BANKING ON THE CLOUD - BENEFIT, CHALLENGES AND OPPORTUNITY FOR BANKS IN INDIA

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ABSTRACT

Today, cloud computing is one of the important topics discussed across the IT world. The flexibility it offers in terms of service and deployment models makes it very appealing to senior management across different IT and banking industries. Virtually every business sector today is betting big on cloud computing. Cloud computing helps banks to transform their different operating processes and enhance their ability to grow in new segments or regions without the time and cost burdens. Banking sector basically operate over the vast IT infrastructures that deal with enormous volumes of data on a day-to-day basis. The cloud-based technologies facilitate banks to sustain with latest technological changes while reducing their overall overhead costs.

Cloud-based IT environment is expected to become an integral part of the banking industry. Different companies are using cloud-based solutions to achieve different critical business objective like cost reduction, resource optimization, ability to access data on the move and so forth. This research paper will give the overview of cloud computing, the various cloud models and cloud computing architecture. It further analyses the key benefit and challenges present in cloud computing and highlight the opportunity for banks in India.

Keywords: *Cloud Architecture, Cloud Computing, Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS).*

INTRODUCTION:

In the coming years, one of the fastest-growing technologies is Cloud computing. The largest market for cloud technology is business applications with a gradual transition from on-premise to cloud-based services which involves applications like customer relationship management (CRM) and enterprise resource planning (ERP). A bank may have different reasons for moving to the cloud, but the primary reason is different types of applications deployment required to meet various services offered by them. This often requires major investments in new technologies as it involves huge capital expenditure for new infrastructure, with a probability of success or failure of services offered by them. With the introduction of cloud computing, financial institutions only have to allocate budget for operational expenses and pay for the services they use. This makes it easier and more cost effective to test new applications on the cloud versus current traditional infrastructures.

There is no single cloud computing services model is expected to meet all the technology requirements for every banks in India. Therefore banks should develop and maintain an application portfolio consisting of both cloud and on-premise applications. The different applications deployed in cloud are expected to provide the benefit of lower investments and faster turnaround time for product and service offerings, mainly for mobile devices and the Internet based applications.

The bank is working under digital ecosystem, which is growing at faster pace. The main two reason for this type of exponential growth is, first, frequent changes in consumer tastes and preferences forcing financial organisation to offer what they want, secondly, consumers

across the globe are adopting mobile lifestyle and using digital platforms for socialisation, they expect banks also to connect on the same platform. Banks are continuously working to transform their product offerings, channels and customer service to meet the demands of the customer.

Now a days customers are digitally connected, impatient, empowered and demanding services that meet their individual and social needs. To accomplish the challenges, banks need to integrate different business processes with the help of advanced analytical capabilities services and products in real-time. Banks are mainly depending on the power of the cloud technology for helping to achieve their objectives and managing market challenges.

There are basically three different cloud computing models that is Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). SaaS service helps the users to use the applications provided by cloud service provides on a cloud infrastructure. The consumer does not require to maintain the cloud infrastructure like network, servers, operating systems, storage and so forth. They can use the applications with minimum user-specific application configuration settings. PaaS services will further helps users with better control of cloud infrastructure as it allows user to deploy onto the cloud their own set of acquired applications created by using programming languages, libraries, services, and tools supported by the provider. IaaS model further provide the consumers even more control as it helps consumer in processing, storage, networks, and other fundamental computing resources to deploy and run arbitrary software required for digital product and service.

Banks in India have already started using SaaS for non-core services in their business processing like billing, payroll and human resources management. Some of the banks are further exploring the possibilities of moving more critical services to the cloud technology. Some small banks have already transferred their core services onto the cloud.

Adoption of cloud models generally has greatest impact in offering different digital product and services. Cloud computing can provide banks with new lower-cost operating models with greater automation, virtualization and a massive scale-out option with the ability to outsource a number of non-core activities.

There are four cloud deployment models are available for banks for movement of banking core services to the cloud which are private cloud, community cloud, public cloud or hybrid cloud. Banks normally prefer the private cloud deployment models as it provides security but this comes at the expense of some scalability and cost. The public cloud is basically used by multiple set of unrelated users whereas community cloud deployment model include cloud deployment used by a community of users with similar requirement and needs. The banks can use any of these deployment models for migrating their on premises application to cloud. The main cloud provides are Amazon Web Services, Google and Microsoft and so forth.

