Cloud Computing Using AWS : An Analysis

** Prashansa Sinha*

Abstract

Cloud computing has become a driving innovation, it has become so popular and successful that everyone is stepping ahead towards Cloud. Today Cloud computing is the foremost demand of companies as it benefits their growth. With Cloud computing, new businesses witnessed immense success by locating their services and data on the internet without depending on any of physical operations. This independency and trend have inspired many eminent companies such as Netflix, Salesforce, and Amazon to move towards Cloud-based infrastructure. Cloud computing also refers to a set of policies, technologies and controls used to protect data, applications, and infrastructure. There is a wide range of Cloud service providing companies and platforms in which Amazon Web Services (AWS) and Microsoft Azure are regarded as the leading Infrastructure as a Service (IaaS) Cloud. In this paper, AWS and Microsoft Azure are compared and points why AWS is at peak or better than others are highlighted. The aim of this paper is to present an insightful description of Cloud computing, its characteristics, and Cloud computing models. This paper also describes various AWS services and shows its uniqueness by comparing it with other Clouds. It also explores certain benefits of Cloud computing using AWS over traditional IT service environments including how it is helping education industry to evolve and how it is transforming our lifestyle for better and easy access to things. This article gives an overview of the benefits of AWS.

Keywords : **Amazon AWS, AWS services, Azure, characteristics of cloud computing, cloud computing model, e-Learning**

I. INTRODUCTION

Today we are at the sting of a fourth technological revolution that may fundamentally change the way we live, work, and relate to atleast one another, and these changes are going to be those which we humans have not experienced before. The number of individuals connected by mobile devices, with processing power, storage capacity, and access to knowledge, are unlimited and these numbers keep increasing because technology keeps changing in fields like computer science, Internet of Things, 3-D printing, cloud computing and plenty more. This paper aims to place forward Cloud computing technology and one amongst the cloud platform AWS, how we are using it for further development and changes. The IT world is looking forward to the services provided by cloud computing thus boosting it. Cloud computing is changing our lifestyle, that is, how we play, learn, and live. There are many life-changing applications out there that run on the Cloud, and that we use them in our daily lives but are not aware of them. Nowadays, Cloud-powered entertainment is emerging on the internet. It is a powerful weapon of entrepreneurs of today's generation to start their start-ups. Gone are the days when one had to be available for watching one's favourite shows. Cloud technology has given you control of how, where and when you watch T.V., and due to streaming services and portable devices like laptops, tablets, and smartphones, it is possible to look at any T.V. show anywhere within the world as long you are connected to the internet, for example, on Netflix. Same is the case with other entertainment options like music streaming apps and games. These things are on the Cloud and are not costly. Broad network access is the key characteristics of the Cloud technology which permits learners around the world access to online learning platforms from anywhere, anytime using various devices to find out at their own pace. The adoption of Cloud technology within the

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* P. Sinha is Student at Balaji Institute of Management and Human Resource Development, S.No. 55/2-7, Tathawade, Off Mumbai-Bangalore Bypass, Pune, Maharashtra – 411 033. (Email : prashi.sinha917@gmail.com)

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academic environment has the capacity of offering new opportunities for improvement and innovation for gaining knowledge. This is currently in high demand because of the pandemic situation, it is also helping students relate to their studies. This also opens the trail for newcomers within the market to grow, as there are people who are attempting to style the varsity within the Cloud, a learning lab in India, where children can explore and learn from one another using resources and mentoring from the Cloud. In this manner Cloud technology will transform education/learning process of India. There has been a significant shift in how people interact with one another with these Cloud-based communication platforms. The pioneer within the Infrastructure as a Service (IaaS) market - Amazon Web Services (AWS), its innovation has helped companies create new possibilities to create your lives easier in this con nected world. Before the introduction of AWS within the market, there had been some issues in Cloud computing which are resolved with the evolution of AWS. There is a wide range of platforms providing Cloud services. AWS is at a peak as compared to other companies, and its biggest competitor is Microsoft Azure. Both companies are global titans and popular but the question is which of the two is better or why people prefer AWS over Azure? Therefore, it is important to observe the services offered by the two firms.

