**1. Introduction**

**1.1)Introduction**

**1.1.1) Rural banking in India**

Rural banking in India has been the subject of study Survey Committee Report. Literally thousand of reports have examined and investigated the problems relating to the credit delivery for agriculture and rural area. As the majority of the Indian population lives in rural areas, there is an urgent need to deliver citizen services to them in a cost effective way with assured quality. This involves mainly the following:

* Enabling the ready access at the place of the villagers
* Reducing transaction cost to make the services affordable
* Reduction in delays
* Improving the quality of services available

The criticality of this need may be seen from the fact that even with concerted and

Extensive attempts to meet the credit needs of the farmers for agricultural operations etc., informal agencies including money lenders are currently providing substantial Portion of the total credit to this sector. Besides, the agricultural credit flows themselves are inadequate and the gross capital formation can be improved only if substantial Amount of investment funds flows to the rural areas in the form of credit. Likewise, there is also a need to provide market information, extension services, marketing support and Government and other public services to the people in a cost-effective manner.

For Achieving financial inclusion and economic growth, the ICT can play an important role by increasing effective access and improving delivery and governance in banking Services. Against this background, the key issue is how technology can be harnessed for improving the efficacy of the credit delivery and for the minimization of the transaction Costs involved, for ensuring that bank credit actually increases and promotes productive Capital formation and investment in rural areas and helps address the critical problem of the rural-urban service divide.

**1.1.2) Cloud Computing**

"Cloud Computing," to put it simply, means "Internet Computing." The Internet is commonly visualized as clouds; hence the term “cloud computing” for computation done through the Internet. With Cloud Computing users can access database resources via the Internet from anywhere, for as long as they need, without worrying about any maintenance or management of actual resources. Besides, databases in cloud are very dynamic and scalable.

In its broadest form, we can define ‘cloud’ is an elastic execution environment of resources involving multiple stakeholders and providing a metered service at

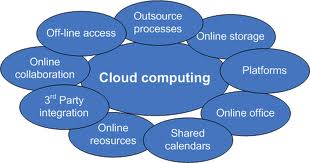


Figure 1 :Cloud computing resources

multiple granularities for a specified level of quality (of service).To be more specific, a cloud is a platform or infrastructure that enables execution of code (services, applications etc.), in a managed and elastic fashion, where “managed” means that reliability according to pre-defined quality parameters is automatically ensured and “elastic” implies that the resources are put to use according to actual current requirements observing overarching requirement definitions implicitly, elasticity includes both upward and downward scalability of resources and data, but also load-balancing of data throughput.

Cloud computing is unlike grid computing, utility computing, or autonomic computing. In fact, it is a very independent platform in terms of computing. The best example of cloud computing is Google Apps where any application can be accessed using a browser and it can be deployed on thousands of computer through the Internet.

Cloud computing is cost-effective. Here, cost is greatly reduced as initial expense and recurring expenses are much lower than traditional computing. Maintenance cost is reduced as a third party maintains everything from running the cloud to storing data.

Cloud is characterized by features such as platform, location and device independency, which make it easily adoptable for all sizes of businesses, in particular small and mid-sized. However, owing to redundancy of computer system networks and storage system cloud may not be reliable for data, but it scores well as far as security is concerned. In cloud computing, security is tremendously improved because of a superior technology security system, which is now easily available and affordable. Yet another important characteristic of cloud is scalability, which is achieved through server virtualization.

In a nutshell, cloud computing means getting the best performing system with the best value for money. To deliver a future state architecture that captures the promise of Cloud Computing, architects need to understand the primary benefits of Cloud computing:

• Decoupling and separation of the business service from the infrastructure needed to run it (virtualization).

• Flexibility to choose multiple vendors that provide reliable and scalable business services, development environments, and infrastructure that can be leveraged out of the box and billed on a metered basis

• Elastic nature of the infrastructure to rapidly allocate and de-allocate massively scalable resources to business services on a demand basis.

• Cost allocation flexibility for customers wanting to move CapEx into OpEx [6.2].

**1.1.3) Problem Definition**

Cloud Computing refers to both the applications delivered as services over the Internet and the hardware and systems software in the data centers that provide those services. The services themselves have long been referred to as Software as a Service (SaaS). The data centre hardware and software is what we will call a Cloud. ATM’s today use Client Server computing, but it has a few disadvantages. They are: For banks, reaching rural India through the traditional branch banking model isn't viable because of the low value of transaction per customer and a dispersed population. There is little experience in managing remote information technology (IT) infrastructure and guaranteeing security and services. From a consumer perspective, the time spent in banking transactions set off against the opportunity cost of lost employment posed challenges to adoption of banking services in rural areas, as also did the habit of storing money at home (typically stuffed into pillow covers or under mattresses).Still, banks could ill-afford to ignore rural India as it increasingly became a hub of economic activity. Mobile phone and TV penetration is high and rising, has made a number of people "connected”. But that's only if the IT services major was able to deliver a product or service that is designed specifically for rural banking needs within the cost parameters that would make business and social sense.

