Cloud Computing for Small Business

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Abstract—*Cloud computing is a process that allow users access to a certain set of shared resources. Data stored in the cloud, specifically on servers, is accessible from almost anywhere, and can be used on demand. It is a measured service, one that is easily used and takes advantage of pooled resources to create something greater than the sum of its parts. There's a reason cloud computing is often advertised as the future of business. Today is the era of Cloud Computing Technology in IT Industries. Cloud computing which is based on Internet has the most powerful architecture of computation. Cloud Computing Technology (CCT) is a new way of leveraging the power of the Internet to provide software and infrastructure solutions to Small and Medium-Sized Businesses (SMBs) around the world. SMBs are rushing to the cloud to save time and money, increase efficiency, and gain a competitive advantage.*

Keywords— *Cloud, SaaS, PaaS, IaaS, Cloud Computing.*

1. INTRODUCTION

'Cloud', as name suggests is a place where anyone from any part of the world can have access there. Let's take example of cloud technology, there are virtually data centres available there [10]. Means whether a personal cloud user or an enterpriser both can buy cloud services [9] . Basically, cloud is a technology where we can keep our large amount of data at minimal cost as compared to premises data centre [12] . Cloud technology allow users to pay only according to usage; neither monthly nor yearly [12]. Back in years when traditional infrastructure was used on high scale business, people used to spend more money on hardware systems in order to support business. A support team was also needed and this whole system resulted in high expense. Whereas in cloud the story is completely different.

The workload can be reduced in cloud computing. Load of service is handled by the networks which forms the cloud that's why the load on local computers is not heavy while running an application [12] . So the requisition of hardware and software at the user side is decreased [12]. All required is a web browser to use cloud computing. Following are the key features of cloud computing [2] :

- Resource Pooling and Elasticity
- Self-Service and On-Demand Services
- Pricing
- Quality of Service

SMBs have different IT requirements and often face different IT challenges in order to do large scale enterprises [1] . SMBs IT resources, including budget and staff are often highly constrained [1] . CCT is especially practical for smaller organizations because it reduces IT resources and the time spent managing them [1]. Instead of relying on expensive hardware, software and people to manage them, small businesses can take advantage of CCT's availability, reliability, security, scalability, flexibility, and more [7].

Now the question is that why SMBs shifting towards CCT? Several studies have identified reasons for SMBs to migrate towards cloud and described the impact of CCT [7] . According to the Microsoft survey, getting new software applications, high speed, reducing IT workload, and improving IT collaboration were mentioned as important benefits of moving to CCT (RighScale, 2017). Popular applications used by SMEs included hosted desktop, storage and back-up, accounting and billing, Human Resources and Customer Relations Management. According to an IBM survey of 2,000 mid-size companies, 66% of mid-size companies planned to implement cloud computing projects in 2017 [9] . While 75% planned to do this in conjunction with IT Infrastructure improvements (Secure ITnet, 2017).

According to a 2016 Gartner report, Cloud computing technology is perhaps the most promising and anticipated technology to come around in a number of years (Smith, 2016). For some SMBs, making a heavy move toward a cloud structure is a way to significantly cut hardware costs [10] . For others, CCT streamlines operations and speeds up development cycles. Properly planned and implemented, CCT has the potential to drastically improve operational efficiency of SMBs. A recent survey found out that majority of SMBs (80%) would prefer to get a single bill for all their communication consumptions. This is a perceived benefit for SMBs to move all communication services to a single main service provider (Secure ITnet, 2017).

On the other hand, every new technology comes with some issues [12]. In order to completely adopt this new technology, issues and problems must be resolved first [12] . There is a long debate about the security issues related to CCT. One cannot deny the fact that it does have some serious security issues [12] . The question arises that if user keeps data on cloud location then it might have high risk of theft and being attacked by the hackers. Yes, it is true, but it doesn't mean that there is no kind of security. Cloud Network Administrators and specialists look after all the issues related to the security. Most of the cloud service providers do have the agreement which specifically have details about the security which they will offer.

2. EVOLUTION OF CLOUD COMPUTING IN SMBs

Cloud Computing gives user the opportunity to accessing of services, including, storage, applications and servers through the Internet, making use of another company's remote services for a fee [8]. A Company can have remote access to their developed applications or can programs virtually rather than on local hard drives and servers.

