

# Fuzzy Approach to Mobile Cloud Computing

Rinku Rajankar, R.W. Jasutkar

**Abstract:-** In a world that sees new technological trends bloom and fade on almost a daily basis, one new trend promises more longevity. This trend is called mobile cloud computing, and it will change the way we use computer and the Internet. The increased degree of connectivity and the increasing amount of data has led many providers and in particular data centers to employ larger infrastructures with dynamic load and access balancing.

This raises a bottleneck to efficiently access the data. In this paper we introduce idea of improving accessibility of Cloud using if then concept of Fuzzy. In the developing process of various servers proposed work make use of Microsoft's latest windows Azure cloud computing platform.

**Index Terms:-** Mobile Cloud Computing, Azure framework, fuzzy IF-THEN rule.

## I. INTRODUCTION

The Mobile Cloud Computing [1] is a new concept that will revolutionize the business world in the coming years. Its purpose is to outsource the entire process of computing and storage of personal computers, allowing for faster times and optimize intra-company resources. In other words it is a term that refers to a structure in which both data storage and processing take place outside the mobile device from which the application is launched. For the average consumer, a mobile application in the cloud has the same visual appearance than any other acquired or downloaded feature through a mobile device application store such as the iTunes. However, the application works from the cloud, not the device itself. There are already several mobile applications well known in the mobile cloud computing, including Google's Gmail and Google Voice for iPhone. To deliver them via shortcuts Home screen of the iPhone, these applications work just like any other, but all the processing power resides in the cloud. Virtualization [2] is an essential technological characteristic of clouds which hides the technological complexity from the user and enables enhanced flexibility (through aggregation, routing and translation). More concretely, virtualization supports the following features:

- 1) Ease of use: Through hiding the complexity of the infrastructure (including management, configuration etc.) virtualization can make it easier for the user to develop new applications, as well as reduces the overhead for controlling the system.

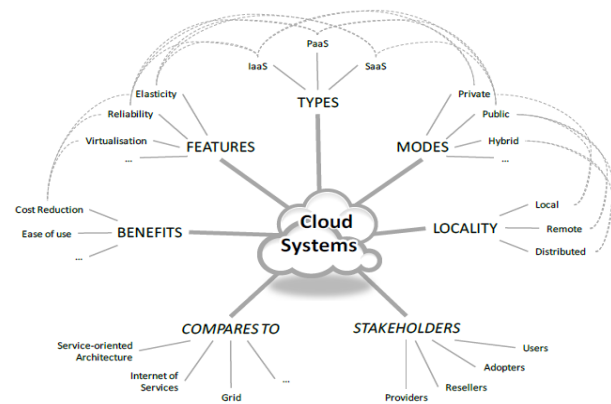


Fig. 1 View on main aspects forming cloud

- 2) Infrastructure independency: In principle, virtualization allows for higher interoperability by making the code platform independent.
  - 3) Flexibility and Adaptability: By exposing a virtual execution environment, the underlying infrastructure can change more flexible according to different conditions and requirements (assigning more resources, etc.).
  - 4) Location independence: Services can be accessed independent of the physical location of the user and the resource.
- Multi-tenancy is a highly essential issue in cloud systems, where the location of code and / or data is principally unknown and the same resource may be assigned to multiple users (potentially at the same time). This affects infrastructure resources as well as data / applications / services that are hosted on shared resources but need to be made available in multiple isolated instances. Classically, all information is maintained in separate databases or tables, yet in more complicated cases information may be concurrently altered, even though maintained for isolated tenants. Multitenancy implies a lot of potential issues, ranging from data protection to legislator issues.
  - Security, Privacy and Compliance is obviously essential in all systems dealing with potentially sensitive data and code.
  - Data Management [3] is an essential aspect in particular for storage clouds, where data is flexibly distributed across multiple resources. Implicitly, data consistency needs to be maintained over a wide distribution of replicated data sources. At the same time, the system always needs to be aware of the data location (when replicating across data centres) taking latencies and particularly workload into consideration. As size of data may change at any time, data management addresses both horizontal and vertical aspects of

Manuscript Received on May 25, 2012.