The solution: Branchless banking using cloud computing to take banking services to the unbanked. (Cloud computing refers to Internet-based computing where delivery of services is from servers, storage and other resources served from the Web rather than on-premise assets.)

**1.1.4 Proposed Method**

Cloud computing can be implemented using the already built cloud on Microsoft Azure, Ubuntu, etc. This method requires the development and deployment of the application in to the cloud directly. However, in our project we will develop a tool which will act as a cloud holding the bank databases. Thus, our proposed method is, develop a cloud rather than deploying applications on the existing cloud.

The tool which we would develop would be acting as a manager, so we name it as “CLOUD MANAGER”. The customer selects his bank, then the cloud manager, selects the bank, which is to be accessed by the customer. So as per the selection of bank, the cloud manager will request the web server to display the page of that specific bank. Now, we may think that this may be performed by a normal client-server technology, but here, we have to start the cloud manager, as well as the bank which the customer wants to use, which cannot be done in the client server technology.

Now one of the most important feature of Cloud computing is the “pay-per use” feature. So, for this, we keep a database at the cloud manager, which keeps account of the banks being accessed and accordingly each bank in the cloud will be charged.

**1.2 Organization of Report**

**Chapter 2: Review of Literature**

This chapter aims to review the critical points of current knowledge including substantial findings as well as theoretical and methodological contributions to cloud computing.

**Chapter 3: System Analysis**

This chapter is an explicit formal inquiry carried to help the decision maker identify a better course of action and make a better decision. This chapter encompasses those tasks that go into determining the needs or conditions to meet the cloud development.

**Chapter 4: Software and Hardware Requirements**

This chapter focuses on the software and hardware requirements that have been identified for the development of an indigenous cloud.

**Chapter 5: System Design**

In this chapter, we have examined the problem of developing a cloud for rural banking and then created its solution in the form of architecture.

**Chapter 6: Working**

In this chapter we have examined the working of cloud architecture for rural banking.

**Chapter 7: Implementation**

In this chapter we have accomplished the aim to develop an interface as well as the cloud for Rural Banking using Cloud Computing. Microsoft Visual Studio is the tool used for implementation.

**Chapter 8: Testing**

In this chapter, testing is performed to verify that the completed software functions according to the expectations defined by the requirements. The overall objective is not to find every bug that exists but to uncover situations that could negatively impact the client, usability and maintainability.

**Chapter 9: Conclusion & Future Scope**

In this chapter, we have included of the outcome of the process of developing a cloud required in rural banks. Also, here we have included the opportunity for free outlook where the cloud could be extended to provide more services

**2. Review of Literature**

Cloud Computing is the most important trend in the IT Industry. Even the biggest critics seem to agree that – in spite of some over-zealous marketers – Cloud Computing is one of the most important paradigm shifts of the past decades. There are probably as many definitions of Cloud Computing as there are self-acclaimed Cloud Specialist. Most of those definitions include pay-per use, instant availability, scalability, hardware abstraction, self-provisioning, virtualization and internet. A short but safe, summary would be “Cloud Computing is a new way of delivering IT services: end users can deploy the services they need when they need them. Many of those services are available over the internet and users are only charged for what they consume.” The Cloud Computing market is typically segmented into public clouds (services offered over the internet), private clouds (internal enterprise) and hybrid clouds (a mix of both). The Public Cloud market is often sub-segmented into IAAS (Infrastructure as a Service), PAAS (Platform) and SAAS (Software). [1][4]

Cloud Computing found its origin in the success of server virtualization and the possibilities to run IT more efficiently through server consolidation. Soon, visionaries came up with idea to bring virtualization to a next level by implementing some early storage and network virtualization techniques and thus making abstraction of the hardware in the entire data center. Add to this self-provisioning and auto scaling, and Cloud Computing was born. At the time it was called utility computing, however, and only Amazon – a bookstore – was good at it. Amazon saw a growing popularity of its EC2 (compute) and S3 (storage) and the Amazon API was being used by thousands of developers and many more customers to deploy and run infrastructure in the Cloud.

The first BYOC (build your own cloud) products that were brought to the market came from companies like Flexiscale (UK), 3Tera (US) and Q-layer (BE). They aimed at the ISP’s – who had an urgent need for innovation: ISP’s had entered into a price war amongst themselves and their market was now also threatened by newcomers like Amazon, Microsoft and Google. The first new services those ISP’s offered were nothing more than virtual machines – allowing them to run their facilities more efficiently and still charge the same prices to their customers. Soon, companies like Savvis, GoGrid and Rackspace added interfaces that enabled end users to control their own infrastructure. In early 2009, Sun Microsystems launched the Virtual Data Center (VDC), a graphical interface with drag & drop that enables users to create and manage a full virtual data center in the cloud.