The technology 'Cloud Computing' is not new. People have been using it from many years but were not aware of it. Services like Gmail, Google docs and many more are using the same technology, but users never ever thought that these were Cloud Computing services. Cloud Computing has very deep background, it was first used when Main frame Computers came into existence in 1950 [7] . The idea was to connect the users to the Central point and this was done by using dummy terminal. There was a main frame computer and all the users connect to this via dummy terminal. It was the first time when the idea of shared resources came into existence. But as main frame computers were expensive, and it was not feasible for companies to buy them to run their applications. So, at that time the idea looks expensive and failed to attract the companies.

In 1970, IBM came up with a new idea of Virtualizations. 'Virtualization' means that more than one operating system can be run on a single system. All the operating systems running on a single system will have their own memory and other infrastructure, making it possible to share these resources. This was the time when that idea become popular globally.

In 1990, telecom operators begin offering virtualized private network connections, whose quality of service was as good as those of point-to-point (dedicated) services at a lesser cost. This paved way for telecom companies to offer many users shared access to a single physical infrastructure.

At first it was not possible for SMBs to move towards Cloud Computing. As the technology was still growing and was expensive to adopt. With the passage of time different Companies like Google, Amazon, Microsoft, IBM came into the market and start providing cloud services to SMBs to mid-Sized Businesses.

3. COMPONENTS OF CLOUD COMPUTING

Here are some of the essential components of Cloud Computing:

3.1 SAAS(Storage-as-a-service):

When user performs operations and found the disk shortage then it can request the service to provide Cloud storage to perform their tasks [3] . The significance of the component makes itone of the top priorities for the efficient functionality of all the other cloud computing components [2].

3.2 Database-as-a-service:

There is a live Database available on Cloud Storage where all the operations are performed [2]. A physical DB is also present in the local machine. This component will decrease the Database Cost.

3.3 Information-as-a-service:

This feature allows users to have remote access to their information. User can have access from anywhere in the World. The scenery behind the remotely fetched information or data can be applicable in account validation, online news, internet banking, and live stock prices among other examples.

3.4 Process-as-a-service:

Unlike other components, this one combines various resources such as data and services. Mainly this is used for business processes where various key services and information are combined to form a process.

3.5 Application-as-a-service (AaaS):

This is the Complete Package to access and use an application. This one is built to connect end-users to the application and the users can access this service through the internet [2] . It is the end user's front end and includes Google Calendar, Gmail, Salesforce, and so on.

3.6 Platform-as-a-service (PaaS):

This Component includes the application development, storage, and testing of the database [5] .

3.7 Integration-as-a-service (SaaS):

This Component helps developers to integrate the developed application's components to the other applications [3] . It helps in mediating between the remote servers with the local machines.

3.7 Security-as-a-service:

Well, when any company moves towards Cloud Computing then their first priority is the security, and this is one of the most required Component. Most Cloud Providers have three-dimensional security principles.

3.8 Testing-as-a-service (TaaS):

This Component is used for testing the remotely hosted applications [6] .

3.9 Infrastructure-as-a-service (IaaS):

This is the most important Component of Cloud Computing. It contains virtual consideration of the networks, servers, software, and hardware on the cloud platform [2] . Users don't know about the backend processes, rather it can see the whole developed environment.

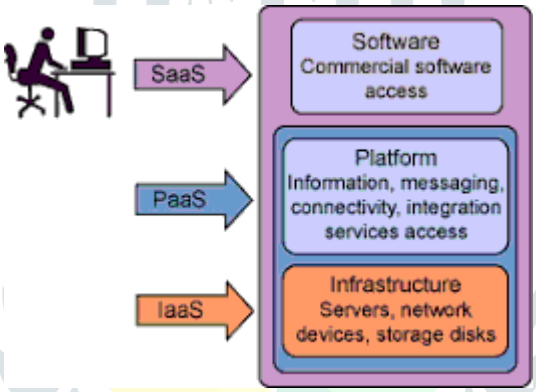

Fig.1. Cloud computing architecture refers to the components and subcomponents required for cloud computing. These components typically consist of a front end platform , back end platforms, a cloud based delivery, and a network.

4 TYPES OF CLOUD COMPUTING

Based on a deployment model, classification of cloud is done as:

4.1 Public Cloud:

In Public Cloud the whole application will be deployed on the premises of a cloud computing company that offers the cloud service [2] . On public cloud everyone from any part of the world can have access to the application [6] . But as public clouds use shared resources, they do excel mostly in performance, but are also most vulnerable to various attacks [3] .

