Research Paper on AWS Cloud Infrastructure vs Traditional On-Premise

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ABSTRACT - *This research paper provides the customer with an overview of the advantages of the AWS Cloud over Traditional on premise and introduces the customer to the services that structure the platform. Amazon Web Services (AWS) was launched in March 2006, that was thirteen year ago. Presently as of 2019 statistics, 77 percent of enterprises have a minimum of one application or some of their enterprise computing infrastructure within the cloud. 73 percent of all organizations have a minimum of one application or some of their infrastructure within the cloud. 15 percent of enterprises will adopt cloud apps and platforms within the next twelve months. AWS has over one Million active enterprise customers round the world. AWS offer a whole range of global cloud-based products including computing, data storage, databases, analytics, networking, mobile, developer tools, management tools, Internet of Things, security, and applications: on-demand, available in seconds, with pay-as-you-go evaluation. From data warehousing to deployment tools, directories to content delivery, over 140 AWS services are accessible. New services can be made available quickly, without any direct capital expense. This helps start-ups, small and medium sized businesses, and customers within the public sector to access the building blocks using which they can reply quickly to dynamic business necessities.*

KEYWORDS: Cloud, Data centres, Amazon Web Services, AWS, Capital expense, Cloud computing, Availability Zone, Amazon Region, Infrastructure, Server, on-premise, AWS outpost., public cloud, private cloud.

I. INTRODUCTION

Cloud computing is the on-demand delivery of computing power, information storage, applications, and different IT resources which can be made available through a cloud services platform via the internet with pay-as-you-go pricing.

With cloud computing, the customer doesn't need to provide giant direct investments in hardware and pay loads of time on the work of managing that hardware. Instead, the customer will provision precisely the right sort and size of computing resources they would like to power their newest bright plan or operate their IT department. They can access several resources as they would like, nearly instantly, and solely obtain what they employ. Cloud computing provides an easy way to access servers, storage, databases and a huge set of application services over the internet. A cloud services platform, like AWS, owns and maintains the network connected hardware needed for these application services, whereas the customer provision and use what they would like via an internet application.

In 2006, Amazon Web Services (AWS) began providing IT infrastructure services to businesses within the variety of net services currently normally called cloud computing. One amongst the key advantages of cloud computing is that the chance to switch up-front capital infrastructure expenses with low variable prices that scale along with your business. With the Cloud, businesses no longer need to arrange for and procure servers and different IT infrastructure weeks or months earlier. Instead, they will instantly spin up a whole bunch or thousands of servers in minutes and deliver results quicker. Today, Amazon Web Services provides an extremely reliable, scalable, inexpensive infrastructure platform within the cloud that powers many thousands of companies in 190 countries round the world.

Now let's focus on the other part of this research paper i.e. on-premise data centres, here the customer himself is responsible for the development, deployment, stacking and whole lot of the activities required to maintain the servers. On premise are primarily used to run private clouds, in which the resources are same as that of a public cloud but are kept out of reach for public access. On premise are mostly used by Government agencies and large enterprises who want to keep their critical data private. This data can include biometric scans, salary statements of the employee, or an organization business models and other critical data.

II. ADVANTAGES OF AMAZON WEB SERVICES OVER ON-PREMISE

1.Avoid direct capital expense for variable capital expense:
Instead of having to invest huge amount of money in on-premise, before the customers even knows how they're going to use them. They can pay only when they consume computing resources, and pay only for how much they consume the resources.

2.Gain from massive economies:
By using cloud computing, the customer can achieve a lower variable cost than they can get on their own. Because usage from hundreds of thousands of customers is aggregated in the cloud, providers such as AWS can achieve higher economies of scale, which translates into lower pay as-you-go prices.

3.Stop figuring out the best capacity:
AWS helps eliminate guessing on infrastructure capacity needs. When the customer makes a capacity decision prior to deploying an application, they often end up either sitting on expensive idle resources or dealing with limited capacity. With AWS, the customer can access as much or as little capacity as they need, and scale up and down as required within few moments.