Ms.Rinku Rajankar, Computer Science and Engg., Nagpur university, G.H.Raisoni College of Engg., Nagpur, India.

Prof. R. W. Jasutkar, Computer Science and Engg., Nagpur university, G.H.Raisoni College of Engg., Nagpur, India.



scalability. Another crucial aspect of data management is the provided consistency guarantees (eventual vs. strong consistency, transactional isolation vs. no isolation, atomic operations over individual data items vs. multiple data times etc.).

- APIs and / or Programming Enhancements are essential to exploit the cloud features: common programming models require that the developer takes care of the scalability and autonomic capabilities him- / herself, whilst a cloud environment provides the features in a fashion that allows the user to leave such management to the system.

The remainder of the paper is organized as follows, in section II we present underlying technology cloud computing. In section III we reported related work and IV proposed work and finally conclusion.

## II. UNDERLYING TECHNOLOGY

### A. Net Framework

The Microsoft .Net Framework is a platform that provides tools and technologies required to build networked applications as well as distributed web services and web applications. The main two components of .Net Framework are Common Language Runtime (CLR) and .Net Framework Class Library (FCL). The Common Language Runtime (CLR) is the runtime environment of the .Net Framework that executes and manages all running code like a Virtual Machine. The .Net Framework Class Library (FCL) is a large collection of language-independent and type-safe reusable classes.

### B. C#3.0

C# is an object-oriented language, but C# further includes support for component-oriented programming. C# most directly reflects the underlying Common Language.

### C. AJAX for ASP.NET

AJAX features in ASP.NET enable user to quickly create Web pages that include a rich user experience with responsive and familiar user interface (UI) elements. AJAX features include client-script libraries that incorporate cross browser ECMA Script (JavaScript) and dynamic HTML (DHTML) technologies, and integration with the ASP.NET server-based development platform. The processing of web page formerly was only server-side, using web services or PHP scripts, before the whole page was sent within the network. But Ajax can selectively modify a part of a page displayed by the browser, and update it without the need to reload the whole document with all images, menus, etc.

### D. Azure Framework

The Azure Services Platform (Azure) is Microsoft's first attempt at a cloud services platform, their take on implementing Platform as a Service (PaaS)-style functionality. Azure includes an operating system (Windows Azure) and several collections of developer, communication and data services intended to simplify the creation and hosting of Windows-based applications in the cloud as shown below.

Fuzzy IF-THEN Rules :

A fuzzy IF-THEN rule consists of an IF part (antecedent) and a THEN part (consequent). The antecedent is a combination of terms, whereas the consequent is exactly one term. In the antecedent, the terms can be combined by using fuzzy conjunction, disjunction and negation. A term is an expression of the form  $X = T$ , where X is a linguistic variable and T is one of its linguistic terms.

## III. RELATED WORK

The aim of this paper is to combine cloud computing technologies with fuzzy[5] concept so that cooperating organizations can improve accessibility of vast amounts of data. Recently an increasing number of commercial cloud platform has established to offer flexible services for end user around world. Amazon simple storage services (S3) aim to provide storage as a low-cost highly available service via an HTTP-like interface. Generic operations such as get, put, delete and list are supported so that other services can be developed based on S3.

### A. Microsoft Azure Platform

The Microsoft Azure Platform [4] is a cloud computing platform that offers a set of cloud computing services similar to the Amazon Web Services. Windows Azure Compute allows the users to lease Windows virtual machine instances. Azure compute follows a platform as a service approach and offer the net runtime as the platform. Users can deploy their programs as an Azure development package through a web application. Platform-as-a-service infrastructures have a greater capability to offer quality of service and automated management services than infrastructure-as-a-service offerings. Azure offers a limited set of instances on a linear price and feature scale.

### B. Web Application

The Web Application is the only interface provided system to the user to access the cloud infrastructure. We provide different functions based on the permissions assigned to a user. Our system is based on the client-server[6] approach. The client tools provide files and directories operations for users except for the management of users. It takes care of the registration of users and communities. It is designed to present users a friendly interface to simplify the management of users and communities.