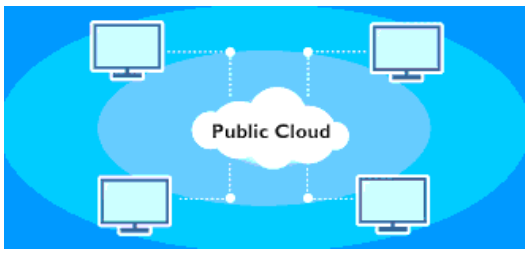

Fig.2. The public cloud is defined as computing services offered by third-party providers over the public Internet, making them available to anyone who wants to use or purchase them.

4.2 Private Cloud:

Private Cloud works the same way as Public Cloud but uses dedicated, private hardware [2] . Private Cloud means an enterprise have bought any cloud location for their business purpose. It is not shared with others, yet it is remotely located [3]. The security

and control level is highest while using a private network. Yet, the cost reduction can be minimal, if the company needs to invest in on-premise cloud infrastructure [6].

Fig.3. The private cloud is defined as computing services offered either over the Internet or a private internal network.

4.3 Hybrid Cloud:

Hybrid Cloud means that it can perform the functions of both Public and Private Cloud [5] . It all depends on the purpose it is using for. For example, public cloud can be used to interact with customers, while keeping their data secured through a private cloud [6] .

Fig.4. Hybrid cloud is a cloud computing environment that uses a mix of on-premises, private cloud and third-party, public cloud services.

5 BENIFITS OF CLOUD COMPUTING IN SMBs

Following are the benefits of Cloud Computing on SMBs:

5.1 The gain of Technological Innovation:

Every day, technology witness's further advancement, and much of it happens in the cloud. With this trend in mind, large companies that are into technology have taken cloud as their main focus, while the companies that offer technology services have also integrated everything they offer into the cloud. Various innovative start-ups, which are just enabling and releasing their new applications and new use cases, are establishing them directly in the cloud [4] .

In any way or form it is, be it new ways of customer connection, or collaborating with and within an organization more efficiently, most of these tools are cloud based only [4] . Any business – be it big, medium or small – can afford neglecting the consideration of these technologies that cloud computing brings [11].

5.2 Scalability:

The most important feature for using cloud computing is its Scalability which means if user have a small business or a Startup, it gives a way through which its sees the environment [5] . Means if the service is accessing by a large number of people then it will increase the scalability so that the server doesn't down because of accessing large number of users and they can have a smooth experience, and in the same way if the service is down means it is not on peak or its not on peak hours so it will scale down it. Which means if the service is not accessing by the large number of people, so it doesn't require high resources for it [6]. So, it will scale down the resources, so that there will be no wastage of resources. These resources can be used when required.

5.3 Easy Access to Applications:

Just like in the case of big companies, small companies also want to have their services available 24/7. Cloud provides the ability to have the services available 24/7 and without any interruption [5] .

Now a days, services is being accessed by many devices like PCs, laptops, tablets, Smartphones. So, it must be sure that user accessing from any device or from anywhere must have the seamless experience.

5.4 Ease of Choice:

The rise of cloud computing has given businesses the complete ease of assessing, exploring and of selecting various options. Cloud computing has allowed all companies and organizations the choice of what accounting, messaging, CRM, collaboration apps and so on to use, after the stage of proper assessment and exploring of all the possible options available [3]. This ease of choice even comes at an affordable cost, especially when compared to the regular onsite technology we were restricted to so far.

5.5 Low Cost:

When talk about the small business or a startup, the cost is the main concern and cloud computing is providing the best deal in low cost. The concept of charges in cloud computing lies in the fact that they charge for what services user use for applications and for how many time users are using the services. So, which means if user is not currently using the services so they don't have to pay and this is the best approach for small businesses to grow [3].

5.6 Support and Performance:

Cloud computing service providers promote their deals and offers in a certain way, by highlighting availability, reliability and performance [4] . The features which are usually obtainable from the onsite IT infrastructure and the way this infrastructure is set up for many small businesses have become more and more complex [5]. The required complexity of this onsite IT infrastructure has grown organically, and this has ended up making the whole process very difficult to manage with a clear performance expectation, as long as you stick to traditional onsite IT.

Cloud service providers, instead, give explicit service level agreements regarding stats such as availability, migration, security, host failure, application performance and datacenter uptime [11]. Also, the cloud support they offer is always available, 24 hours of the day, to assist users with any issues they may face.