4.Increased speed and increased agility:
In AWS environment, new IT resources are only a click away, which means that the customer can reduce the time to make those resources available to their developers from weeks to just minutes. This results in increase in agility for the customers, since the cost and time it takes to experiment and develop is significantly lower.

5.Less complication to run and maintain data centres:
AWS helps the customer stay focussed on projects that differentiate their business, not the infrastructure. Cloud computing lets them focus on their own customers, rather than doing the heavy lifting of racking, stacking, and powering servers.

6.Deploy your application globally:
AWS also helps deploying the application in multiple regions around the world with just a few clicks. This means the customer can provide lower latency and a better experience for their customers at minimal cost.

III. AMAZON WEB SERVICES CLOUD CONSOLES

AWS consists of many cloud services that the customer can use in combinations modified in accordance with their business or organizational needs. There are major AWS services which are differentiated by category. To access these services, AWS has provided three ways: AWS Management Console, the Command Line Interface, or Software Development Kits (SDKs).

1.AWS Management Console:

"AWS Management Console is a web application which is used for managing Amazon Web Services. AWS Management Console consists of list of various services to choose from. It provides different information related to a particular service and provides the customer with billing details at the end of every month.

This console provides an inbuilt GUI to perform AWS tasks like working with Amazon S3, launching Amazon EC2 instances, setting Amazon CloudWatch alarms, etc."

2.AWS Command Line Interface:
"The AWS Command Line Interface (CLI) is a unified tool to manage AWS services. With just one tool to download and configure, the customer can control multiple AWS services from the command line and automate them through scripts."

3.Software Development Kits:
"AWS Software Development Kits (SDKs) simplify using AWS services in applications with an Application Program Interface (API) tailored to artificial language or platform."

IV. GLOBAL INFRASTRUCTURE

"AWS serves more than one million active customers in over 190 countries." AWS are steadily increasing international infrastructure to assist their customers attain lower latency and better output, and to make sure that their knowledge resides solely within the AWS Region they specify. As the customers grow their businesses, AWS can still offer infrastructure that meets their international necessities.

The AWS Cloud infrastructure is made around AWS Regions and Availability Zones. AN AWS Region is a physical location within the world which has multiple Availability Zones. Availability Zones contains one or a lot of distinct data centres, everyone with redundant power, networking, and properly housed in a separate facility. These Availability Zones give the customer the power to work production applications and databases that are a lot of extremely available, fault tolerant, and be doable from one data centre.

"The AWS Cloud operates in over 60 Availability Zones among over 20 geographic Regions round the world, with declared plans for a lot of Availability Zones and Regions." Every region is intended to be fully isolated from other

Regions. This achieves the best doable fault tolerance and stability. Every Availability Zone is isolated; however, the Availability Zones in a Region are connected through low-latency links. AWS provides the customer with the flexibleness to put instances and store data among multiple geographic regions similarly as across multiple Availability Zones among every AWS Region. Every Availability Zone is intended as an independent failure zone. This suggests that Availability Zones are physically separated among a typical metropolitan region and are set in lower risk flood plains. Additionally, to distinct Uninterruptable Power Supply (UPS) and onsite backup generation facilities, they're fed via totally different electricity grids from independent utilities to avoid single points of failure.

V. LIMITATION OF AWS CLOUD

As with any other solution, AWS cannot go without certain limitations that can make customers decide on competitive cloud platforms. They are the following:

1. Difficult Service Implementation:

Most of the AWS services not only provide businesses with advanced capabilities but also require expertise for their implementation and support. Also, it demands companies to be well-versed with service updates and innovations. This makes it is tough on the technology-enabled companies and AWS partners, also different services providers. However, there is also a bright side: customers can be assured that these managed service providers apply AWS technologies properly, as they have already earned this status.

2. Off-radar updates and modernization:

AWS are used to update their services in the background so that the general audience is in the dark about it, which is why significant modifications may go unnoticed.

