A survey on: Cloud Enabled Agricultural Management

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Abstract:

Cloud enabled storage of electronic data is playing the important role in agricultural field. Cloud storage allows the storage of large data related to the agricultural sector, which enable farmer to take the proper and appropriate decision in cultivation. Recently many researchers have studied the cloud system for different services provided by the cloud. Recent researches have also added the feasibility to the existing cloud based system by addition of the mobile application. A mobile application allows the farmer to receive or upload the information related to the cultivation and information related to the soil moisture, temperature.

Keywords: Cloud storage; agricultural management; WSN; farming

I.   INTRODUCTION:

Continuous and constant evolution in the computer technology leads the research in agricultural field. Recent development in IT has made greater impact on social, economic and production development [6]. Cloud computing is considered as the third pillar or third IT wave after computer technology and Internet Technology [1].

Currently much research is being done in the field of agriculture in the different countries. Many companies in IT such as HP, Google, Microsoft, IBM etc. have realized potential opportunity in the field of cloud computing, and is being used in various areas [6].

Cloud computing successfully used in manufacturing, medicine, financial services etc. Cloud Computing would play a very critical role in the field of Agriculture if implemented effectively and efficiently [6].

- **Cloud Computing Technology:**

Cloud computing allows sharing of computing resources instead of having local servers or personal computer devices to handle the applications.

The word cloud is used as a metaphor for "the Internet" [1]. Cloud computing is a *"Internet-based computing",* where different computing resources such as storage, servers and applications are provided to an organization through the Internet [6].

- **Features of Cloud Computing:**

Here we will have look on different cloud services –

1.   **On demand self-provisioning of resources:** A consumer can individually provision computing Capabilities and resources, such as processing capability, software and storage [1].

2.   **Utilization of Internet technologies**: These services such as URLs, HTTP, and IP which give customers maximum benefit from network resources.

Pool of resources: In cloud computing resources are shared at application level, host and network

level. Different physical and virtual resources are dynamically assigned and reassigned depending on consumer demand [1].

3. Massive scalability and elasticity: Cloud computing gives customers the ability to increase the resources if the area of application grows or new functionality is needed [6]. On the other hand if requirements become less, [6]the user can request to reduce resources, [1]taking into account that they are not paying for resources.

II. LITERATURE REVIEW
A. Cloud enabled agricultural system:

K. D. Yesugadeet. al. "Agro-Sense: A cloud-enabled mobile app helps in improvements in the farming activities. Author proposed the system based on cloud and WSN to give more flexibility and reliability to the system."

In [1] a cloud based system is proposed to offer the large storage space as well as the past agriculture records to the farmers. This system provides the facility to the smart phones (farmers) that they can download and upload the data from the cloud servers. Thus system provides the maximum flexibility to the farmers. This system uses the Light, Temperature, and Humidity and Soil moisture will be the various WSNs.

The main task of the sensors is to sense and measure the environmental data from the fields. Sensors will send the notification to the farmer about the water level, temperature etc. When the water level in the field reduces, the farmer will get notification. This notification helps farmer to switch ON the motor through his Smartphone. The motor will get switched OFF automatically when the sufficient water supply is provided in the farm up to the threshold value [1].

Farmers of our country lack behind in case of proper facilitation Smartphone will be used in this system which makes thework easier [2]. This system consists of two parts: one mobile application and one web portal [1].

B. iFarm: Development of Cloud-based System of Cultivation Management for Precision Agriculture:

Yukikazu Murakamiet. al. [2] a systemof cultivation management, iFarm system is proposed to developed to support effective farm management. This system consists of smart phone applications, Web browsers and a cloud server [2].Farmers on farmland can easily refer to work plans and can enter field data into the cloud system. Farmers can share field data with head office in real time by using Smartphone [2].
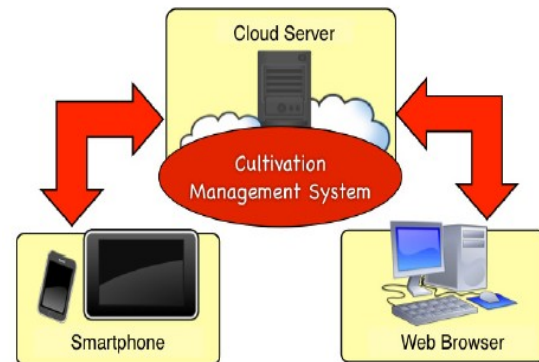

Fig1Cultivation Management for Precision Agriculture

Agriculture expert at head office can analyze data in the cloud system using a Web browser and estimate farming costs and formwork plans based on their analyses [2]. This system helps farmer in cultivation process by using their work plans and allowing them to enter data in real time [1,2]. The traditional systems are not flexible like this system, as we can access the system from anywhere.