5.7 Better Collaboration and Remote Work:

It's the advantage of Cloud Computing that team members can work remotely on a single project without any disturbance [3] . They can access, edit and share documents from anywhere, using computers and mobile devices. It saves time and cost of the development process.

Look for cloud-based workflow and file sharing apps that track the progress of work. Some studies suggest that collaboration tools alone may give your firm a productivity increase of up to 40 percent or more.

5.8 Big Data & Analytics:

Whether it's a big Company or a small, they are producing bulk of data every day and the main thing is to arrange and analyze the data. Well, back in years only big companies has Computing power to Analyze this large amount of data. But now, big Data apps abound on the marketplace, giving small businesses to uncover important trends in their business.

5.9 Backup and Disaster Recovery:

Wherever there is a disaster in term of data lost, in house infrastructure requires a lot of time and money to recover from that disaster. Only big companies can survive in this environment, as small companies can't afford to do this. For this reason, small companies like were out of lock if a hard drive failed or data was lost due to power outages.

Cloud Computing comes in the market as it makes backup and disaster recovery very easy because service providers have redundant systems that guard against hardware failure [3].

Similarly, Cloud service providers perform daily backups, so businesses have least chance of cyber-attacks.

6 DISADVANTAGES OF CLOUD COMPUTING IN SMBs

6.1 Access to data:

Application's private data must be accessible by the administrator not by each and every user. If it allows the users to access their data then there is a high chances of data thrifting and can-do DoS attacks, email spam, computerized click extortion.

6.2 Encryption of backups:

Encryption means to fold something in such a way that inside thing can't be seen by the outside world. Encryption of data backups must be done on cloud otherwise there are high chances that hackers can get the backups. Data should be secured over its whole lifecycle.

6.3 Permanent data loss:

Any information destruction or loss can be a permanent harm to the business. Cloud information is liable to an indistinguishable danger from is on premise information, unintentional cancellation by clients or staff of providers, natural loss or damage, or psychological militant assault. It is the cloud supplier's obligation to make preparations for human mistake and to fabricate strong physical server farms.

6.4 Network Connection Dependency:

In order to avail the benefits of Cloud Computing, business should have powerful internet connection. Unfortunately, there is no way to get around this fact. Businesses always need good connection to send and retrieve data to or from Cloud locations. You need a network to be able to use your virtual machines even if you opt for an IaaS, Infrastructure-as-a-Service. If there is a network loss due to any reason, then business can face serious issues [3]. Companies need more bandwidth in order to perform tasks [4]. If a small business can't afford consistent internet connection, speed and bandwidth then it's not good for them to move towards cloud.

6.5 Loss of Control:

Small Businesses don't have control over their data. They are trusting other party to maintain and secure their data with the same care as they would do [4]. They have to trust that Service provider's datacentre are compliant and secured both physically and online [3]. Some find the lack of in-house control of the server unnerving.

6.6 Technical Issues:

If there are technical issues, then businesses have no choice but to call their service provider to fix these issues [3]. Companies are not able to fix these issues in-house, but most of the service providers who provide services to small businesses do not offer around-the-clock technical support.

There is an easy fix to remediate this concern, pick a Hosted Services provider who offers 24/7 support to their clients. But it's not feasible to do especially for small businesses.

6.7 Inflexibility:

When businesses choose the cloud service provider, make sure that their terms and Conditions don't lock companies at some point. Whenever a small or a big company choose cloud vendor then they have to go through all the agreements [3]. There are some conditions like user cannot insert a document created in another application, which may be detrimental to business. Make sure that a chosen vendor gives businesses a chance to add or remove cloud users as per their requirements.

6.8 Cost:

Analysing and checking the cost of using cloud computing in SMBs will be a tricky task. Sometimes its good for SMBs to go with cloud computing as compared to traditional infrastructure [3]. In some cases it may not be cheaper for SMBs to go with Cloud Computing. Small Businesses have to choose which service provider is best for their business, whether they are providing all the features that small business needs or is that some features missing. Small Business also have to look the fee structure of service providers because some cloud providers claim themselves as utility-based providers but in actual they are not. They claim that they charge only for what you use, but it's not the case all the time.

6.9 Security:

Recently there are the news of hacking of cloud-based applications. It may suggest that all the cloud providers are not secure as they claim to be [3]. Whether a small or a large business, can't afford that their company's sensitive data fall victim to hackers [11]. In this situation it has become very difficult for business to know which service provider is more secure.