Currently, the battle has moved to the Private Clouds. Enterprises seem to be ready to cloud-enable their infrastructure either in a purely private or a Hybrid (enabling cloud-bursting to Public Clouds for certain services) environment. All the leading software providers have announced their products and I expect an important role for integrators and telcos to help enterprises to pick a best of breed for their own implementation. Implementing a private cloud affects the entire business, including the entire IT infrastructure (hardware, software, services) but also most business processes (e.g. regulatory compliance). As none of the big software providers have teams with experience in all those fields – except maybe IBM – enterprises will have to rely on integrators to build their clouds. However, quite a few enterprises will build their clouds all by themselves (e.g. Wall Street banks).Cloud computing today is focused on the idea of utility computing where companies purchase computing needs (such as computing power and storage space) along the lines of a conventional utility service (water or electricity).The software as a service (SaaS) model is beginning to emerge as a successful approach to cloud computing. This model provides a specific application for hundreds or thousands of users through their internet browser. From the customer’s perspective, this means no capital investment in servers or licensing; and from the provider’s point of view there is just one application to maintain, meaning costs are quite low relative conventional hosting. [4][6.2]

Managed service providers (MSPs) are another current approach to offering cloud computing services. MSPs offer various services interfacing with the IT departments of businesses rather than the individual end users. Services like desktop management, application monitoring, anti-virus scanning, and anti-spam filtering are typical offerings from MSPs. Right now business must access cloud-based services individually, but integration of services is inevitable, and in fact a number of cloud computing aggregators are already emerging. OpSource is one such company and just announced a cloud computing integration tool called OpSource Services Bus, and several other companies are working on their own version of a cloud computing service bus. The recent availability of the Windows Azure platform appliance, which enables IT departments to transform their traditional IT infrastructure into a private cloud still using Microsoft's familiar OS, management tools and applications, is another step in the mainstreaming of cloud computing.

It is obvious to anyone that is paying attention that cloud computing is much more than just another buzz word to describe a new delivery model. Cloud computing is for real, offers some significant advantages to both providers and users, and in the long-run the cost and scalability benefits that cloud computing provides will mean that just about every enterprise of any size will have its own place in the clouds.[1][6.2]

**3. SYSTEM ANALYSIS**

**3.1) Existing Systems**



Figure 2: Existing rural Atm machine

The client–server model of computing is a distributed application structure that partitions tasks or workloads between the providers of a resource or service, called servers, and service requesters, called clients. Often clients and servers communicate over a computer network on separate hardware, but both client and server may reside in the same system.

A server machine is a host that is running one or more server programs which share their resources with clients. A client does not share any of its resources, but requests a server's content or service function. Clients therefore initiate communication sessions with servers which await incoming requests.

An Automatic Teller Machine is essentially a client-server system. The bank's central computer is the server, and maintains information about the accounts of all the customers. The ATM is the client. You may assume the bank has only one customer - your server needs to keep track of only one balance. You should assume all amounts are in whole rupees (don't bother with decimal points) and that can be positive or negative. The server must handle three commands withdrawal: subtract an amount from the account (and return the new balance) query: return the account balance to the client be a simple iterative server that is it handles only one connected client at a time. The client must connect to the server when it is started allow the user to perform any of these functions and consequently disconnect from the server.

**3.2) Proposed System**

Cloud computing has particular characteristics that distinguish it from classical resource and service provisioning environments:

(1) It is (more-or-less) infinitely scalable;

(2) It provides one or more of an infrastructure for platforms, a platform for applications or applications (via services) themselves;

(3) Thus clouds can be used for every purpose from disaster recovery/business continuity through to a fully outsourced ICT service for an organization;

(4) Clouds shift the costs for a business opportunity from CAPEX to OPEX which allows finer control of expenditure and avoids costly asset acquisition and maintenance reducing the entry threshold barrier;

(5) Currently the major cloud providers had already invested in large scale infrastructure and now offer a cloud service to exploit it;

(6) As consequence the cloud offerings are heterogeneous and without agreed interfaces;

(7) Cloud providers essentially provide datacenters for outsourcing;

(8) There are concerns over security if a business places its valuable knowledge, information and data on an external service;

(9) There are concerns over availability and business continuity – with some recent examples of failures;

(10) There are concerns over data shipping over anticipated broadband speeds.

To overcome the disadvantages of client-server systems in Rural Banking, we can use the concept of cloud computing which is extremely cost-effective. Today, in remote villages where people have to travel miles so as to have access to an ATM machine (may or may not be the one where he/she holds an account), rural banking using cloud computing can be extremely helpful and cost-effective and thus, will ultimately bring about a development in the technology and will also benefit rural India.

Usually the scenario in villages is, either there is an ATM machine of a particular bank or there is no ATM machine. In the first case, if there is an ATM machine, people using it will have to pay the ATM usage charges if they are non-members of the bank and in the second case they will have to travel long distances and then the scenario might be same as the first. So to overcome this, a single ATM machine can be installed which allows members of different banks to use it without being levied the ATM usage charges. A common interface (a cloud of the different bank ATMs) can be developed to deal with the problem.