3. Less cooperation with open-source communities:

AWS has been developing an increasing number of open-source solutions, while also not providing enough support to open-source communities. However, recently they have started to apply the opposite approach.

4. Quite a high price:

The price may not be as reasonable as it appears. The creation of a custom solution that meets all specific requirements may cost a bundle.

5. Database compatibility issues:

Amazon's Aurora, Redshift and Dynamo DB are compatible only with AWS.

VI. WHAT ARE ON-PREMISE DATA CENTRES?

On-premise data centres are located at the customer site, where the customer is completely responsible for the racking and stacking of servers, patching and deployment of applications, and all the other activities including maintenance. These on-premise data centres are virtualised the same way as the public clouds. The customer has to pay for the servers, the software's to run the servers, the cost to run the servers 24/7 and maintain them.

VII. ADVANTAGES OF ON-PREMISE DATA CENTRES

•Total cost of ownership: -
Since the customer is only paying the licensing fees once, it has a lower TCO than cloud systems

•Complete control: -
The customer has complete control over the data, software and applications, also the customer decides the configurations, updates and any changes in the system.
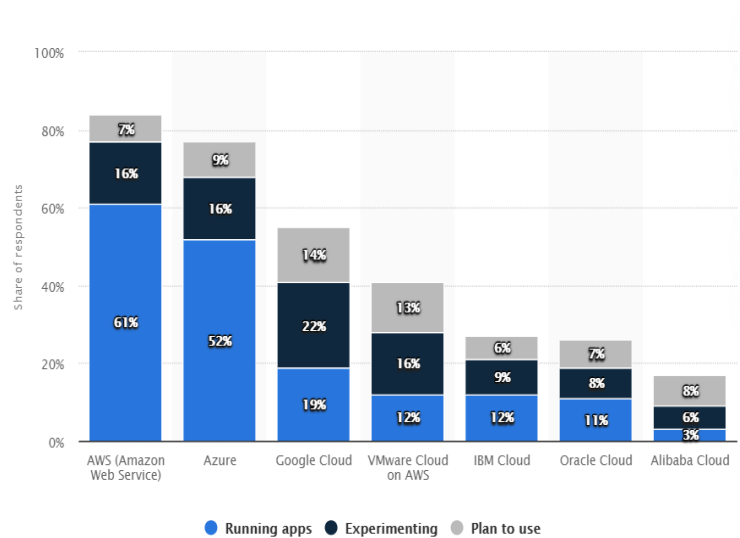
•Uptime: -
Since the servers are on-premise, the customer do not have to rely on the internet connectivity or any external factors to access the software's.

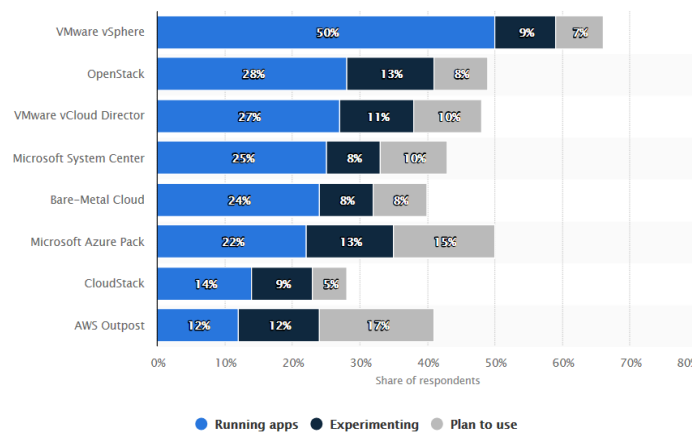## VIII. DRAWBACKS OF ON-PREMISE DATA CENTRES

•Large capital expenditures-The customer has to provide huge upfront capital expenditures in order to purchase, support, upgrade and maintain servers.

•Maintenance Responsibility-The customer has to take full responsibility for the management of server, scheduling backups, storage and disaster recovery methods. For small size businesses and start-ups this can be a issue as they have limited budgets.

•More implementation time- Setting up the on premise takes more time as each server takes more time for installation.