II. RESEARCH PROBLEM

The research problem identified while exploring the available literature is that there is a lack of empirical studies on the concepts of Cloud computing and Cloud service providers as well as factors which play a major role in choosing Cloud services. There is no such study on how Cloud computing is influencing our daily lives. Moreover, most of the research is based on old concepts of early researchers and existing research is also based on these. No new factors have been involved in these researches. There are no accurate answers for :

(1) The era is coming when upcoming movies will release on online platforms instead of theaters.

(2) Transformation in education sector in India using technologies provided by Cloud computing.

(3) Why companies are moving to Cloud services.

(4) No research particularly mentions how Cloud computing is becoming a big asset for entrepreneurs.

These concepts cannot be studied in a laboratory setup as they require both qualitative and quantitative inferences to arrive at accurate conclusions. Therefore, a deliberate investigation is required to be carried to understand how AWS as Cloud service provider is evolving Cloud computing and Cloud technology is making changes to our lifestyle.

III. RESEARCH OBJECTIVES

The main objective of this research paper is to get an overview of Cloud computing and understand why AWS is better for Cloud computing and what changes or innovations it can bring to our lifestyle in different ways.

IV. LITERATURE REVIEW

A. Cloud Computing Emergence and Definition

Cloud computing originated in late 2007 and it is an important and hot topic of dialogue nowadays. Cloud computing is the on-demand delivery of computing power, database storage, applications, and other IT resources through a Cloud services platform via the internet with a system of meeting costs as they arise [5].

National Institute of Science and Technology defined Cloud Computing as "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) which will be rapidly provisioned and released with minimal management effort or service provider interaction" [7].

B. Benefits of Cloud

Cloud has virtual servers, virtualization software and data centres. Virtualization software allows multiple operating systems on a single hardware to run. Data centres have actual servers which are provided to users as virtual servers using virtualization software. Cloud consists of many data centres. A data centre consists of thousands of servers. In a real-world, organization invest in building storage solution and in buying servers kills plenty of time and needs an outsized investment of capital for an organization but this can be avoided by using Cloud [3].

C. Emergence of AWS and Its Upperhand

Since 2006, the year it was introduced, Amazon Web Services (AWS) is completing 14 years. Some may say that it is old and outdated, while others would say that Amazon took that point to create a superb advantage over its competition and leading on it. One among those competitors is Microsoft Azure which was introduced in 2010, but by this time Amazon already had a powerful lead in providing Cloud services, whereas, Microsoft had been building its Infrastructure as a Service (IaaS) at that point [6].

D. AWS and Its Benefits

Amazon Web Services (AWS) is a public Cloud service provider. It has over 50 services, greater than other cloud providing companies. AWS provides all three service models : SaaS (Software as a Service), IaaS (Infrastructure as a Service), and PaaS (Platform as a Service). AWS encompasses a broad range of computing, storage, database, analytics, application, and deployment services delivered as a utility: on-demand, available in seconds, helping organisations move faster to lower IT costs and enabling them to scale applications [3].

Amazon Web Services (AWS) can be a global public Cloud provider, it must have a world network of infrastructure to run and manage its many growing Cloud services that support customers around the world. Amazon Web Services (AWS) is incredibly useful because it saves time, flexible, reliable, secure, and cost-effective. AWS can be a technology which resolves all computing-related issues. Using AWS, you need not worry about maintaining data centres because here everything is managed by AWS [4].

E. Changes in Daily Life Because of Cloud Computing and AWS

In 2012, cloud-based educational platforms or MOOCs (Massive Open Online Courses) have taken the globe by storm. MOOC providers like Course Era and other e-learning apps are dedicated to remodelling online education using Cloud technology [1]. Cloud technology, and Internet of Things (IoT) are enabling people to get flexible, secure, and cost-effective technology to facilitate data storage and scale new services for local consumption.

