MIGRATING BUSINESS SERVICES AND APPLICATIONS INTO THE CLOUD

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ABSTRACT
Cloud computing has attracted a lot of hyperbole since it became a trendy topic for IT managers to talk about. Companies frequently trumpet their cloud enabled services but rarely give up details on precisely how they achieved this or how much of their infrastructure has been fully migrated. Security and reliability of cloud services are often raised as concerns. By understanding the basics of cloud computing and knowing how to assess important factors such as security and the identification of systems that are suitable for migration, it becomes much easier to design and implement a cloud strategy. This paper provides the essential facts about the cloud computing, list some factors to prepare for when adopting cloud computing, consideration for managers migrating their services and applications into the cloud. It also discussed the merits of going into the cloud.

Keywords: Cloud Computing, Public Cloud, Service as a Service, Application Migration, Decision Making

1. INTRODUCTION

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. Examples of cloud services include online file storage, social networking sites, webmail, and online business applications. The cloud computing model allows access to information and computer resources from anywhere that a network connection is available. Cloud computing provides a shared pool of resources, including data storage space, networks, computer processing power, and specialized corporate and user applications [1].

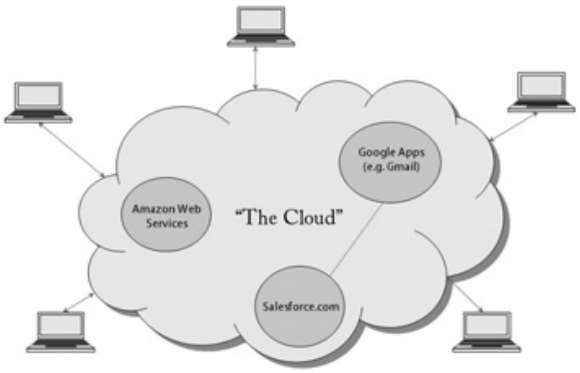

Fig.1 Structure of a cloud [12]

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 ubiquitous, 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 is composed of five essential characteristics, three service models, and four deployment models [3].

Characteristics
The characteristics of cloud computing include on-demand self service, broad network access, resource pooling, rapid elasticity and measured service. On-demand self service means that customers (usually organizations) can request and manage their own computing resources. Broad network access allows services to be offered over the Internet or private networks. Pooled resources means that customers draw from a pool of computing resources, usually in remote data centres. Services can be scaled larger or smaller; and use of a service is measured and customers are billed accordingly [1].

Service models
The cloud computing service models are Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). In Software as a Service model, a pre-made application, along with any required software, operating system, hardware, and network are provided. In PaaS, an operating system, hardware, and network are provided, and the customer installs or develops its own software and applications. The IaaS model provides just the hardware and network; the customer installs or develops its own operating systems, software and applications [1].

According to [2] cloud is a term that has a very loose definition in computing, generally meaning any situation where data storage and processing takes place without the user being able to pinpoint the specific physical computer carrying out the work. This may sound risky at first but in practical terms it really is no different to the traditional model of renting a server in a data centre. When renting a physical server it is unlikely that its precise location within the data centre will be known to the customer. The cloud is no different in this respect except that the physical server is replaced by a simulated (virtual) one.

For decades, manager have wrestled with the question of whether to keep IT functions in-house - which maximises control, but can be complex and wasteful – or contract them out to a specialist supplier []. Cloud computing is a new solution to that problem, harnessing the internet to deliver IT services that, its proponents maintain, are more flexible, more efficient, and cheaper than a business's own data center can hope to be.

This paper focuses on issues relating to the steps and factors manager considers when an organisation prepares to migrate its services into the cloud. The first of these issues is to know the deployment models of cloud computing to adopt that will be suitable to for the organisation's service with ease of access of its customers and clients alike. Deployment model to adopt could be one or combination of two or more of the available models – private, community, public or hybrid.

