A Critical Appraisal of Cloud Computing Technologies for Banking

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***Abstract*—**
*In coming years cloud computing is expected to become one of the most important inventions of the era. Cloud computing can offer banking sector a number of advantages like enhanced data processing capability, cost saving, agility of information technology and reduced risk of information technology. To further facilitate the implementation of cloud computing in banking, banks must consider the issues related to data confidentiality, security, regulatory compliance, quality of service and technical standards. With the help of cloud computing many services like storing, managing and accessing the information has become easier for both the bankers and the consumers. Cloud computing should be applied gradually from the minor business to the core business for better stability and unvarying expansion. In this paper cloud computing in banking sector has been examined with respect to its scope, advantages, disadvantages, applications and its comparison with traditional banking. Finally, this paper concludes that cloud computing is competent to provide the banking sector a more efficient and effortless working environment with promising future prospects***.**

Keywords— *Cloud computing, modern banking, use of cloud computing, Cloud computing in banking, Financial Services***.**

I. INTRODUCTION

In this fast-developing world of advanced technology and sciences, cloud computing has become a crucial aspect of the new generation of IT change. Cloud computing provides us the capability to use IT infrastructure and services that are not installed on any community server or computer. To make connections with external computers or servers for appropriate resources by using networks like internet or intranet (Poelker,2003). The general interest in cloud as a computing style is increasing an it is able to influence each and every sector undoubtedly.

Most financial services IT leaders believe that provided taking the appropriate precautions cloud computing will play a major role in the evolution and growth of the banking sector. Still, banks have been sluggish in acquiring the cloud approach as there are worries regarding lack of control and environment spread out which may lead to security risks and management issues (Dr M. Parameswari,2018). Banking need to take financial innovations and safe place to conduct transactions (Dongol, 2021). Commercial banks also have to their financial risk disclosure which helps them to improve the performance (Debele, 2021) Banks work in a complex environment, as a result the need for data storage and processing power is increasing constantly. Real estate and human resources for data centre management come with a huge cost. Putting the data centre in cloud provides banks cost efficiencies, enables speed to market and helps in delivering quality services to customers.

Cloud computing provides banks with extensibility and the ability to handle expansions and contractions of processing power requirements. With cloud, banks no longer have to worry about managing infrastructure and upgrading operating systems as the cloud provider takes care of that. Cloud computing make the banks competent to emphasise on its core competencies rather than focusing data management.

In this paper we will also be taking a look at how cloud banking is different from traditional banking and how different aspects of working changes with the use of cloud banking. In order to make full use of cloud's advantages banks must take care of itsdrawbacks and contemplate issues related to data security and quality of working standards for better results.

FEATURES OF CLOUD COMPUTING

A non- regulatory agency of the US Department of commerce (NIST), defines cloud computing as: a model for allowing omni present, suitable and on demand network access to a shared pool of customized computing resources which can be quickly provisioned and released with minimum effort of management and the service providers (NIST,2011),

Cloud Computing is becoming new revolutionized concept in this era of modern technology. It is becoming easier for companies to maximize the potential benefits of cloud computing services as

they are maturing in both technological and commercial ways (Novkovic,2017). It is the most economical and feasible system. It facilitates data security and it automatically installs and configures the cloud computing services; all these characteristics makes cloud computing as one of the hottest topics in today's computerized world. Here are characteristics of Cloud Computing which makes it one of the fastest growing technologies at present:

(I) RESOURCE POOLING:

In this the services of the providers are pooled together so that it can serve various tenants at once making it a multiple tenant-model. In this tenant (customer) has no access over the exact location of resources but may be able to find the top tier notion like country, state etc. It accumulates all IT resource pools and share all these resource pools in such a way that it indubitably ensures that they are all synchronized.

(II) SCALIBILITY AND ON-DEMAND SELF SERVICE:

On-demand self-service refers to the assistance provided by cloud computing vendors for tenants (users or customers) on demand. It gives the client the control to constantly monitor the data, allotted network storage and server uptime (Upadhyaya,2020). In this service, the user can authorize cloud services through an online portal. Self Service means that the users should accomplish all the activities required to obtain the service by themselves. The consumer's request is instantly perceived by cloud infrastructure, without intervention of human intelligence on the provider's side. It is a key feature of cloud computing where users or customers can range the requisite structure up to a significant level without interrupting the anchor operations. With this user can keep a track on computing capabilities, server reliability and network storage. Scalability has the potential of a process, software, web or device to grow and manage increased demands.