F. Security is Top Priority

Cloud storage is a system of dispersed data centres that utilize virtualization technology and supply interface for data storage. Providing implicit storage security to online data is more beneficial in Cloud computing. The utilisation of a knowledge partitioning scheme for implementing such security involves different methods as per necessity whichever is healthier. In this scheme data is partitioned in a simple way so that every portion is secure and is not encrypted. These portions are stored on different servers on the network which are known only to the user. Reconstruction of the information requires access to every server and the knowledge on which servers the data portions are stored [2].

V. RESEARCH GAP

Despite plenty of researches on Cloud computing and AWS, there is no full fledge research on concepts of Cloud computing and Cloud service providers as well as factors which play a major role in choosing any Cloud service. Most research paper are on old concepts of Cloud computing but no one particularly mentions how Cloud computing is influencing our daily lives. Also, there was an absence of descriptive analysis on an overview of AWS and changes brought by Cloud computing.

There was a lack of research study on how transformations are brought about by Cloud computing technology in the field of education and entertainment sector and how Cloud technology is becoming an opportunity for entrepreneurs to grow.

VI. RESEARCH METHODOLOGY

Method of Data Collection

(1) Modes of Data Collection: Primary data were collected through questionnaire which was circulated among students, IT professionals, and entrepreneurs.

(2) Sample Size : The questionnaire was circulated among 250 people out of which 206 persons responded to it. Hence, the sample size was 206.

(3) Sampling Method: Cluster sampling:- Cluster sampling (also known as one-stage cluster sampling) was used for this research. It is a probability sampling

technique in which the researcher creates multiple clusters of people from a population where they are indicative of homogeneous characteristics and have an equal chance of being a part of the sample.

VII. HYPOTHESES

S. No.	Hypothesis
1.	H_{o1} : There is no significant relationship between interest in Cloud and using Cloud services.
	H_{a1} : There is a significant relationship between interest in Cloud and using Cloud services.
2.	H_{o2} : Cloud based platforms don't have impact on entrepreneurs in entertainment sector.
	H_{a2} : Cloud based platforms have an impact on entrepreneurs in entertainment sector.
3.	H_{o3} : Cloud based platforms don't have significant effect on transforming and growing online education.
	H_{a3} : Cloud based platforms have significant effect on transforming and growing online education.

VIII. DATA ANALYSIS

TABLE I.

RELIABILITY TEST

Reliability Statistics		
Cronbach's Alpha	**Cronbach's Alpha Based on Standardized Items**	***N* of Items**
0.795	0.780	6

Interpretation

The questionnaire is based on a Likert scale of 1 to 5. The questionnaire also consisted of multi-nominal questions for which the responses were Yes, No, and Maybe.

To test the reliability of the questionnaire, Cronbach's Alpha was used.

The coefficient of Cronbach Alpha (α) is 0.795, which shows that the questionnaire has high internal consistency. Therefore, the data is said to be reliable.

Descriptive Data Analysis

Interpretation

From Table II it is evident that 47.6% companies use

TABLE II.

FREQUENCY TABLE FOR PERCENTAGE ANALYSIS

Does your Company use any Cloud Platform Services for Storing Data

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	98	47.6	64.1	64.1
	No	28	13.6	18.3	82.4
	Maybe	27	13.1	17.6	100.0
	Total	153	74.3	100.0	
Missing	System	53	25.7		
Total		206	100.0		

Cloud services, that is, companies are preferring Cloud services for storing their data as Cloud is more secure.

Hypothesis Testing

Hypothesis 1 :

Test Applied : Here, Chi-square was used for testing the hypothesis.

- **H_{01} :** There is no significant relationship between interest in Cloud and using Cloud services.
- **H_{a1} :** There is a significant relationship between interest in Cloud and using Cloud services.

Chi-square Test : Chi-square test of independence determines whether there is an association between categorical variables (that is, whether the variables are independent or related). It is a nonparametric test. So, to identify which test is to be applied for testing the hypothesis, a normality test was used which indicated whether Parametric test or Non-Parametric test was to be applied.

Significance value is less than 0.05 which means data is not normally distributed, hence non-parametric test of Chi square was applied.