Another issue is the factors businesses have to put in mind before the start of moving into the cloud. Organisations rightly focus mostly on technology processes and business factors when preparing for cloud computing. Even if you have these areas fully-scoped, your enterprise cloud computing endeavour can fall apart if you've haven't established a realistic time table for migration or addressed the cultural changes necessary for a successful implementation.

Migrating applications into the cloud is also an important issue to consider when adopting cloud computing. Migrating applications to the cloud is not an easy task. It is important to strictly adhere to some model to ensure that the process is robust and free of errors.

Besides considering migrating business applications into the cloud it is paramount to give the services it renders a though also. When moving services into an externally-provisioned cloud, care and attention to detail is vital to the decision made.

The organisation of this paper is as follows: Section 2 presents a brief history of cloud computing while section 3 highlights the deployment models of the cloud. In section 4, factors to prepare for in cloud computing was discussed. In section 5, necessary steps to migrating application s into the cloud was presented. Section 6 also discussed the consideration of migrating business services into cloud computing. Sections 7 and 8 explained the advantages and disadvantages of cloud computing respectively while the conclusion of the paper is presented in section 9.

2. BRIEF HISTORY OF CLOUD

Year	Type of Cloud
1967	IBM CP-40 Virtualisation OS
1970	IBM S/370 Virtualised mainframe
1999	VMware Workstation Virtualised PCs SalesForce.com SaaS
2002	Amazon Web Services PaaS
2003	Xen Open-source virtualisation
2006	Amazon EC2 SaaS

Fig. 1: Firsts in cloud computing [2].

Traditional mainframes of the 1960s and 70s were the forerunner of cloud computing, although it wasn't called that at the time. Machines such as the IBM System/370 provided users with a number of simulated servers (virtual machines) running simultaneously on a single piece of powerful hardware. Each virtual machine ran its own operating system (for example IBM CP/CMS) and appeared to the user to be a completely independent entity functioning without reference to its host. The user did not need to know precisely which corner of the mainframe's hardware their virtual machine was running in – as long as it worked, that was all that was required [2].

Modern technology allows this same process of virtualisation to take place on commodity server hardware and even desktop computers. It is very common for companies to use out-of-the-box virtualisation technology such as VMware or Xen to be able to run several virtual machines on one physical server in the same way as mainframes used to. This allows them to increase the number of servers they have available without necessarily purchasing any additional hardware [2].

Cloud computing is merely the application of virtualisation technology on a larger scale. Instead of a single physical server hosting multiple virtual machines, clouds consist of groups of one or more physical servers sitting behind an access point that distributes requests for virtual machines between them. Clouds can be built in-house on top of existing hardware, or access to external clouds can be rented on demand from third-party vendors such as Amazon, Microsoft, or Google [2].

Who is using the cloud?

60% of business have moved or are planning to move into the cloud according to a February 2011 [4], confirming a recent Gartner report cited in the same source that 40% of firms would have no appreciable local IT infrastructure within the next 4 years. (As an aside, it goes on to say that despite this widespread take up of cloud computing 72% of respondents are concerned or very concerned about security in the cloud [4].

An interesting side-effect of the cloud is that it encourages use of open-source software to run cloud-based services [5]. This is due to the lack of licensing restrictions – in a dynamically scaled and constantly changing computing environment, having to continually count and limit instances of licensed software is next to impossible. Many proprietary software vendors have yet to come up with licensing models that suit the cloud paradigm [5].

This combination of difficulty of using commercially licensed software with concerns over security is often the only excuse IT managers need not to use the cloud, but there are good arguments and techniques for overcoming both that mean that they do not necessarily need to be stumbling blocks [5].

3. DEPLOYMENT MODELS OF CLOUD COMPUTING

Sequel to the five characteristics and three service models of cloud computing there is other issue known as the four deployment models in cloud computing. These models are the different modes of providing services to the cloud which are:

Private Cloud: The private cloud deployment model represents a model where a single organization stands up cloud capacity and ONLY members of that organization are allowed to consume that capacity. This is a common model for Governments and large enterprises. The primary reasons you would want to create a private cloud are Security concerns, Data sovereignty concerns, Fear, Uncertainty, and Doubt (FUD) [6]

Dipping the enterprise toe into Cloud Computing via a private cloud does have significant merit. The path to cloud is not easy. It requires organizations to modify policies and procedures. It requires staff members to adapt their ways of thinking. Private cloud can serve as a foundation on which to build robust approaches to Cloud Computing that can then be used to support a transition to community, hybrid or public clouds [6].