As the data is on Internet so companies have very low control over their data [3].

This cloud computing disadvantage is more prevalent in SaaS providers than with Hosted providers. As because of the popularity of SaaS providers it gets targeted more and easily as compared to hosted providers.

One way to protect company's private data that there must be user authentication system like user name and passwords, in this way user who have valid user name and password can access the servers.

7 FUTURE SCOPE OF CLOUD COMPUTING IN SMBs

Cloud Computing has become the talk of the town as many enterprises has accepted its advantages. Well, it also has some weak points, but it will not affect any business if handle properly. The fact is that its helping small businesses to grow among the Giants and that's the reason why many small businesses and start-ups are shifting to Cloud [5].

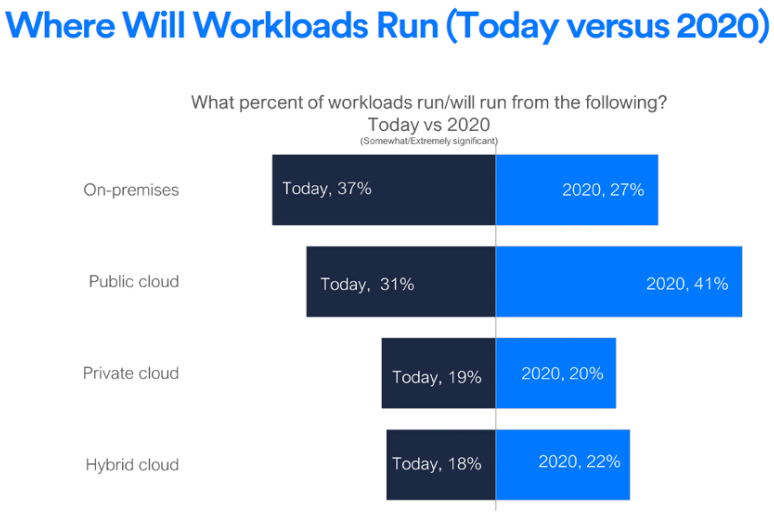

Fig.5. Workloads comparison showing between today's and 2020. Loads of work will move to cloud till 2020.

There is a report that the worldwide market for Cloud Computing is likely to grow at a CAGR of 30% to reach US$ 270 billion through the year 2020.

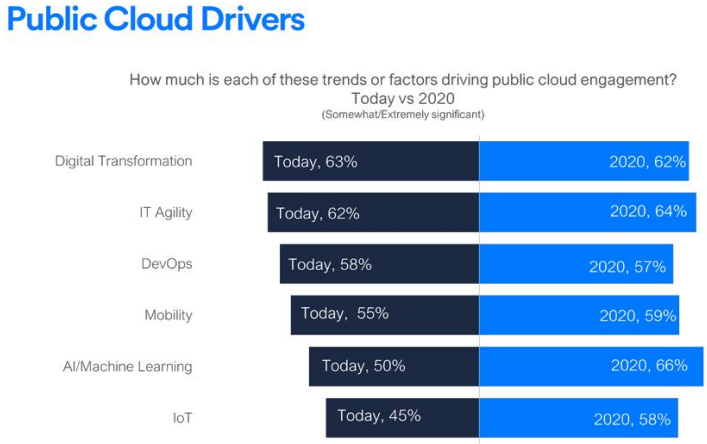

Fig.6. Today's comparison with 2020, showing that how different technologies will move to public cloud engagement till 2020.

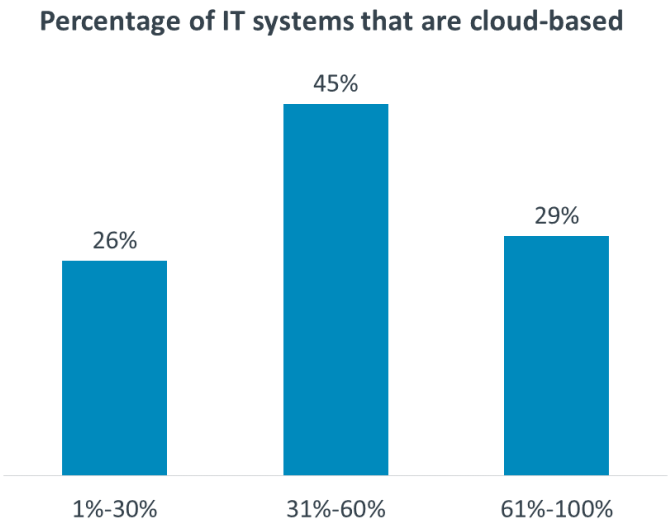

Fig.7. With the passage of time most of the IT systems will be moving towards Cloud.