(III) MEASURED SERVICE:

Measuring and reporting service is one of key characteristics of cloud computing. It is helpful and informative for both cloud providers and their customers. It gives a leverage hand to both the provider and customer to keep a track on what services have been utilized and for what purpose. It also facilitates the optimum utilization of resources by leveraging charge per use of capabilities, providing transparency to both the provider and customer. It means that the source storage, whether virtual server or physical server storage in the cloud computing is controlled and proclaimed by cloud service provider. The cost model is based on the billing per usage of resources. The measurement service is also utilized by cloud service provider to ascertain how to best assign its physical computing services and activities to its customers and clients to fulfil the need of Service Level Agreement commitments and cut down its cost of providing sources and services and to amplify its margin and competitiveness. Specific features of the service-quality, accessibility, authorities and responsibilities- are seen eye to eye between the service user and the service provider(Kearney,2011).

(IV) LARGE NETWORK ACCESS AND ECONOMICAL:

Its main characteristics are its pervasiveness and iniquitousness. Cloud computing resources are available over internet and can be accessed and utilized by variegated customer platforms. The user or customer can access the cloud data or transfer the data to the cloud from any place in the world with just help of a device and internet connection. These capacities are pervasive in nature. This competent feature of cloud computing covers a wide range of diversified customers and users. Cloud providers safeguard the wide network access by monitoring and ensuring various configurations of storage that reflects how customers consume the cloud resources and data: latency, access time, data throughput etc. Cloud Computing is economical and feasible as it saves money of the organization and it enables to cut down the expenditure of IT department. In Cloud Computing the user or customer has to pay to the administration for the cloud computing source or space they have consumed. There are no overhead charges that they have to pay besides this. The organization does not have to spend additional charges on the maintenance of servers as the servers are effortlessly maintained and the downtime remains low or sometimes zero.

APPLICATION OF CLOUD COMPUTING IN BANKING SECTOR

In todays cut throat world of banking, cloud computing has overtaken on-premise deployment and has become the rule rather than the exception (Verma,2020.) The banking sector is a family to thousands of consumer data and it's their key responsibility to provide best services to the consumers. Therefore, cloud

computing technology acts as an informational digital solution which provides sense of security, agility and helps in operational efficiency to the banking sector while cutting down its cost expenditure.

(i) OPERATIONAL EFFICIENCY:
The cloud computing technology stimulates banks with maximum possibility of integrating and merging with new and latest technologies and applications in near future which accelerates the speed of productivity of their operations. It permits the IT department of banks to focus on their fundamental and crucial business operations and enhance process for accomplishing greater operative and productive efficiency. Cloud computing also facilitates banks to eliminate complexities and difficulties related to the changes in consumer data.

(ii) AGILITY: Cloud based services facilitates the productivity, agility and efficiency of the banking industry. Cloud computing permits banks to innovate and transform their customer experience by simplifying processes and using new and advanced technologies like artificial intelligence, machine learning and robotic automation. Cloud based service infrastructure facilitates access to software and application updates without making any additional investment, making banks more agile and flexible to the changing trends of market.

(iii) INTENSIFIED DATA SAFETY:
Data Centres generally undergo by enormous cyber-attacks by hackers which can lead to the loss of crucial and personal information in the bank. Such cyber-attacks can be eliminated by keeping a track on end-to-end processes and authenticating resources through cloud computing. Every data stored in the banks is safe and secure with hybrid cloud computing technology. Cloud computing-based infrastructure permits banks to respond immediately to potential risks and protect their consumer's data.

ADVANTAGES FROM CLOUD COMPUTING-

To fulfil the needs of banks in today's world cloud offers a business model which delivers innovative experiences, enhanced speed and effective collaboration (Kiran Kawatra,2014). The banking sector consists of substantial and in-depth application of information technology. Organisations have started adopting public cloud services available from various vendors which manifests a shift in the mindset of people to embrace the cloud as it comes with a number of advantages. The new business models are driven by the customers. Technology has changed the traditional banking models and banks need to react and adjust innovatively as well as efficiently to the new customer driven environment(Dr.G. Vengatesan,2018). Considering the adoption of cloud computing banks can bring great changes in their management, working style, service quality, infrastructure, reliability, and operating costs as reflected in the following four areas-

A. COST SAVING:
With the adoption of cloud computing banks can easily abstain from the huge costs which go into the development of infrastructure and human resources which are needed to run data centres. With cloud computing the service vendors provide all the necessary software's and network equipment's so banks do not have to buy any servers and devices. With the liability of all the data storage work being in the hands of the cloud computing service provider the banks can wholly focus on important businesses and projects. This can help banks develop their core competencies. With the cloud computing system banks do not have to shorten its budget by buying hardware and instead store all its data on cloud which has proven to be very cost efficient and economical for financial institutions.