Community Cloud: A community cloud is a Cloud Computing environment that's not dedicated to a single organization, and yet, it's not available to anyone who comes along. A community cloud is implemented to support the Cloud Computing needs of a group of related organizations (e.g. fire departments, government agencies, community swimming pools). Much like a "credit union" in the United States, you must meet certain criteria to be eligible to consume the services of a community cloud. The primary advantages of a community cloud are: Security, Scale, Common practice [6]

Public Cloud: This is the one you're probably most familiar with. This is the Amazon, Google, Dropbox, and Box clouds that many of you are already using. It's a cloud that anyone can use, all you need is an email address and – in some cases – a credit card. Public cloud implementations are, by far, the largest cloud implementations around. This scale enables them to achieve massive economies which private & community clouds just can't match. This scale is what allows Amazon and RackSpace to provide IaaS at price points that can't be beaten. So why would you want to deploy your workloads onto a public cloud infrastructure? Here are a few reasons: price, Scalability, Flexibility/Agility [6].

Hybrid Cloud: As the name implies, hybrid cloud is a combination of two or more of the deployment models discussed above. In all honesty, this is where I see a large percentage of enterprises living in the "near" future.

3.1 Public Cloud versus Private Cloud

In a typical cloud computing scenario organisations run their applications from a data centre provided by a third-party – the cloud provider. The provider is responsible for providing the infrastructure, servers, storage and networking necessary to ensure the availability and scalability of the applications. This is what most people mean when they refer to cloud computing i.e. a public cloud [7].

There is also much talk about private clouds. A private cloud is a proprietary computing architecture, owned or leased by a single organisation, which provides hosted services behind a firewall to "customers" within the organisation [7].

Some commentators regard the term "private cloud" as an oxymoron. They say that the word "cloud" implies an infrastructure running over the Internet, not one hidden behind a corporate firewall.

There is, however, a larger body of opinion suggesting that private clouds will be the route chosen by many large enterprises and that there will be substantial investment in this area. Already vendors are lining up to release products that will enable enterprises to more easily offer internal cloud services [7].

Whilst we will undoubtedly see a huge growth in private clouds we need to be careful that this is not just some re-badging of what is there already [7].

Calling the services offered by the internal data centre a "private cloud" without changing management processes, organisation/culture and the relationship with business customers is not going to hack it. If your data centre can't provision new environments, add new storage or increase computing power within minutes (or at worst within hours) then you are not operating in a cloud environment [7].

Today there are very few companies that have the internal knowledge and the resources to create and effectively manage true cloud computing infrastructures. This will change as the market for cloud services matures and as new products emerge to help with rolling out private cloud-related services within the enterprise data centre.

We will also see the adoption of hybrid cloud environments where organisations will combine the advantages of a public cloud with an internal private cloud. Some applications, or parts of applications, could run in the public cloud while others remain behind the corporate firewall [7].

This paper examines the issues around cloud computing in its true sense of the meaning i.e. the public cloud. However, many of the points made can be applied to a private cloud. Regardless of which route you end up following (private, public or hybrid) your expectations of what you should be getting for your money remain the same.

4. FACTORS TO PREPARE FOR IN CLOUD COMPUTING

Organisations rightly focus mostly on technology processes and business factors when preparing for cloud computing. Even if you have these areas fully-scoped, your enterprise cloud computing endeavour can fall apart if you've haven't established a realistic time table for migration or addressed the cultural changes necessary for a successful implementation [8]. Organisations that take a phased approach to moving to cloud computing and fully prepare the IT department and the rest of the business get the most out of their technology investment [8].

