A Cloud Based SOA for Agricultural Modernization

M.Begum Razeeya Sulthana[1] , N.Gayathri Devi[2]

[1]M.Begum Razeeya Sulthana,M.E/CSE, Ganadipathy Tulsi's Jain Engineering College,Vellore,India.

[1]razeeyanoor@gmail.com

[2]N.Gayathri Devi,Asst.Prof/CSE,Ganadipathy Tulsi's Jain Engineering College,Vellore,India.

[2]gayathridevi_cse@gtec.ac.in

ABSTRACT

Cloud computing supports many different platforms which effectively promotes business. The providers manage the infrastructure and platforms that run the applications. SaaS is sometimes referred to as "on-demand software" and is usually priced on a pay-per-use basis. As the agriculture gains its importance worldwide in food and welfare. In the vision of promoting cloud computing towards agriculture, there are various traditional farm management systems which effectively supports integration processes like, monitoring, operation farm management, with cloud specific capabilities. These leads to increase in productivity. On this view, this project deals with creating a multiplexed platform for farmers based on the economic and climatic conditions worldwide which effectively uses remote servers on cloud to exchange and sync information across systems. Using this, the decision making process is likely to proven effective and cost saving. In the business model using software as a service (SaaS), users are provided access to application software and databases.

Keywords: Farm management, Cloud Computing Services, On-demand Software

1.INTRODUCTION

Cloud computing is generally defined as the computing in which computing in which large groups of remote servers are networked to allow centralized data storage and online access to computer services or resources. The charm of cloud computing is that the services may be availed whenever and wherever needed. It also reduces the cost of availing those services drastically. At the same time, it offers involvement of very less manpower and maintenance of those services. It also makes users free from certain concerns such as buying software, maintaining them up to date, maintenance of data etc. Clouds can be classified as public, private or hybrid. In simple, it is the rise in popularity at a rapid rate. One of the famous and well-known cloud services that we use on day-to-day life is Google Doc. It is very helpful for online consumers. It provides the software as a service, where people the software's as a service without any installation and hardware cost. The recent survey on cloud computing related to SaaS focuses that the cloud services develops the maturity model of consumer cloud computing to optimize the benefit from cloud computing services. In the business model using software as a service (SaaS), users are provided access to application software and databases.

1.1 SaaS

SaaS is a software licensing and delivery model in which software is licensed on a subscription basis and is centrally hosted on a cloud server. SaaS is typically accessed by users using a thin client via a web browser. SaaS has become a common delivery model for many business applications. This application is hosted on the Google cloud server which is used to validate a number of innovative concepts for the agricultural sector such as the notion of a services' market place and the system's adaptation to network failures. It includes the ICT working environment tools suchas software, web applications etc., without buying/downloading and installing in specific machines. Another characteristic of this model is that the users are charged for whatever has to be used for a specific duration, against the traditional way of buying and paying for the full application. The results of the evaluation process validate the acceptance of such a system and the need of farmers to have access to sophisticated services at affordable prices. Cloud providers manage the infrastructure and platforms that run the applications. SaaS is sometimes referred to as "on-demand software" and is usually priced on a pay-per-use basis. SaaS providers generally price applications using a subscription fee.

In the SaaS model, cloud providers install and operate application software in the cloud and cloud users access the software from cloud clients. Cloud users do not manage the cloud infrastructure and platform where the application runs. This eliminates the need to install and run the application on the cloud user's own computers, which simplifies maintenance and support.

2.CLOUD BASED FARM MANAGEMENT

Farm management deals with the organization and operation of a farm with the objective of making a livelihood whilst dealing with global trade, traceability and consumer requirements, agricultural policies, environmental requirements, and the multi-functionality of agricultural enterprise as a whole.Cloud became more attractive and easy to use for everyone and people became more familiar with Cloud environments. Besides, Cloud computing means resilience, confidentiality, secure identities, interoperability and safe electronic services for data and documents. This is an adequate environment for data storage, aggregation and retrieval, available anytime and everywhere. If the potential offered by Clouds is exploited for citizens it will be possible to have Cloud computing support for an enabled cost-effective