Banks that take the initiative of migrating their traditional infrastructures to cloud computing are better positioned to respond to economic uncertainties, interconnected global financial systems and demanding customers. They can use the services of cloud banking to enhance

customer segmentation techniques and to develop more focused services that are aligned with customer needs. Banks also can optimize their channel investments and differentiate themselves through customer service excellence. Banking leaders with new insights can identify and eliminate the cost of complexity in their operations and use new and existing forms of information to optimize risk.

CLOUD COMPUTING ARCHITECTURE:

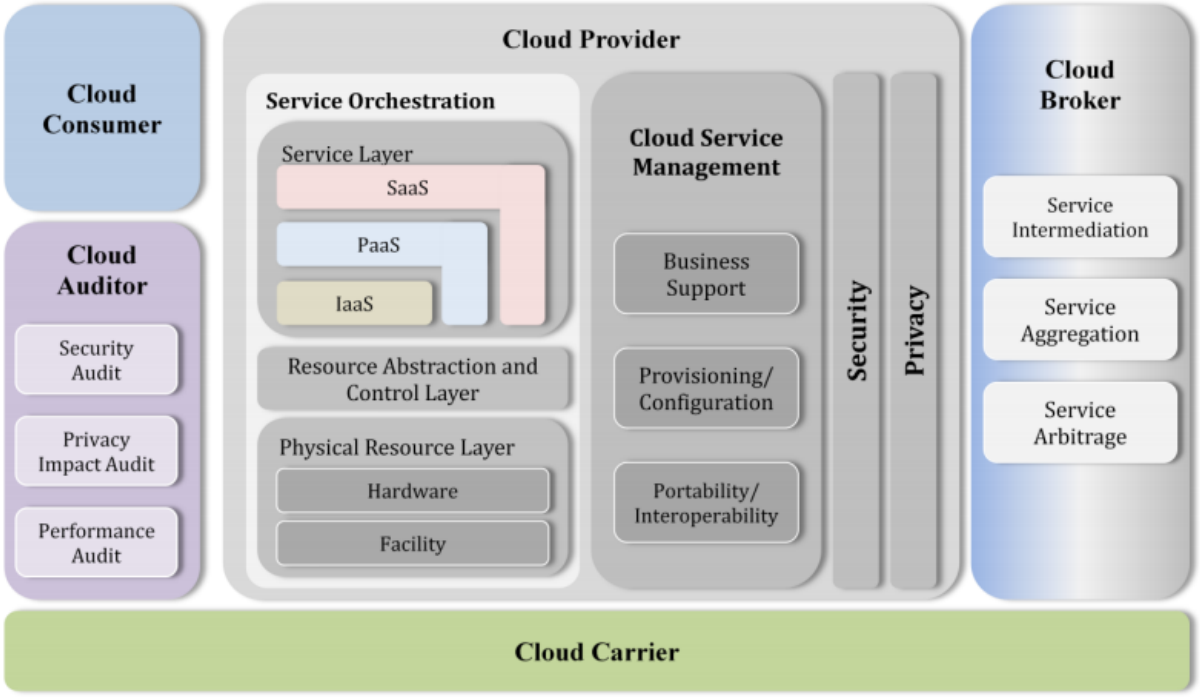

Figure presents an overview of the NIST(The National Institute of Standards and Technology) cloud computing reference architecture, identifies the major players, their activities and functions in cloud computing. The diagram depicts a generic high-level architecture and is intended to facilitate the understanding of the requirements, uses, characteristics and standards of cloud computing.

The cloud computing reference architecture defines five major players that participates in a transaction or process and/or performs tasks in cloud computing.

1. Cloud Consumer: A person or organization that maintains a business relationship with, and uses service from, Cloud Providers.

2. Cloud Provider: A person, organization, or entity responsible for making a service available to interested parties.

3. Cloud Auditor: A party that can conduct independent assessment of cloud services, information system operations, performance and security of the cloud implementation.

4. Cloud Broker: An entity that manages the use, performance and delivery of cloud services, and negotiates relationships between Cloud Providers and Cloud Consumers.