B. IMPROVED MANAGEMENT:
Cloud computing is a very agile application. It consists of attributes which eases the use of computing services and managerial activities. It helps in fast deployment of new applications and easy expansion. With cloud, banks can easily implement the expansion or deployment of new applications without undergoing a chain of different processes like purchasing, installing, and configuration which may take up a lot of time and money. With the use of cloud computing banks can make expeditious adaptions to their resources as well as quickly upload new applications in no time with minimum management. Cloud computing is a very affordable and low maintenance application which can scale the bank operations according to the need with ease. As cloud computing is a software it requires minimal managerial guidance to work and takes care of the information of every task related to the bank.

C. ENHANCED DATA SECURITY:
Cloud computing helps banks and financial institutions to manage the security of large amounts of data reasonably. It provides a highly reliable infrastructure. Cloud models provide a very secure environment for the data. The data stored here is encoded and encrypted in such a manner which prevents any type of malpractice or theft. Financial institutions today are well aware of the consequences of data larceny. It can put the banks under the debt of millions including fines and lost revenue. This is the reason banks rely more on cloud computing for data storage rather than traditional ways as it provides more safety and at the same time saves extra costs of the banks.

D. ELIMINATION OF MONOTONOUS TASKS -
Cloud computing makes it very simple to use data and it helps financial institutions to meet different demands of the banking world quite easily. With cloud banks do not have to invest their precious time in the management and infrastructure of data centres as all the work related to the storage of data is handled by the cloud service providers. Banks can therefore focus their work force and time towards much productive and value adding work which can take banks towards growth and extension. Hence, with cloud mundane tasks can be avoided and resources can be applied to create a better future for the financial world.

CHALLENGES OF CLOUD COMPUTING-

With the help of cloud computing banks and financial institutions can reap immense benefits but at the same time have to be cautious about its repercussions. Recent studies have highlighted some critical issues based on secondary data issues such as data privacy, authentication of cloud system, authorization, safeguard of personal information and accessibility to data (Mohmed Doheir,2019). Nowadays new technologies are emerging rapidly and any institution would want to adopt a technology which has been popular and in use by other organisations to avoid any type of risks. Although cloud computing has proven to be fairly efficient and profitable, banks may have concerns about suitability and security. In the following three parts we will discuss about the certain challenges for banks in order to acquire cloud services.

A. DATA SECURITY ISSUES:
Information security is very crucial for banks. Data loss can accompany many losses to the bank including fines, forfeitures and resource deprivation. The most crucial task of cloud computing is solving data security issues with the use of high-end IT engineering and encryption of information. With cloud computing banks lose direct control to manage the data which can raise insecurity and panic in banks. The growing dependence on cloud means more data will be stored on the platform which increases the fear of data abuse. if these complications could not be solved it would be hard for cloud to gain the confidence of banks.

B. BUSINESS SECURITY RISKS:
There has been an increased dependence of banks on the cloud services. Banks can use cloud according to their requirements and pay as per the use. The computing services can be scaled up and down in line with the bank's requirements. Cloud computing has emerged as a public service provider of information technology. Presently no one can guarantee the stability or lifecycle of an IT service vendor, therefore the safety of the data in cloud would be directly affected by the loss of steadiness of the cloud. Hence, cloud may suffer challenges with the rowing complications in the financial world.

C. ABSENCE OF TECHNICAL QUALITIES:
The lack of technical standards shows, that there might be absence of infrastructure, architecture and the synchronization between different systems or platforms. Cloud computing is a very new concept and technology. The banking sector which is developing rapidly could have great concerns depending on a system which lacks technical standards. Cloud computing stores and manages a large number of data related to the banking customers. It is very necessary for cloud vendors to set rules and make certain laws to safeguard the data and information stored on the platform. It should also set policies for better regulated working environment.

CONCLUSION-

In the light of the above discussion, the author would like to conclude that there are enormous opportunities in the concept of cloud computing as a business strategy for banks and financial institutions, provided the shortfalls are resolved through tailor made solutions and proper automation.

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