interaction with different services, in our case with farm management systems and with e-Government services . Cloud services-based system, using advanced computer technology, automation and communications to increase product quality and business development in the area of farming. The integration between Cloud Computing and farm management systems will generate products and services which can be immediately used. Cloud platform, as a support for services based on the specific ontology of the agricultural activities .The application of Cloud Computing and Internet of Things in agriculture modernization, will solve the problem of farmers in China. Moreover ,visualization, SOA, technologies can help in realization of an plan factory that is completely automatized. Cloud accessible software services which consider economical efficiency, ergonomic aspects at the farmer's work place or the influence that other system or adjacent phenomena could manifest(climatic, hydrological, specific data access, laws, etc).The classical directions to act, implemented at the moment both in Romania and internationally aim to give solutions for the automation of the agricultural activities and services for the business development in agriculture and related domains. It intends to introduce cloud computing model with two core parts in it. The first part is to monitor and fulfill user requirements with a user-friendly and faster approach, and the other one to store all relevant data in a centralized location – cloud. For farming, the most important functions should be getting as much information as possible for daily decision-making, and possibly share information and knowledge with neighbouring farmers. This also includes integration in a sensor data network. Many of these applications or systems already exist, but they are proprietary and because of their poor interoperability, investment and maintenance costs are relatively high. Cloud computing has the potential to solve some of these issues. For agri-logistics, all the selected applications should have the same practical benefits as cost reduction, better coordination and better information for decision making by ensuring the real-time exchange of very large amounts of data, and the proactive control of processes leading to increased efficiency and effectiveness. By using cloud computing database, information management of specific processes of plant production becomes possible and this allows cloud computing management of relevant records and storing of data related to production performance shown by individual plant and plant groups, analyze and compute, make production plans, etc. This include automatic analysis of key problems occur in specific process of production, like analysis of potential management defects, measurement and analysis of productivity and property based on productivity curve.

3.OVERVIEW OF EXISTING SYSTEMS

The existing system includes each process is isolated from one another and integrated at a specific servers on cloud. This helps in management of all processes. Current systems works based on different API's which offers the possibilities to run on cloud architecture.The design is based on Service-Oriented Architecture (SOA). SOA facilitates provision of compound services covering whole customer processes, where a customer may be either a citizen or an enterprise. The Existing systems faces issues with integrating the data from different cloud servers. Insufficient agricultural infrastructure and support facilities, Insufficient institutional capacity to deliver farmers specific services, Lack of awareness regarding suitable agricultural methods among the farmers, Agricultural content development and its up gradations, Ownership issues of the public and government generated data, Inadequate use of Public-Private Partnerships, Lack of "Common Platforms" for the farmers, Absence of an "Agricultural Think-Tank", Insufficient use of ICT for agricultural purposes, etc. As the main source of application is to sync the data servers from cloud, the latency on fetching the data proves the disintegrity on sync. This leads to severe impact on the cultivation factor, as the agriculturalists depends on this data for cultivation.

4.PROPOSED APPROACH

The proposed system has the integrated solutions on agriculture across different requirements on cultivation factors. Epidemic services for cloud architecture where all the services portal is maintained and synced worldwide across many different countries. It is mainly required to share across information with other users. Farmers cloud access diverse set of information and data related to farm ,in an integrated and unified approach in order to take informed decisions or to be supported in decision making process.

The overall objective of the proposed solution is to create an intelligent, integrated, cloud services-based system, using advanced computer technology, automation and communications to increase product quality and business development in the area of farming. In present, adding dedicated access to the underlying infrastructure through a specific APIs offering possibilities to run application on the Cloud. That means in the same way power, control, and efficiency. Clouds are most often serving developers or businesses, or Large Enterprises as a new way to host applications. Agricloud application displays the farm status information such as temperature, humidity and then displays workflow information: current step, future actions, etc. Information system based on cloud services accessible through mobile devices, to increase product quality and business development farms.

- The proposed system uses the concept of cron jobs, which performs the immediate on time sync to the data servers.
- The real time notification about the status of the climate conditions and the up to date status is provided on the proposed system.
- No Latency issue has been faced with GAE.
- Proposes the high scalability on Application servers which is used to serve many users at time.

5.TRENDS IN FARM FARM MANAGEMENT

5.1Technology-based Solutions

Applications of e-Agriculture in intensive agricultural systems in developed countries are gearing towards using sophisticated technologies to improve the quantity and quality of production, in order to maximize profits. This is the case in precision agriculture in which farmers are harnessing computer and satellite technologies to cut costs, improve yields and protect the environment; and e-commerce (or e-marketing) in which the marketing and sale of agricultural products is conducted over electronic networks such as the Internet and extranets. On the other hand in many developing countries farmers‟ access to information is improved through grass root level initiatives of using ICTs as well as distance education modalities to enhance the knowledge base among service providers.