5. Cloud Carrier: An intermediary that provides connectivity and transport of cloud services from Cloud Providers to Cloud Consumers.

BENEFIT OF CLOUD COMPUTING

Cloud computing technology can help financial institutions to improve performance of digital product and services in a number of ways. Some of the benefits of cloud computing includes.

1. Usage-based Billing leads to cost savings: The financial institutions can plan and convert large infrastructures capital expenditure into a smaller ongoing operational cost with the help of cloud computing. There is no need to plan for heavy investments in hardware and software infrastructure. One of the prime advantage of the cloud computing is that it helps the financial institutions to plan and select the services as per their requirement on a pay-as-you-go basis.

2. Business Continuity: Normally set up of business continuity site involves investment of huge infrastructures cost. Cloud computing helps the financial firms to gain a higher level of data protection, fault tolerance, and disaster recovery for their digital product and services. Banks do not have to maintain the business continuity site as with cloud computing, the provider is responsible for managing the technology deployed for business continuity site. It also provides a high level of redundancy and back-up at lower price than traditional baking solutions.

3. Business Agility and Focus: The financial institutions by using flexible cloud based operating models experiences shorter development cycles for new products and services. This helps in providing a faster and more efficient response to the needs of digital banking customers. It helps in saving initial set-up time as cloud is available on-demand and required less investment in infrastructure. The development of new product and services can move forward without any capital investment. Cloud computing also helps businesses to consolidate and migrate non-critical product and services to the cloud like software patches and so forth. This helps firms to focus more on the business of financial services instead of technology.

4. Green IT: Cloud computing also helps in the promotion of green banking as it helps in less generation of carbon footprint as applications are migrated and maintained in cloud based infrastructures instead of physical infrastructure. It also leads to more efficient utilization of computing power and less idle time.

5. Flexibility and scalability: The cloud helps banks to improve the ability to respond quickly to changing market, customer and technological needs. They can easily scale up and scale down the technology infrastructures according to requirement. The ability to respond quickly will be an important competitive edge for the banks planning to migrate in cloud.

6. Increase efficiency: Cloud technology helps banks to increase their operational efficiency. The standardisation process of cloud will helps the banks in easier integration of new technologies and applications for their requirement in the future. The cloud gives banks a better opportunity to drive out complexity because technology and business operations can be much more closely aligned.

7. Serve clients better: Cloud computing makes new and consolidated products and services easier to develop and operate, either on a stand-alone basis or in sharing basis. It helps in removing infrastructures procurement delays for hardware and software. Banks will be able to increase the computing power to accomplish the demand peaks and provide the latest technological solutions without any delay.

CHALLENGES IN CLOUD COMPUTING

Financial institutions must select the right service, deployment, and operating models to address security and compliance concerns. In the initial phases of cloud computing adoption, it is expected that banks will own and operate the cloud themselves with service providers taking increasing ownership and control of the cloud infrastructure as cloud computing matures and more rigorous controls become available. When a bank planning to moves their operations into cloud computing, there are two main challenges that are required to be addressed:

1. Security: It is important to maintain the confidentiality and security of financial data of customer in order to maintain the data integrity in the system. It is required for the banks to ensure that valid and strong security framework is in place by cloud service provider while moving the mission-critical applications. Banks cannot afford the risk of a security breach.

2. Regulatory and compliance: This the second hurdles for banks to move in cloud. The financial regulators suggests that customer financial data should stay in their operating data centre locations. Also they demand that data not be intermixed with other data like shared servers or databases. Banks should have a clear understanding of where their data migrated in the cloud while planning movement to cloud.

3. Reliability: It is the responsibility of cloud provider to ensure that applications and data are always available in the event of a natural disaster or any unpredictable event. Banks are advised to design a stringent service level agreement with the providers which should offere remedies if a provider fails to meet service levels.

4. Cloud management: Achieving visibility and measuring performance are difficult in case large banks are planning to source cloud services from several cloud providers. Therefore cloud management becomes one of the challenging task for them to use internal or private and external, or public, cloud services. The bank have to handle multiple security systems, and ensure that all parts of their business can communicate with each other and where necessary with clients. The banks need to develop fully-fledged cloud management platforms in order to manage the increased use of various technology infrastructures and different cloud environments internally and externally.