1. Prepare for migrations on a realistic timetable
Organisations often believe they can have cloud computing solutions up and running in no time. But there are several steps that need to happen before you can take advantage of your cloud solution. Your cloud computing provider will need to provision your infrastructure in the cloud, install the core operating system and validate network, storage, security and capacity requirements. Then your provider will test the solution before allowing our organisation to test it and give final approval so you can begin installing your applications in the cloud computing platform [8].

While it is possible to do a rapid cloud computing implementation, it is not recommended to take this approach, as it means more of your business will be offline at once, which increases business risk. A phased approach is recommended to migrating to a cloud computing platform, guided by an estimated time frame that keeps only portions of your systems offline at the same time. A good cloud computing provider will work with your organisation to determine which workloads can be taken offline, for how long and which additional workloads might be affected [8].

2. Prepare for cultural resistance and change
Obviously, adopting a cloud computing platform will require training the trainers as well as applicable employees. And any new hardware will require training technical specialists in repair and maintenance. With cloud computing, you'll also want to impart a valuable lesson to IT employees: "You'll need to change your approach" [8].

When your IT team begins working with cloud computing, it might not have quite the amount of control it's accustomed to having. IT staff will still need to be technical experts, but the amount of technical work they actually undertake will decrease as cloud fills the gaps in certain processes. Your direct reports might find their jobs shift to developing appropriate policies (like BYOD) that guide employees at large about the rules of engagement for cloud computing [8].

With cloud computing rapid scale and provisioning ability, your IT staff will begin taking up more special projects that focus on innovation to drive business value. This is obviously not a bad thing, but after years of making sure everything runs smoothly behind the scenes, this cloud computing perk will certainly take some getting used to amongst your IT staff [8].

5. MIGRATING APPLICATIONS INTO THE CLOUD

Migrating applications to the cloud is not an easy task. It is important to strictly adhere to the seven step model to ensure that the process is robust and error free. The seven stages of migrating into a cloud are outlined below [9].

1. Assess
Migration starts with an assessment of the issues relating to migration, at the application, code, design, and architecture levels. Moreover, assessments are also required for tools being used, functionality, test cases, and configuration of the application. The proof of concepts for migration and the corresponding pricing details will help to assess these issues properly.

2. Isolate
The second step is the isolation of all the environmental and systemic dependencies of the enterprise application within the captive data center. These include library, application, and architectural dependencies. This step results in a better understanding of the complexity of the migration.

3. Map
A mapping construct is generated to separate the components that should reside in the captive data center from the ones that will go into the cloud.

4. Re-architect
It is likely that a substantial part of the application has to be re-architected and implemented in the cloud. This can affect the functionalities of the application and some of these might be lost. It is possible to approximate lost functionality using cloud runtime support API.

5. Augment
The features of cloud computing service are used to augment the application.

6. Test
Once the augmentation is done, the application needs to be validated and tested. This is to be done using a test suite for the applications on the cloud. New test cases due to augmentation and proof-of-concepts are also tested at this stage.

7. Optimize
The test results from the last step can be mixed and so require iteration and optimization. It may take several optimizing iterations for the migration to be successful [9].

It is best to iterate through this seven step model as this will ensure the migration to be robust and comprehensive.

6. CONSIDERATION WHEN MIGRATING INTO THE CLOUD

There are differences when considering in-house clouds to hiring time on an externally-provisioned cloud and what is true for one may not necessarily be true for the other. However the focus here is on the latter so this section of the paper will focus solely on that aspect – i.e. what to look out for when migrating to an externally-provisioned IaaS cloud. Care and attention to detail is vital when making the decision to migrate a project to an external cloud. Here are ten key points to consider when migrating:

1. *Look for an established vendor with a track record.*
A cloud vendor that is well established will have a wider breadth of knowledge and deeper insights into potential pitfalls than a smaller less-established vendor. They are also more likely to have higher security standards, a better range of services, more resources available to meet peak demand, and a better quality of support and training available for their users.
The support and training provisions alone are likely to make the biggest difference to a customer that is new to the cloud – the vendor must be able to answer questions in great detail and within an appropriate timescale.