Interpretation

Since Pearson Chi Square is less than 0.05, the null hypothesis is rejected. There is a relationship between people having interest in Cloud and using Cloud services. Therefore, H_{a1} is accepted that there is a relationship between these two variables.

TABLE III.

NORMALITY TEST PERFORMED WITH SPSS

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	[Cost]	Statistic	*df*	Sig.	Statistic	*df*	Sig.
Transformation in e-learning through Cloud	Highly Preferred	0.394	50	0.000	0.668	50	0.000
	2	0.328	44	0.000	0.709	44	0.000
	3	0.262	50	0.000	0.792	50	0.000
	4	0.365	39	0.000	0.707	39	0.000
	Least Preferred	0.291	23	0.000	0.744	23	0.000

a. Lilliefors Significance Correction

TABLE IV.

CHI SQUARE TEST

Chi-Square Tests

	Value	*df*	Asymptotic Significance (2-sided)
Pearson Chi-Square	19.965[a]	4	0.001
Likelihood Ratio	20.125	4	0.000
Linear-by-Linear Association	0.089	1	0.766
N of Valid Cases	206		

a. 2 cells (22.2%) have expected count less than 5. The minimum expected count is 3.64.

Hypothesis 2

↳ **H_{02} :** Cloud based platform doesn't have an impact on entrepreneurs in the entertainment sector.

↳ **H_{a2} :** Cloud based platform has an impact on entrepreneurs in the entertainment sector.

Interpretation

TABLE V.

FREQUENCIES TABLE FOR ONLINE PLATFORMS USED BY RESPONDENTS IN ENTERTAINMENT SECTOR

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Don't Use Any	7	3.4	3.4	3.4
	0-3	144	69.9	69.9	73.3
	4-6	49	23.8	23.8	97.1
	6+	6	2.9	2.9	100.0
	Total	206	100.0	100.0	

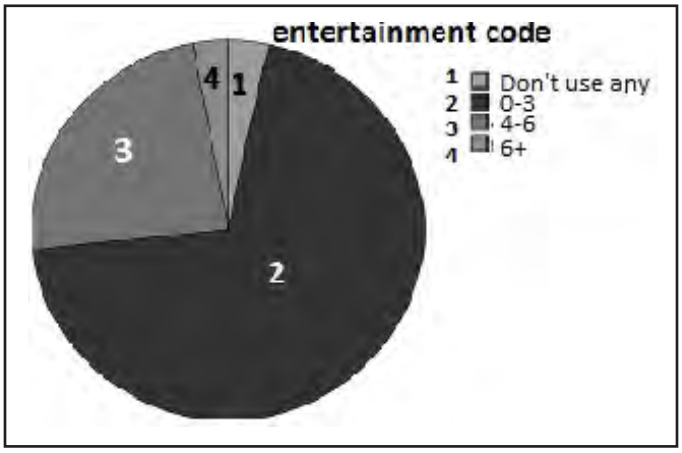

Fig. 1. Pie Chart Showing the Number of Online Platforms Used by Respondents

It can be seen from Table V that there are seven respondents who didn't own any OTT (Over-the-Top) platform and the rest owned it. So, it is evident that people are now moving towards online platforms for entertainment.

Observations

From the analysis of usage of entertainment platform, it is evident that people are using Cloud-based platforms for their entertainment (movies/music etc.) more than visiting the theatre and this will help entrepreneurs grow.
H_{02} is rejected and the alternate H_{a2} is accepted.

Hypothesis 3

↳ **H_{03} :** Cloud based platforms don't have a significant effect on transforming and growing online education.

↳ **H_{a3} :** Cloud based platforms have a significant effect on transforming and growing online education.

TABLE VI.

FREQUENCY TABLE ON IS E-LEARNING HELPFUL

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Yes	170	82.5	82.5	82.5
	No	5	2.4	2.4	85.0
	Maybe	31	15.0	15.0	100.0
	Total	206	100.0	100.0	

TABLE VII.