While offering the flexibility to the use of the system, system must be less expensive and affordable.

The system composed of three sub-systems: 1)Smartphone application, 2) Cloud server, and 3)Web browser.

Storage provided the cloud server can be accessedeverywhere from farms and offices. A Web browser is helps to manage field and work schedules [3].The browser can be used on a smartphone, tablet,or on a personal computer depending on the condition andusability requirements.

C. Cloud Computing: Demand and Supply in Banking, Healthcare and Agriculture:

Authors in [2] proposed and developed a cloud-based system tooperate cultivation. The functionalities can be explained briefly to help many farmhousesto manage agricultural work to accomplish cost-effectiveprecision agriculture [1].

Avinashet. al. express the different challenges being faced by the farmers

1. Lack of awareness among farmers about the benefits of ICT in agriculture [3].
2. Deficient production information [3].
3. Inadequate knowledge about the weather forecast, threats from pests and diseases [3].

Above challenges can be easily solved by the cloud computing system. As farmers do not need to know about the software and hardware requirements also they don't need the any kind of training [3]. In this system client (farmer) need to send a request to the service provider and by thorough analysis of request, result will be passed back to the farmer.
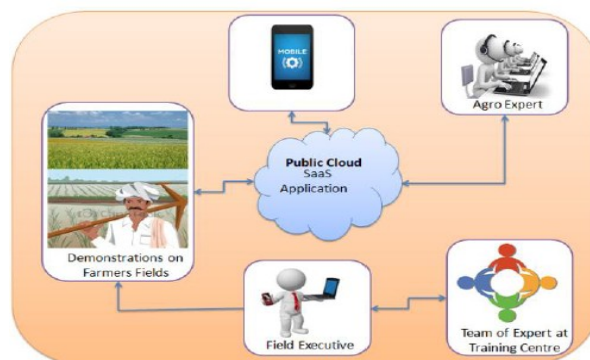

Fig2Cloud Computing in Banking, Healthcare and Agriculture

Cloud computing offers on-demand opportunities through which data sharing and data collection can be done. This increases opportunity in agricultural research and development [3].

Cloud offers centralized storage of agricultural data which helps in analysis and prediction.
There are some services which can be provided by the service providers [3].

1. Prediction of weather and related knowledge database.
2. Database for crop related information.
3. Database for market related information.
4. Database for production related data.

The cloud based system helps farmer to solve their problems by allowing them to get the solution by discussion.A mobile phone application helpsfarmers to contribute to the knowledge database by uploading crop and soil information. Farmers can also share pictures, videos and any other information [3].

D. Discussion on the Application of Cloud Computing in Agricultural Information Management:

Miao Tianet. al. in [4] discussed the status and the problems that in the agriculture information

management of china. Recent advances in agriculture had focused on IT and agricultural services. Different agricultural management information systems have emerged in china [4]. Miao et. al. in [4] "Through years of construction, agriculture information infrastructure has made great achievements [4], such as "agriculture project","villages" project and "three-in-one works" etc.".Qian in the process of constructing agriculture information, there exists some problems such as [4] "overlook software, highlight hardware,low quality of the information may not be able to handle the real needs of farmers. Also farmers cannot implement information impractical and information could not have some impact on farmers and so on" [4].

As the authors of [4] discussed agricultural information resources and services can take different methods to provide the required information that the farmers actually need.In this process services provided changes with the change in the external environment.

Miao Tianet. al. "1st ,it transform information to farmers mainly by face-to-face. Second stage, it transforms information to farmers by media and printed materials. 3rd stage, it transforms information by telephone, network and so on. Also there are some new rural construction areas; they [4] establish" Rural Book House" to transform information. At last stage of cloud computing, it transforms information by convenient terminals and combines the network to obtain the required information [4]."
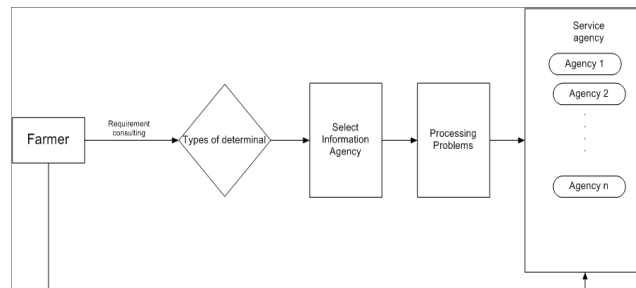

Fig.3Cloud Computing in Agricultural Information Management

E. Review: Using Cloud Computing Technology in Agricultural Development:

Seenaet. al. in [5] discussed the system for past agricultural-work data and the cost control of agricultural products, compared to electrically stored data.

Many of agricultural-work pursuers arerecording agricultural-work record on the paper basis [5].

Seenaet. al "Manyfarmhouses want to manage agricultural-work information,in order to grasp the cost price."