5. Interoperability: This is the ability of two or more systems to work together in way that they can exchange information and use that exchanged information. Many public cloud networks are configured as closed systems and are not designed to interact with each other. The lack of integration between these networks makes it difficult for organizations to combine their IT systems in the cloud and realize productivity gains and cost savings. To

overcome this challenge, industry standards must be developed to help cloud service providers design interoperable platforms and enable data portability

OPPORTUNITY IN CLOUD COMPUTING

There are various opportunities are available for private and public sector banks in India, some of them are mentioned below.

1. Cloud Opportunity for business growth: Cloud technology offers various growth opportunity by providing unlimited hardware and software resources on an off-the-peg, pay-as-you-go basis over the internet. Cloud helps organizations to rapidly and easily scale up their business operations to support business goals and helps in managing the different business challenges like expanding into new markets, attracting and retaining new customers, executing merger and acquisition strategy or speeding up time-to-market for new products and services.

2. Cloud Opportunity for business agility: The adoption of right available cloud model helps in allocating flexible infrastructures and on-demand pricing. It further helps in starting to reset the expectations for IT within the business. Clouds presents the opportunity for technology to be re-cast as an enabler of business agility rather than an inhibitor of business change.

3. Cloud Opportunity for cost reduction: The cloud technology helps the organizations of all sizes under constant pressure to reduce the cost of their operations and deliver more value for less expense. By eliminating up-front spend on IT and providing IT capability on a pay-per-use basis, cloud has the potential to restructure the IT budget, moving key applications and services to multi-tenancy architectures.

OBJECTIVE:

The objective of the research paper is to study:

- Overview of cloud computing.
- Benefit of cloud computing.
- Challenges of cloud computing
- Opportunity of cloud computing for Indian banking sector

LITERATURE REVIEW:

The study involve review of different literature. Some of them are as follow.

Suruchee Nandgaonkar et al., (2014). Cloud computing involves the deployment of new infrastructure environment which helps to deliver on-demand services like virtual hardware infrastructure, software and data access in a flexible manner by scheduling bandwidth, storage and compute resources on the fly without required end-user knowledge of physical location and system configuration that delivers the service. Also cloud computing provide model based approach for providing shared pool of configurable computing resources like

networks, servers, storage, applications, and services that can be rapidly provisioned and released with minimal management effort or service provider interaction. Virtualization technology provides good support to achieve aim of cloud computing. There is a need to provide solutions and technical support for various security problems to maintain the trust level of organization for deploying the cloud computing without any hesitation.

Bharath V et al., (2014). Cloud computing has the potential to save mobile client energy. Cloud computing can enhance the computing capability of mobile systems. It provides many advantages for businesses like low initial capital investment, shorter start-up time for new services, lower maintenance and operation costs, higher utilization through virtualization, and easier disaster recovery. Reports suggest that there are several benefits in shifting computing from the desktop to the cloud.

Mohsin Nazir (2012). Generally Cloud Computing services are delivered by a third party provider who owns the infrastructure. Different types of industries, such as banking, healthcare and education are moving towards the cloud computing because of flexibility offered in terms of services provided by the pay-per-use pattern based on the resources such as processing power used, transactions carried out, bandwidth consumed, data transferred, or storage space occupied and so forth. There are various challenges in adoption of cloud computing such as well managed service level agreement, privacy, interoperability and reliability. Some of the challenging highlighted in cloud computing are Service Level Agreements, Cloud Data Management & Security, Data Encryption, Migration of virtual Machines, Interoperability, Access Controls, Energy Management, Multi-tenancy, Server Consolidation, Reliability & Availability of Service, Common Cloud Standards and Platform Management.

Nancy Awadallah (2016). Cloud computing helps banks to transform their business processes and enhance their ability to grow in new sectors or regions without the time and cost burdens. It helps to create new markets and services to differentiate from competition and improve the ways customers' access and use the bank's products and services. Cloud computing provides opportunity for banking systems and associated technologies available in the cloud on a pay-per-use basis. There is no barriers associated with this technology as anyone, anywhere can have access to banking systems without any additional cost. Cloud computing offers compelling advantages, the most important benefit is the ability to scale on demand without procuring intensive, expensive infrastructure.