2. *Does the project really need to be migrated?*
It may sound obvious, but not every project is suited to migration to the cloud. If management and customers are happy with the current hosting arrangements, and particularly so if they are cheaper than the cloud option, then there is no reason to move. Cloud migrations are usually only necessary when considering large-scale hardware purchases in order to sustain or scale existing in-house projects or enable new projects to take place. Such migrations are only value-for-money if the perceived benefits of the migration outweigh the costs of performing it.

3. *Consider data security.*
It goes without saying that when putting applications and data onto a system outside an in-house data centre, customers will want to be sure that only the right people can access it and that its contents remain secure. Take a long hard look at the applications that will be migrated and consider getting an ethical hacker to attempt to break into them so that developers can close any loopholes before the move takes place. Use firewalls liberally to ensure no accidental backdoors are opened through routes other than the application itself. Encrypt all communications with the external application and lock it away behind a proven authentication system that will guarantee that the only people who can access it are those who are permitted to.

4. *Data transfer.*
IaaS clouds are internet-based, therefore there is usually only one method of getting data into them: uploading files across the internet. Many internet connections used by smaller businesses offer far slower upload speeds than download speeds and it can take an eternity to upload even a gigabyte of data. Even the fastest corporate networks struggle to upload a few tens of gigabytes within a reasonable timeframe, e.g. a dataset from a DNA sequencing machine. If the transfer of large datasets to and from the migrated software is a requirement then careful consideration needs to be made as to how this could be achieved, reduced, or avoided. Some IaaS providers offer the option of shipping hard drives of data to them to avoid these upload bottlenecks, but be aware that shipping delays and workload at the vendor's data centre may mean the process is far from instant. The best approach is to take a very close look at the data transfer requirements and see if they can be minimised, e.g. by pre-processing large datasets locally to produce a smaller summary dataset for upload. Conversely, the cloud can be a good way of improving download speeds for customers using an application. Cloud vendors can deploy an application on whichever of their physical servers are closest to a customer's location. This can make a big difference to the response times customers get from the application.

5. *Data storage and location.*
How much data does the application really need? Cloud data storage can be expensive, particularly for very large quantities, so consideration should be given to data retention policies. Should old data be archived off-cloud to a tape library or other external resource? Is raw data needed at all or are summaries sufficient? Whilst not hugely expensive, movement of data within the cloud does cost money in terms of internal bandwidth charging, depending on the vendor, so applications should avoid moving it around unnecessarily. Shared data resources such as shared drives or central relational databases can be more effective than directly copying data between virtual machines, particularly for data sources that are usually accessed randomly or partially rather than sequentially or in their entirety.

6. *Scaling.*
The scalability of cloud applications is not something that magically happens upon deployment (at least, not in IaaS – although PaaS deployments of single applications do inherit a certain amount of scalability from the host environment). Applications have to be placed behind load-balancers/auto-scalers within the cloud in order to be scaled up on demand. Some cloud vendors offer these as part of the service, others require the installation of third-party tools, however most scaling and balancing solutions incur some additional expense.

Once the application is behind a load-balancer or auto-scaler, the application itself needs to be aware that it could be scaled. If migrating an in-house application that already sits behind an in-house load-balancer than chances are that very little will have to be changed to support scaling in the cloud. For applications that have not yet been load-balanced in house, developers will need to assess the code to ensure that it can cope with a changing environment. How will user sessions be persisted? How will they co-ordinate access to any central data resources in order to avoid conflict?

7. *Service level guarantees.*
The first question to ask any cloud vendor is what their availability guarantee is, and what recompense there might be if they fail to live up to their claims. A cloud vendor failing to provide the agreed service is the worst possible situation for any cloud application to be in. Particular attention should be paid to the processes in place in case of vendor collapse or takeover.