•Less Services- On premise won't run as efficiently as AWS Cloud because the latter has more services to make the process more efficient.

IX. FIGURES AND SURVEY RESULTS

1."Current and planned usage of public cloud platform services running applications worldwide as of 2019"
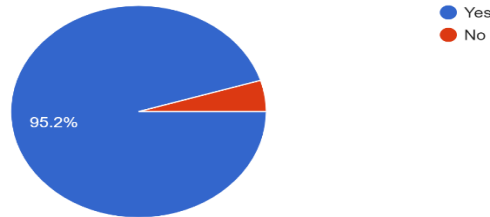

2."Current and planned usage of private cloud platform services running applications worldwide 2019"

3. Public awareness with Cloud Computing is 95.2%

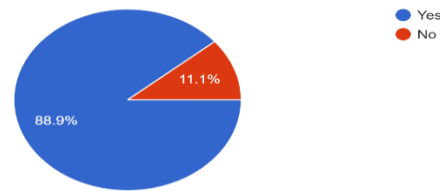**Are you familiar with cloud computing?**
63 responses

4. Public awareness with AWS cloud technology is 89%

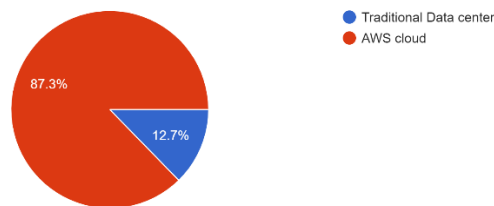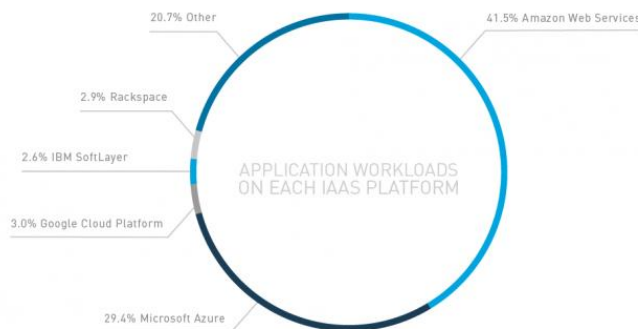**Are you aware about AWS Cloud technology?**
63 responses

5. 87.3% of the developers would choose AWS cloud over on-premise for their applications

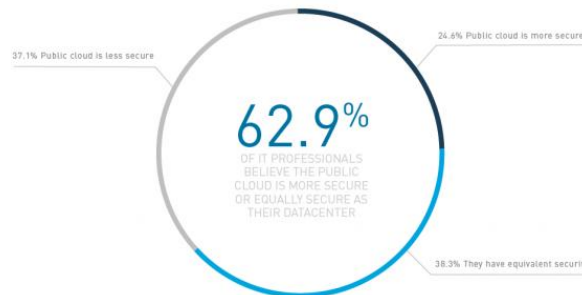**Would you choose traditional data centers or AWS cloud for your application?**
63 responses

6. AWS dominates 41.3% of the public cloud market

7. Despite security concerns, the overall confidence is 62.9% in Public cloud

X. CONCLUSION

The major outcome of this research was to change the customer's perspective of AWS Cloud and give more information on why it should be preferred over on premise. This research is important for start-ups and small/medium sized companies. As any other technology, AWS cloud has its own limitations. But recently AWS Cloud has started sharing their resources with open source communities so that the issues can be found and resolved quickly to provide more efficient user experience. But as provided in the research paper, AWS cloud has more significant advantages over traditional data centres. However, a hybrid cloud storage strategy can be adapted to provide better solutions to organization. If the customer still requires the its data on on-premise but with AWS Tools and services, it is recommended to use AWS Outpost to manage those servers and create a hybrid environment. AWS Outpost can help run these servers efficiently and can help the customer to avoid unnecessary costs. This research paper can help start-ups, small/medium sized companies to choose a better environment for their infrastructure with the size of their budgets.

ACKNOWLEDGEMENT

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