FREQUENCY TABLE ON OPINION OF TRANSFORMATION IN E-LEARNING THROUGH CLOUD

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Strongly Disagree	12	5.8	5.8	5.8
	Disagree	7	3.4	3.4	9.2
	Neutral	32	15.5	15.5	24.8
	Strongly Agree	38	18.4	18.4	43.2
	Agree	117	56.8	56.8	100.0
	Total	206	100.0	100.0	

TABLE VIII.

FREQUENCY TABLES FOR QUALITIES THAT ATTRACTS MORE TO AN INDIVIDUAL WHILE SELECTING CLOUD SERVICE

[Cost]

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Highly Preferred	50	24.3	24.3	24.3
	2	44	21.4	21.4	45.6
	3	50	24.3	24.3	69.9
	4	39	18.9	18.9	88.8
	Least Preferred	23	11.2	11.2	100.0
	Total	206	100.0	100.0	

TABLE IX.

GLOBAL NETWORK AND SECURITY

[Global Network]

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Highly Preferred	47	22.8	22.8	22.8
	2	51	24.8	24.8	47.6
	3	43	20.9	20.9	68.4
	4	36	17.5	17.5	85.9
	Least Preferred	29	14.1	14.1	100.0
	Total	206	100.0	100.0	

[Security]

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Highly Preferred	59	28.6	28.6	28.6
	2	36	17.5	17.5	46.1
	3	49	23.8	23.8	69.9
	4	39	18.9	18.9	88.8
	Least Preferred	23	11.2	11.2	100.0
	Total	206	100.0	100.0	

Interpretation

From Table VII it is evident that out of 206 respondents, 170 think that e-learning is helpful and from the second table of transformation in e-learning through Cloud it is evident that a total of 155 people agree with (which includes *strongly agree* as well as *agree*) statements of transformation in e-learning, so it implies that out of 170 respondents 155 respondents, that is, 91.1% of the people agree that Cloud platforms used for delivering education or learning are transforming the education sector. It is also helping in learning through different innovative technologies. So, this will help entrepreneurs as they will get motivated to develop more such technologies and provide services in that sector with new benefits to respondents.

H_{03} is rejected and the alternate hypothesis $H_{a3}$is accepted, that is, Cloud based platforms have significant effect on transforming and growing online education.

From Table VIII we can see that some people have high preference for cost and some are neutral to it while selecting a Cloud service.

Interpretation

From Table IX we can see that security is the most

TABLE X.

EASY TO USE

[Easy to Use]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Highly Preferred	49	23.8	23.8	23.8
	2	38	18.4	18.4	42.2
	3	35	17.0	17.0	59.2
	4	52	25.2	25.2	84.5
	Least Preferred	32	15.5	15.5	100.0
	Total	206	100.0	100.0	

important quality for respondents while selecting Cloud services as we have to share some private information for accessing Cloud services.

Interpretation

From Table X we can see that people choose/prefer services which are easy to handle as everyone can't understand software technicalities.

Interpretation

It can see be seen from Table XI that respondents are now more concerned with jobs, hence they prefer to do courses or use those service providers which later on consider them while they look for jobs as some companies want people who have some prior knowledge of AWS.

TABLE XI.

FUTURE JOB ROLES

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Highly Preferred	59	28.6	28.6	28.6
	2	37	18.0	18.0	46.6
	3	38	18.4	18.4	65.0
	4	30	14.6	14.6	79.6
	Least Preferred	42	20.4	20.4	100.0
	Total	206	100.0	100.0	

TABLE XII.

FREQUENCY TABLE FOR CLOUD SERVICE PROVIDERS

Amazon Web Services

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	0	58	28.2	28.2	28.2
	1	148	71.8	71.8	100.0
	Total	206	100.0	100.0	