In the windows Azure platform, a platform called Windows Azure Storage is specifically designed to build file storage service. Windows Azure Storage allows programmers to store any data they want. In accordance with "cloud computing" concept, the data once stored in the "cloud" will never be lost, programmers can gain access to any size of data at any time, from any terminal, anywhere. Different types of data storage available on windows azure are.

- 1) Blob storage: It is for long-term data. Blobs are

binary objects together with <name, value> pair metadata. Each blob can be up to 50 GB and blobs are grouped into logical containers. Blobs are replicated three times in the data center for reliability purposes and they can be accessed from any server or by a URL over the Internet.

- 2) Table storage: Another type of persistent storage. A table can be very large (millions of rows and columns) and is partitioned by rows and distributed over the storage nodes in Windows Azure. It is also triply replicated. Tables are not full SQL tables because there is no join operator.
- 3) Queue: Asynchronous messaging service.

Table storage is used in proposed module to store huge data so that we can access it according to if-then rule.

#### IV. PROPOSED WORK

To create the working environment proposed work use if then concept of fuzzy. Huge data of cloud is divided into different database membership function and uses if then rule that give us advantage in access time. Work define range of marks of student depending on if then rule we search precise data and obtain results. Experimental result show that searching normal data takes more time as compared to data split according to membership function of fuzzy. Hence it is better approach for huge database.

Result of implementation.

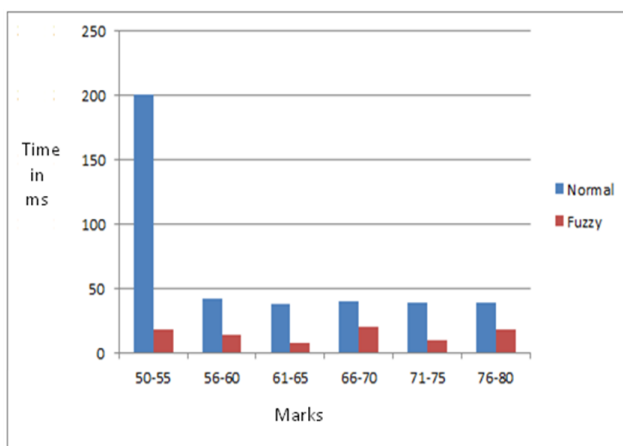


Fig 2. Comparison of normal and fuzzy search.

As seen from graph that fuzzy search results are always better.

#### V. CONCLUSION

Now, mobile computing users are looking for more effective ways to store and access their large amount of personal data. Alternately complexity of managing data increasing so better solutions need to implement. Proposed work is providing more flexibility to access the data using if then rule of fuzzy concepts. Also that data may not be precise. In future proposed system may include fuzzy concept to improve accessibility of imprecise data also.

#### REFERENCES

- [1] Pipieter Simoens, Filip De Turck et al, "Remote Display Solutions for Mobile Cloud Computing," IEEE Computer.
- [2] Vijay Sarathy, Purnendu Narayan et al, "Next generation Cloud Computing Architecture," 2010 Workshops on Enabling Technologies: Infrastructure for Collaborative Enterprises.
- [3] Li Ye-bai and Zhang Bin, Wang Hai-bin, "Study and Design on Data Management Model of SQL Server CE For Mobile Application," 2010 International Conference on e-Education, e-Business, e-Management and e-Learning.
- [4] Wei Lu, Jared Jackson, Jaliya Ekanayake, et al "Performing Large Science Experiments on Azure: Pitfalls and Solutions" 2nd IEEE International Conference on Cloud Computing Technology and Science
- [5] Amel Grissa Touzi and Mohamed Ali Ben Hassine, "New Architecture of Fuzzy Database Management Systems," The International Arab Journal of Information Technology, Vol. 6, No. 3, July 2009
- [6] Gwan-Hwan Hwang, "Supporting Cloud Computing in Thin-client/server Computing model" 2010 IEEE International Symposium on Parallel and Distributed Processing with Applications.

#### AUTHOR PROFILE



Ms Rinku Rajankar pursuing her M.E. in W.C.C. from G.H. Raisoni College of Engg., Nagpur. Her area of interest is Cloud Computing and Wireless Networks..



Ms R.W. Jasutkar is professor at G.H.Raisoni College of Engg., Nagpur, India.