K .Sudhakar et al (2016). There is a dramatic changes taking place all across the banking sector in India. This require to adopt different technology to maximize profitability and returns. Cloud technology offers secure deployment options which will help banks to develop new segment, enable effective collaboration and improve speed to market while increasing IT efficiency. Banks that take advantage of cloud computing are better positioned to respond to economic uncertainties, interconnected global financial systems and demanding customers. While planning cloud computing deployment, banks should choose service and delivery models that best match requirements for their operational flexibility, cost efficiency, and pay-as-you-use models. Banks should adopt a progressing evolutionary approach towards cloud

computing services, examining each project based on the type of applications and nature of the data.

RESEARCH METHODOLOGY:

The study is primarily based upon the secondary data. The research for this paper was conducted through literature review, without any empirical work being conducted. A large resource of written material was used, which included books magazine articles, academic journals, as well as the websites.

CONCLUSION OF STUDY:

Like companies in other industries, banks are racing to take advantage of the opportunities and manage the risks that the digital economy creates. To do so, they will need computing platforms that provide greater agility at lower cost. Cloud computing offers banks with new ways of providing services to clients. Traditionally banks were reluctant to explore such technologies because of the security issue. There are some other challenges also like regulation and the potential complexity involved while using the cloud services as cloud providers work across the different part of the world. But from last couple of years, financial institution are working closely for exploring the cloud technology in banking.

The larger banks can plan migration of their product and services to the cloud step by step, diving deeper into the cloud application in areas such as human resources, customer analytics and customer relationship management, development and testing, and in some cases, payments. With cloud applications, there is no longer a need to build hardware, install software or pay dedicated software license fees.

Adopting cloud services allows banks to shift costs from capital to operational or from fixed to variable. The bank pays for what it needs when it needs it. This pay-per-use model is more flexible and eliminates the need for significant capital expenditures.

REFERENCES:

Suruchee V.Nandgaonkar and A. B. Raut (2014). A Comprehensive Study on Cloud Computing. *International Journal of Computer Science and Mobile Computing. IJCSMC, Vol. 3, Issue. 4, April 2014, pg.733 – 738.* ISSN 2320–088X.

Bharath V and Priyadarsini K (2014). ENERGY EFFICIENT DATA TRAFFIC MANAGEMENT IN MOBILE CLOUD COMPUTING. *International Journal of Computer Science and Mobile Applications.Vol.2 Issue. 4, April- 2014, pg. 59-64* ISSN: 2321-8363.

Mohsin Nazir (2012). Cloud Computing: Overview & Current Research Challenges. *IOSR Journal of Computer Engineering (IOSR-JCE)* ISSN: 2278-0661, ISBN: 2278-8727Volume 8, Issue 1 (Nov. - Dec. 2012), PP 14-22.

Nancy Awadallah (2016). Usage of Cloud Computing in Banking System. *IJCSI International Journal of Computer Science Issues, Volume 13, Issue 1, January 2016* ISSN (Print): 1694-0814. ISSN (Online): 1694-0784.

K .Sudhakar, G. Vinay kumar, L.Sudha Rani (2014). A View on Cloud Computing in the Banking Sector. *International Journal of Computer Science and Information Technologies, Vol. 5 (3), 2014, 3305 - 3308.* ISSN: 0975-9646

B. Thirumal Rao, Dr. L.S.S. Reddy and P.Sai Kiran "Research Issues in Cloud Computing " Global Journal of Computer Science and Technology, Volume 11, Issue 11, July 2011

R. V. Paturi, B. R. Kandukuri and A. Rakshit. "Cloud Security Issues," 2009 IEEE *International Conference on Services Computing, Bangalore, India, September 21-25, 2009.* pp. 517-520, 2009. ISBN: 978-0-7695-3811-2.

Yogesh B. Dujodwala and Aman Bakshi. "Securing cloud from DDoS Attacks using Intrusion Detection System in Virtual Machine," *ICCSN International Conference on Communication Software and networks, pp. 260-264, 2010, IEEE Computer Society, USA,* 2010. ISBN: 978-0-7695-3961-4.

https://www.capgemini.com

http://www.cisco.com

https://www.tcs.com

http://www.nist.gov