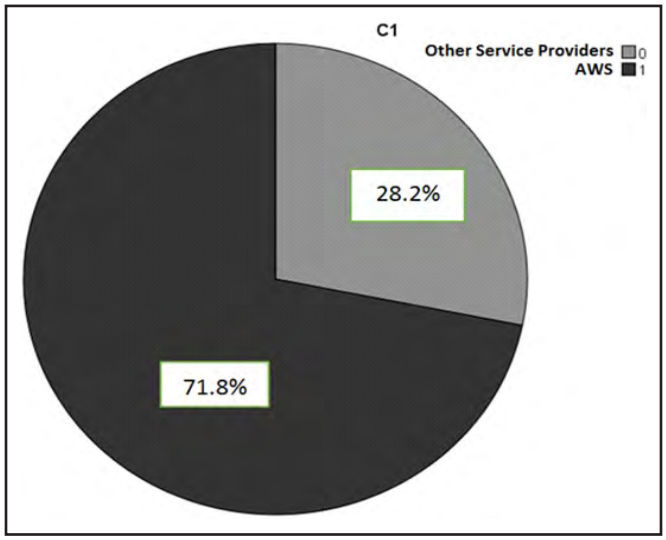

Fig. 2. Pie Chart Showing the Preference of Respondents in Choosing Cloud Service Provider

Objective : To prove AWS is most widely used cloud service provider.

Interpretation

Here 0 is for other service providers and 1 is for AWS. It is evident that from all the 206 respondents 148 selected AWS over any other Cloud provider. Hence, we can say that it is the most preferred Cloud service provider.

IX. FINDINGS

(1) People nowadays are more interested and aware about Cloud technology and are also using it on a daily basis, even some people use it they are not aware that it works on Cloud technology.

(2) People are moving towards cloud platform (OTT) for entertainment on a large scale which makes entrepreneurs invest more in it.

(3) E-learning is helpful for today's generation as well as new transformations /innovations are required for more development.

(4) New technologies in e-learning are a great opportunity for entrepreneurs to grow and lead.

(5) It was observed that global network and security are the most preferred choices of respondents for selecting a Cloud service provider.

(6) It was also observed that IT companies are demanding and applying Cloud services in their system.

(7) Among all the Cloud service providers available in the market it was observed that AWS is the most preferred and used one.

X. RECOMMENDATIONS

Cloud computing is becoming more important than ever and this as technology will not only give organizations competitive advantage but will also shape the future of the world. We can't turn our eyes from the fact that Cloud computing will be the future of the world and also businesses. Thus, organizations have to adapt themselves in new ways.

Key recommendations developed from this study are :

(1) More technologies to bring with the help of Cloud computing to ease our life and to contribute to the development of the country.

(2) Other Cloud service providers should also be studied and should be compared with AWS.

(3) Since global network is very important for Cloud technology, services/technologies which are easily accessed globally should be encouraged.

(4) There should be some services/technologies or any platform which can help parents to understand the technicalities of e-learning platforms so that they can help their child with better understanding as well as can put their views to it.

(5) Some technologies should be developed using Cloud technology which are related to social causes and environmental issues.

XI. LIMITATIONS

The limitations of this study are :

- Cloud computing is a wide topic. It was extremely difficult to cover all the aspects in such a short period of time.

- The research was focused on students, IT professionals, and entrepreneurs, but due to the pandemic it was not possible to do unbiased research due to limited resources.

- Studying Cloud computing using AWS technologies as a whole was difficult due to the study was confined to only education and entertainment sector and also how Cloud technology is helping entrepreneurs grow in these sectors which made this study less ideal for generalisation. In future, research can be conducted in various different sectors to make it more generalised.

- This study is based on an online questionnaire due to which the data can be less valid and reliable. No proper insights could be found on various aspects.

XII. CONCLUSION

Cloud computing is changing the world for the better and making a huge impact in everyone's lives in many ways. Here, recent approaches and progress of cloud computing, AWS, and enabling technologies have been discussed. In this era of technology and intelligence everyone wants to run business with high profits at minimal investment, that is, less input and maximum output. So, companies are implementing it in their system to become financially strong. If we calculate or compare different Cloud services, then AWS has many services which are not possessed by others and it is the most used. It can help entrepreneurs grow by giving new platforms or technologies for the society whose roots are Cloud computing as in the near future everything will be on Cloud. This paper can be considered as a starting point for identifying opportunities for future.

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About the Author

Prashansa Sinha is M.B.A. student at Balaji Institute of Management and Human Resource Development.