5.2 Precision Agriculture

In precision agriculture or site-specific farming, farmers are using ICTs and other technologies to obtain more precise information about agricultural resources which allow them to identify, analyze, and manage the spatial and temporal variability of soil and plants for optimum profitability, sustainability, and protection of the environment.

5.3 E-Commerce in Agriculture

Improved productions and high yields result in the need to look for profitable markets beyond local communities, and electronic markets are providing an opportunity to farmers to market and sell their produce to buyers at the global level. Electronic commerce (ecommerce), simply defined as the general exchange of goods and services via the Internet, is already having a significant impact on agriculture. farms had already bought or sold agricultural products on the Internet[6] and Goldman Sachs had estimated that 12% of all agricultural sales in the U.S. would be conducted over the Internet in 2004, compared to only 4% in 1999[7]. Further, a study conducted by Rockwood Research on Internet use by commercial farmers in the US found that farmers were primarily using the Internet to access information on commodity prices, weather, farm chemicals, and machinery. The study also showed that farmers were migrating quickly toward Web-based transactions such as purchasing seed, crop chemicals, and farm equipment on the Internet.

6.ARCHITECTURE OF CLOUD-BASED FARM MANAGEMENT

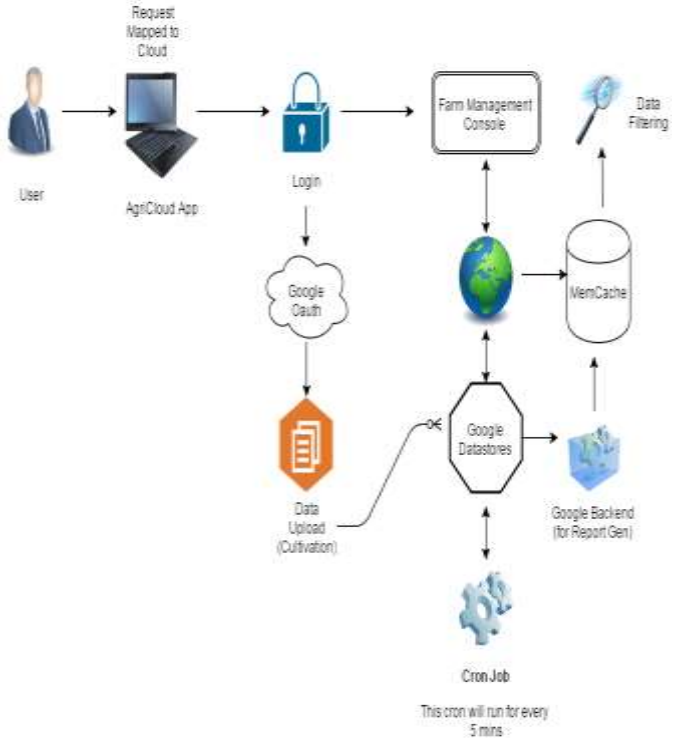

Fig-1,System Architecture

6.1 Cloud Agro System: This part of the system can be used to monitor the overall functionalities of the system and render the needed services. The system will have online service facilities available to all the users, from any part of the country and at any time. In order to render these services, the Agro system may have the following service:

6.1.1 Demand-supply: It can provide an up to date picture of the current demand and supply information of agro products in different parts of the country. It helps the farmers in deciding on selection of the crops. It also provides room to go for a comparative analysis of the demand and supply chain.

6.1.2 e-Knowledge sharing: The system also keeps provision to have online communication with the experts/consultants and attend online training programs using the Community Service Centres (CSC) as the local information bases. The system is not restricted to only local information; cloud agro is a global ICT approach. The system, therefore, will collect and disseminate agriculture related global information to the local farmers. This will be specifically useful if they need information. Also farmers can be made aware of recent agro related concepts, such as "Organic cultivation" using this global ICT approach.