Once confident of the vendor's service guarantees, the next check is to look at vendor backup plans. Do they take on- or off-site backups? What is their disaster recovery plan in case of loss of a data centre? Do they guarantee to recover the contents of the virtual servers, i.e. the applications and data, or will they only recover the base operating systems? Independent off-site backup plans should be built with these answers in mind.

8. *Upgrade and maintenance schedules.*
Cloud vendors will need to update their systems from time-to-time to install the latest security patches and new features. Applications built on top of the cloud will need to be aware that these patches take place and have plans in place to ensure that they won't be adversely affected after the upgrade. Vendors often give an option to decide when the upgrade will take place, subject to a fixed final deadline when it will happen anyway, so application developers should carry out testing well in advance to ensure service continuity.

Likewise, if a vendor schedules planned downtime of cloud services to perform maintenance, try to schedule application maintenance windows to coincide with this in order to prevent excessive numbers of outages for customers using the application.

9. *Software architecture.*
Traditional applications are designed for traditional hardware configurations. Cloud applications are designed for cloud infrastructure and features. The two are not necessarily equivalent. Whilst it is entirely feasible to take a traditional application and simply copy it to a cloud-based replica of its original environment, this is not always the most effective use of cloud functionality. Questions need to be asked regarding the choice of infrastructure – does it need a grid/cluster equivalent or can cloud alternatives such as Hadoop or self-instantiating instances provide a better service? Does it need an integrated load-balancer or can the cloud's default load-balancer suffice? Does it need database replication to distribute requests or can a single larger virtual database server handle all the traffic on its own?

10. *Check with the lawyers.*
The final hurdle when migrating to the cloud is almost certainly going to be a legal one. Data protection or other acts of law may prevent the placement of data in certain locations (e.g. French law prevents clinical trial data from being transferred to locations in other countries, even within the EU). The contract with the cloud provider must also provide suitable protection for data transmitted to it. Checks must also be made to establish which jurisdiction's laws will apply in case of a dispute – the application owner's, or the vendor's head office, or the vendor's data centre locations where the application and data is being kept?

Some lawyers express concerns regarding intellectual property (IP) of any data that is outsourced to an external location, cloud or otherwise. The opinions and rules vary widely depending on local custom and precedent so seek legal advice before putting anything on the cloud that could construe potential IP. Using licenced software on the cloud may in some cases contravene the terms of the licence, or may invoke special clauses that would not apply elsewhere. Check the licence text carefully and if necessary consult with the software vendor to gain appropriate permissions or renegotiate the licence.

7. ADVANTAGES OF CLOUD COMPUTING

There is a huge amount of hype surrounding cloud computing but despite this more and more C-level executives and IT decision makers agree that it is a real technology option. It has moved from futuristic technology to a commercially viable alternative to running applications in-house [7].

Vendor organisations such as Amazon, Google, Microsoft and Salesforce.com have invested many millions in setting up cloud computing platforms that they can offer out to 3rd parties. They clearly see a big future for cloud computing [7].

Of course, no technology comes without a set of advantages and disadvantages so we've tried to sort to wheat from the chaff when it comes to the reality of cloud computing. In particular, one always has to be cautious in believing the claims of any specific vendor [7].

1. Scalability
Scalability is a key aspect of cloud computing. The ability of the platform to expand and contract automatically based on capacity needs (sometimes referred to as "elasticity"), and the charging model associated with this, are key elements that distinguish cloud computing from other forms of hosting. Cloud computing provides resources on-demand for many of the typical scaling points that an organisation needs including servers, storage and networking. The on-demand nature of cloud computing means that as your demand grows (or contracts) you can more easily match your capacity (and costs) to your demand. There is no need to over-provison for the peaks.

At the software level cloud computing allows developers and IT operations to develop, deploy and run applications that can easily grow capacity, work fast and never — or at least rarely — fail, all without any concern as to the nature and location of the underlying infrastructure. One shouldn't forget the advantage cloud computing can offer newer or smaller players. With easy access to a cost effective, flexible technology platform small competitors can punch well above their weight in terms of application capacity and scalability and can quickly turn into significant adversaries.