This system stores the agricultural-work data into electricaldatabase through the Web browser [5].

The system proposed in Yukikazu is composed of three sub-systems: 1) smart phone,2) office PC, 3) cloud server.

The PC is used for field and work schedulemanagement and cost control [5]. The data stored in thecloud server can be accessed from the office PC orsmart phone.
Cultivation management and Cost control systems are implemented based on the data stored on theserver. Workers in the field can check work information andsend reports [5].
This system proposes for management of cultivation.Authors conducted a usability

evaluation experimentwith a questionnaire in [5]. At the end system confirmed that thefunctions offered by the system are useful for agriculturalworkers.

Drawback of the system is that the server is not durable. System need to further improved based on thequestionnaire results using including a voice recognition systemwithin own server for the voice memo [5].

III.   CONCLUSION:

Thus in this paper we have studied the different cloud based system used for farming and data base management system. Traditionally paper based records were searched for the prediction purpose, but now cloud based system can be used for storage of large database for data analysis for farming activity. Recently the authors have started research in cloud based mobile application development. Now the in future there must be a system which can enhance the flexibility offered by the cloud system by addition of automatic data collection system. In future the system must be implemented for the mobile application based on cloud enabled system with a further enhancement using wireless node.

IV.   ACKNOWLEDGEMENT

V.   REFERENCES:

[1] K. D. Yesugade1 SonalBathiya ,"Agro-Sense: A Cloud-Enabled Mobile App and Efficient Farming System using WSNs", IJSRD - International Journal for Scientific Research & Development| Vol. 2, Issue 08, 2014 | ISSN (online): 2321-0613

[2] Yukikazu Murakami, SlametKristantoTirtoUtomo, "iFarm: Development of Cloud-based System of Cultivation Management for Precision Agriculture", 2013 IEEE 2nd Global Conference on Consumer Electronics (GCCE)

[3] Avinash Thakur1, Manoranjan Kumar2, Rajan Kumar Yadav3," Cloud Computing: Demand and Supply in Banking, Healthcare and Agriculture", IOSR Journal of Computer Engineering (IOSR-JCE) Volume 16, Issue 3, Ver. II (May-Jun. 2014), PP 96-101.

[4] Miao Tian, Qingli Xia and Hao Yuan," Discussion on the Application of Cloud Computing in Agricultural Information Management",'Research Journal of Applied Sciences, Engineering and Technology 5(8): 2538-2544, 2013.

[5] SeenaKalghatgi, Kuldeep P. Sambrekar, "Review: Using Cloud Computing Technology in Agricultural Development", IJISET - International Journal of Innovative Science, Engineering & Technology, Vol. 2 Issue 3, March 2015.

[6] Wev-Yaw Chung, Pei-Shan Yu and Chao-Jen Huang "Cloud computing system based on wireless sensor network", IEEE , vol 2, Sept. 2013.

[7] Victoria J. Hodge, Simon O'Keefe, Michael Weeks and Anthony Moulds, "Wireless Sensor Networks for Condition Monitoring in the Railway Industry", IEEE Transaction on Intelligent Transportation System, vol. 16, June 2015.

[8] Mr. Mahesh D.S, Ms. Savitha S. and Dr. Dinesh Anvekar, "A cloud computing

Architecture with wireless sensor networks for Agriculture Application", International Journal of Computer Networks and Communications Security January, vol.2, January 2014.

[9] J.M. Reddy and J.M. Monika, "Integrate Military with Distributed Cloud Computing and Secure Virtualization," IEEE Computer Society, Nov. 2012.

[10] Swathi B S. and Dr. H S Guruprasad "Integration of Wireless Sensor Networks and Cloud Computing", IPASJ International Journal of Computer Science, vol 2, May 2014.

[11] DimilJosea, SanathPrasadb and V. G. Sridhar "Intelligent Vehicle Monitoring Using Global Positioning System and Cloud Computing", 2nd International Symposium on Big Data and Cloud Computing , 2015.

[12] Mohammed G. H. and A. L.Zamil"Verifying Smart Sensory Systems on Cloud Computing Frameworks", First International Workshop on Mobile Cloud Computing Systems, Management, and Security, 2015.

[13] YingliZhua, JingjiangSonga and Fuzhou Dong "Applications of wireless sensor network in the agriculture environment monitoring", International Workshop on Automobile, Power and Energy Engine, 2011.

[14] M. Fazio, A. Celesti, A. Puliafito and M. Villari, "Big Data Storage in the Cloud forSmart Environment Monitoring", International Conference on Ambient Systems, Networks and Technologies, May 2015.

[15] EisaAleisa"Wireless Sensor Networks Framework for Water Resource Management that supports QoS in the Kingdom of Saudi Arabia", International Conference on Ambient Systems, Networks and Technologies. 2013.