6.2 Data store: It is a central data bank and it can be used to store all the agriculture related information in a centralized cloud, which will be available to all the users at anytime, anywhere. The main concept behind having an data store is to disseminate vital information to the local farmers in decision making. In order to do so, the e-data bank includes the following databases:

6.3 Crop related information: It captures information related to all the crops grown in recent past in different regions. This will help the local farmers of different parts of the nation in crop related decision making.

6.3.1Weather information: It stores the region specific weather information and also the weather forecast for a specific duration. It will benefit the farmers in decision making related to selection of crops.

6.3.2 Soil Information: Soil information also plays a vital role in crop related decision making. So, this section provides information on nature of soil of different parts of the country. It can also provide the trend of soil in past and will help in forecasting the future trend of soil.

6.3.3 Growth progress monitoring: It monitors and captures data on crop growth in different regions on a regular interval. This will be specifically useful in comparing the crop growth region wise and also comparing it with past data will bring a clearer picture.

6.3.4 Farmers Data: It captures the region wise farmer related data, to monitor and study the involvement of farmers in agricultural sector. It will help the policy makers in designing agricultural policies. This will also help in identifying the core agricultural areas, so that the policy makers can take decision on encouraging and promoting agriculture. This may help in overcoming problems such as unemployment and rural-urban migration.

6.3.5 Expert Consultation: It provides solutions to common problems that farmers frequently experience. It can also have a provision to post unattended problems seeking for solutions from the experts. It will also have a bundle of frequently asked questions (FAQs) and their answers to make the response reach the farmers faster. Based on the above stated system, the paper suggests the following model to implement cloud computing as an ICT tool in Agricultural sector. The suggested model, if implemented properly, will benefit all the concerned sectors to a great extent.

6.4 Data management: The data will be managed by the service provider, a team of professionals. That guarantees a better and organized management of data.

6.5 Data readiness: The model provides data from the e-data bank databases to its entire stakeholder at any time and at any location.

6.6 Local and global Communication: The model makes the communication between different users much faster, easier and cheaper. Also the communication will be secured.

6.7Rural-urban migration: It can be reduced as the model provides its services all over the country at any time no matter how remote the place is. This will also help in controlling unemployment problem in the country.

6.8 Motivation: It will motivate the farmers and researchers to get involved more and more into agriculture as any communication will be result oriented. That will result in overall development of this sector in the nation.

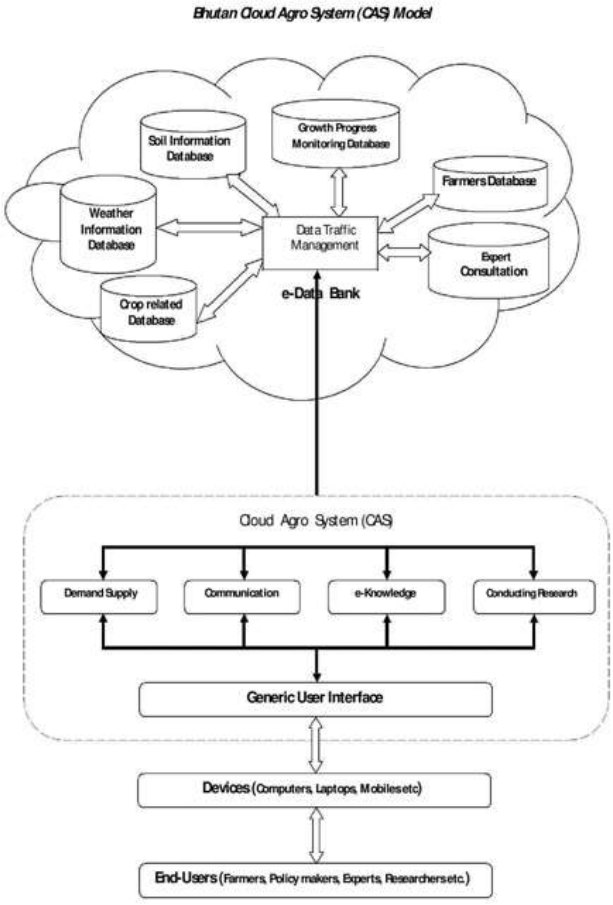

Fig-2,Cloud Agro System

6.9Security: It provides an enhanced security as the resources will be stored in cloud and will be maintained centrally by the service providers. Thus, it is not a cause of concern for its users.

6.10 Reduction of technical issues: It cuts short the man power, maintenance and infrastructure requirement drastically, as it will be provided by the service providers.