2. Cost Efficient
Cloud computing is probably the most cost efficient method to use, maintain and upgrade. Traditional desktop software costs companies a lot in terms of finance. Adding up the licensing fees for multiple users can prove to be very expensive for the establishment concerned. The cloud, on the other hand, is available at much cheaper rates and hence, can significantly lower the company's IT expenses. Besides, there are many one-time-payment, pay-as-you-go and other scalable options available, which makes it very reasonable for the company in question [11].

3. Backup and Recovery Since all your data is stored in the cloud, backing it up and restoring the same is relatively much easier than storing the same on a physical device. Furthermore, most cloud service providers are usually competent enough to handle recovery of information. Hence, this makes the entire process of backup and recovery much simpler than other traditional methods of data storage [11].

4. Easy Access to Information Once you register yourself in the cloud, you can access the information from anywhere, where there is an Internet connection. This convenient feature lets you move beyond time zone and geographic location issues [11].

5. Automatic Software Integration In the cloud, software integration is usually something that occurs automatically. This means that you do not need to take additional efforts to customize and integrate your applications as per your preferences. This aspect usually takes care of itself. Not only that, cloud computing allows you to customize your options with great ease. Hence, you can handpick just those services and software applications that you think will best suit your particular enterprise [11].

6. Quick Deployment Importantly, cloud computing gives you the advantage of quick deployment. Once you opt for this method of functioning, your entire system can be fully functional in a matter of a few minutes. Of course, the amount of time taken here will depend on the exact kind of technology that you need for your business.

7. **More flexibility to get into new businesses.** With the available of on-demand cloud resources, new configurations can be up and running within hours or minutes, so that helps reduce the time element. Since users will only be charged for that amount of time they use cloud, that helps reduce the money needed. On-demand cloud resources provide the way to try out new ideas without extreme investments in supporting systems. And a shift in business focus can be made fairly quickly.

8. **Smoother mergers and acquisitions.** One of the great sticking points of many mergers is the months, or even years, it takes to bring data and records from one system into another. Sometimes, it never happens. Even government agencies have this problem in a big way, especially when efforts are made to consolidate agencies or departments. With systems in the cloud, however, the transition is much faster. End-users in the conjoined organizations can readily and rapidly access cloud-based systems.

8. DISADVANTAGES

1. Security

In nearly every survey done about cloud computing the top reason given for not adopting it is a concern over security. Putting your business-critical data in the hands of an external provider still sends shivers down the spines of most CIOs [7]. This could potentially put your company to great risk. Hence, you need to make absolutely sure that you choose the most reliable service provider, who will keep your information totally secure [11].

2. **Technical Issues.** Though, it is true that information and data on the cloud can be accessed anytime and from anywhere at all, there are times when this system can have some serious dysfunction. You should be aware of the fact that this technology is always prone to outages and other technical issues. Even the best cloud service providers run into this kind of trouble, in spite of keeping up high standards of maintenance. Besides, you will need a very good Internet connection to be logged onto the server at all times. You will invariably be stuck in case of network and connectivity problems [11].

3. **Prone to Attack** Storing information in the cloud could make your company vulnerable to external hack attacks and threats. As you are well aware, nothing on the Internet is completely secure and hence, there is always the lurking possibility of stealth of sensitive data [11].

9. CONCLUSION

Part of the positive effects of cloud computing are going to be positively related to the speed of adoption of the new technology. One of the factors for cloud computing adoption is a proper preparations and understanding of the cloud issues. In this paper, we focused on the issues of preparing for cloud adoption. We started with a brief history of the cloud and deployment models for managers to know which model to adopt for their services. After this we discussed three issues, factors to prepare for in the cloud, steps managers should take for migrating applications into the cloud and points to consider for making decision to migrate their services to the cloud. Also the advantages and shortcomings of cloud computing were highlighted still to guide managers and business owners adopting cloud computing. From this paper it was noticed the merits of cloud computing outnumbered its demerits which explains the speed of adoption of services into the cloud.

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Author's Brief

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