There is a survey which suggests that 83% Of Enterprise Workloads Will Be In The Cloud By 2020. An additional 20% are predicted to be private-cloud-based followed by another 22% running on hybrid cloud platforms by 2020. On-premise workloads are predicted to shrink from 37% today to 27% of all workloads by 2020.

7.1 Three Trends in the Future of Cloud Computing: What SMBs Should Know:

7.1.1 Cloud as the IT norm:

If any small business has come into the market than it should use Cloud as the IT norm which means if it has to flourish in the future days, then it has to shift towards Cloud. It will be easy to perform operational tasks as cloud benefits small business the most. There will be no other way for small businesses then to move towards cloud.

7.1.2 Software to Service:

Routine backup and disaster recovery is among the future trends of Cloud Computing. Well it is the feature which most of the small to mid-sized businesses are looking for. It is important for businesses to look after all of their personal data without any loss and it is easily done by cloud providers. Software as a Service (SaaS) models have been adopt by large enterprises, cheaper Cloud services are expected to make SaaS and Platform as a Service (PaaS) models accessible to small to mid-sized businesses.

Small and medium-sized businesses will be able to leverage significantly cheaper Cloud services that offer enterprise-level services at a fraction of the cost [10] .

7.1.3 Social platform capabilities are expected to include:

- 101% paperless office environment
- Private, Public and hybrid cloud services
- Accessibility
- Low Cost
- Personalized enterprise file access and security

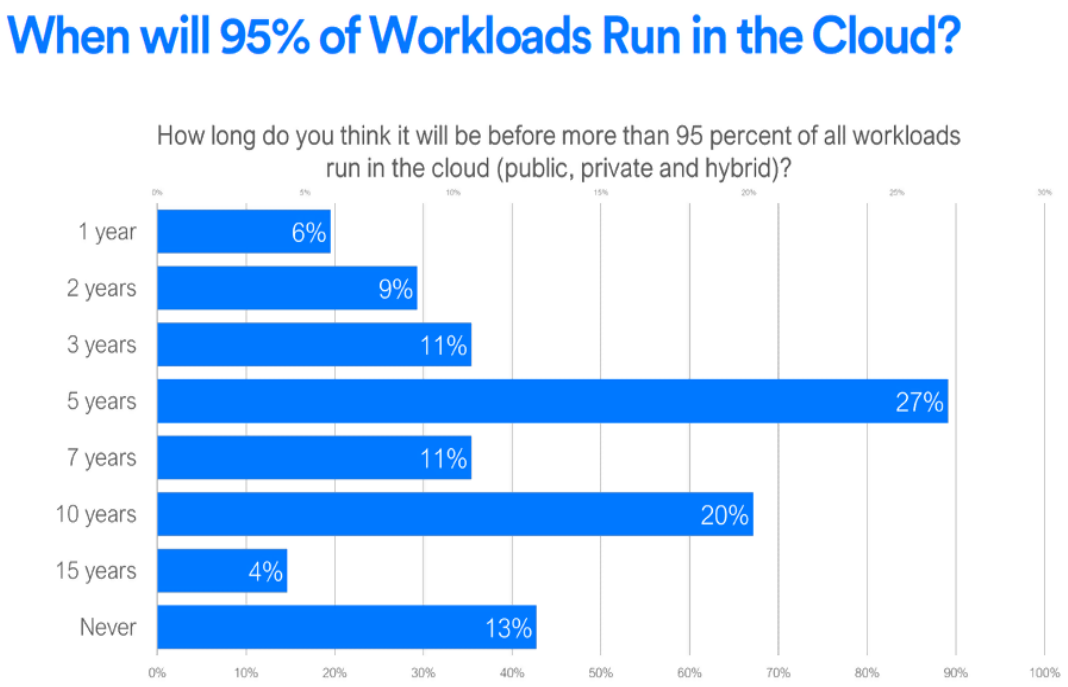

Fig.8. There are high chances that most of the workloads will move to cloud within 5 years.

As suggested in the reports there are chances that 95% of the workloads Run in the Cloud. The future of Cloud Computing will make small businesses to compete in the environment of larger enterprises across all areas of the software life cycle [10].

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