6.11Overall economy: Implementation of the suggested model will help in uplifting the Agricultural sector of the country. That will boost the overall development of the economy. It is due to the mass involvement of different stakeholders, as the system will monitor and deliver progress report whenever and wherever needed.

7.SMART AGRICULTURE

While world agriculture is undergoing industrialization, it is important to develop agricultural informationization at the same time. Agricultural informationization has become the trend of development for world agriculture. As far as China's agricultural development is concerned, agricultural informationization is a major force promoting agricultural development and transformation and a corner stone for maintaining sound and sustaining economic development. In recent years, we have been focusing on agricultural information service and infrastructure development. After years of hard efforts, remarkable results have been seen in agricultural infrastructure development, like "Every Village" project of Ministry of Industry and Information, "Golden Agriculture project" and "Three Dian Project" (computer, TV and telephone network coverage in rural area) of Ministry of Agriculture. These infrastructure provided foundation for agricultural information service. However, problems still exist in China's agricultural information. For example, we put more emphasis on hardware than software and can not provide high quality information to meet production needs of farmers. Moreover, information is not sufficiently used by farmers and the effect of information on agriculture, famers and rural area is not that notable. To change this situation and promote fast development of agricultural informationization, it is necessary to use cloud computing and visualization technology to construct "agricultural information cloud", combine IOT technology and RFID technology, so as to realize smart agriculture.

8.THE PROSPECT OF APPLICATION

Intelligent farm IT help farm managers timely access to various production and management information. Using these information to manage field scientifically can reach the aim of increasing production, improving quality, reducing production costs, promoting circulation of agricultural products and achieving better economic benefits. It can also solve the problem of lack of agricultural technical personnel and popularize science and technology effectively.In order to promote the widely use of IT in intelligent farm, firstly, government should give policy support; guiding and nurturing are the most import. Because the investment in IT is still relatively large, some preferential policies that are different from other industries should be given in terms of taxation and financing. Secondly, with the deepening of urbanization reform, the field managers need to manage large areas of farmland and improve agricultural productivity by means of information. In addition, participation in joint construction and development of information technology companies should their ideas and unify technical standards, reduce barriers, reduce the costs of the construction of farm information.

9.CONCLUSION

Agricultural production need to develop, stay in the traditional scale production and management mode, which is unable to adapt to the demands of modern agricultural development, we must follow the road of the scale and modernization. The production, management and operation of the difficulty must increase because of the increasing scale. So we must use information technology to improve the production, management and operation level. An SOA is proposed based on GAE to sync different cloud servers across globe and integrate the datastores. It enables the data to be widely accessed by all the users targeting the agriculturalists. This application uses the cron job for fetching the data

irrespective of the user action. The cron job works on the asynchronous prototype, where the process automatically fetches the data from the cloud servers configured.

REFERENCES

[1] TongKe,Fan"Smart Agriculture based on Cloud Computing on IOT" Journal of Convergence Information Technology 8,no.2(2013).

[2] Chen,Xingand Linpeng Zhai"Study on the Application of Intelligent Farm" In 2014 International Conference on Computer, Communications and Information Technology (CCIT 2014) Atlantis Press,2014.

[3] Cellary,Wojciech and Sergiusz Strykowski "E-government based on cloud computing and service-oriented architecture" Proceedings of the 3rd international conference on Theory and practice of electronic governance,ACM,2009.

[4]Kaloxylos,Alexandros,AggelosGroumas,VassilisSarris,Lam pros Katsikas "A cloud-based farm management system:Architecture and implementation" Computers and Electronics in Agriculture 100(2014).

[5] Robert Eigenmann,Frederick Teye,Zoi Politopoulou,Sjaak Wolfert,Claudia Shrank "Farm management systems and the future internet era"Computers and Electronics in Agriculture 89(2012).

[6] Kaivosoja, Jere, M. Jackenkroll, Raimo Linkolehto, M. Weis, and R. Gerhards. "Automatic control of farming operations based on spatial webservices." Computers and Electronics in Agriculture 100 (2014): 110-115.

[7] Armbrust, Michael, Armando Fox, Rean Griffith, Anthony D. Joseph, Randy Katz, Andy Konwinski, Gunho Lee et al. "A view of cloudcomputing." Communications of the ACM 53, no. 4 (2010): 50-58.

