infrastructure, it is anticipated that the market share of IaaS will gradually decline. IaaS cloud services will remain operational for some time to come, onetheless, due to certain technical variables and requirements. Because the IaaS cloud service market has a relatively low barrier to entry and no technological differentiation, we will probably see further consolidations in this sector. Investment returns will decline as IaaS becomes a commodity, forcing cloud companies to transition to the more lucrative PaaS and SaaS areas. Because smaller IaaS providers lack the funding to create complex software to compete in the PaaS or SaaS industry, consolidations and partnerships will be essential for survival.

PaaS development and QA services assist businesses in enhancing code quality, encouraging teamwork among developers, and speeding up software development and a continuous integration cycle. The agile software development method is frequently chosen by development teams over the more conventional waterfall methodology. Because PaaS development platforms and collaboration tools save businesses a significant amount of time and money, this market is anticipated to

experience increased innovation. One of the cloud services market's most unexplored segments is cloud business intelligence and data analytics. The main barrier to cloud BI adoption is security. The cloud market is experiencing more competition, which is forcing service providers to drastically lower their rates. High market volatility results from a competitive and unreliable market that has numerous established market players and ongoing market entry. Long-term customer commitments are essential for a company's success in such a turbulent industry. Clients can now obtain substantially better prices if they sign a contract with a provider. Pay-as-you-go and prepaid pricing often have quite significant price differences.

The SaaS business model is a low-cost, high-volume enterprise that adheres to the economy-of scale principle. The process of acquiring new customers is expensive. Because companies have to spend a lot of money on product sales and marketing, Sales force and other SaaS providers have low profit margins. When the SaaS industry reaches a certain degree of development and consolidation, they will need to cut this investment in sales and marketing. SaaS suppliers must maintain low customer churn rates and consistently quicken the pace of customer acquisition if they want to create sustainable development for their organisation. In order to compete with on-premise CRM providers, other SaaS providers, and new market entrants, they must also maintain competitive rates.

CONCLUSION

This chapter presents the conclusions that we have obtained at the end of this thesis. We can say that with a high degree of certainty that the public cloud computing model will likely take over for providing computing resources based on market studies. The market survey indicates that in 2011, about 28% of the surveyed organisations used public cloud services, and by 2014, that percentage will increase to 51%. However, over the long run, private and hybrid cloud market shares are projected to gradually decline, and these cloud models are likely to be employed primarily in specialised business cases. This does not imply that these organisations will stop utilising private clouds.

We understand the future of cloud computing in the market that every organization will acquire a competitive edge, the big businesses that dominated the early cloud market built sophisticated, proprietary cloud technologies. These businesses cannot open-source their technologies and cede their technical advantage. Because they lack the necessary time to create their own technologies and catch up with the market, new market entrants are in a unique situation.The cloud computing will also be raise in the future as it adopt the Pay-as-you-go technique in which client do not need an special hardware and software and there is also no need to rent a big place for storage of the data. The transition to the cloud is a protracted process that includes both organisational and technical difficulties. Cloud computing has seen significant acceptance resistance, much like previous disruptive technologies before it, thus proponents should be ready to overcome it in their organisations. Organisational impediments to cloud adoption are caused by complexity and ambiguity.

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