Factory Farm Cloud

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***Abstract*—Factory farm cloud is basically a cloud for farmers and others involved in agriculture business. It would be a technology that will use Cloud computing along with Big Data and Data Mining. The main feature here would be, that we will be providing consultancy to farmers and as well as a work force to them. Dairy related doubts and consultancy will also be provided. We aim to provide a platform for agriculture related Research. A backend that will be maintained will have records about the quality of soil, weather, crop related data, a growth monitor and agriculture related expert advice will also be given.**

Keywords: Cloud Computing, Factory Farm, Agriculture, internet of things, information communication technology, cloud computing.

I. INTRODUCTION

The rural parts of our country that still solely depend on agriculture didn't have the necessary and required tools that can complement them in their production. They were unaware of the recent progress that has been made which can duly help and maximise their production. They were excellent in skills but not in their growth. Agriculture sector has the required information that could help them in facilitating reports on weather, Current prices, fertilizer quantity and details that are needed for their continuous growth. Information Communication Technology (ICT) has completely changed the face of agriculture and now plays a very specific role in providing services that not only includes reducing the prices but also completely changing the scenario by implementing ICT. Also ICT requires minimal management but provide vast result and services conducive for the growth. Cloud computing and Grid computing basically are changing the faces of agriculture and are considered as an extension of IOT (Internet of Things)

A. Working of cloud computing

Dynamics of agriculture sector and the requirements they have are varied from the different complexes other private or public sectors. They are very much ecology and geographically dependant and therefore, do require human involvement to a certain extent. Cloud computing and Grid computing basically are changing the faces of agriculture and are considered as an extension of IOT. IOT is enabling digitization to a large extent involve objects that are already enabled with Internet and hence is used with the web services that can be implemented with the objects. Sensors, smart phones are the underlying technology of IOT. The main motive of IOT is to use every physical thing as a computer which obviously is connected with the Internet and is able to receive and send from where they are physically situated.[4]

Cloud Computing is the best new approach that has been convenient and on demand recently. It is a new paradigm that is used for non-static and very controlled sharing of computing resources that are usually maintained on sophisticated data-centres which is based on the network of Virtual Machines that run on various physical machines. It provides maximum help with minimum maintenance to provide assistance and convenience to the user when he asks to access this pool of computing resources. Computing resources here are counted as networks, applications, storages and even services to require minimal management effort or service provider interaction. Clouds can be public or private or even hybrid in nature and are able to provide services in many available forms like

- Software as a Service [SaaS]
- Platform as a Service [PaaS]
- Infrastructure as a Service [IaaS]

Therefore, an Agri-Cloud concept would be conducive and can give solutions to many problems that are related to agriculture [3].

Clouds are modifiable that means they are scalable very easily and can be used by an expert group or by farmers. They allow you to store loads of data for historical reference and can be referred for expert opinion or while making a decision. Scientists can add their suggestion can provide discoveries, usage of fertilizers and also has information about pricing of cultivation and seeds.

B. Operational aspects

Factory Farm Cloud when implemented would basically work in layered architecture form where every layer below will provide services and facilities to every layer up. Not only Farmers but people with an expertise in agriculture would interact with other members that would also include officials from government. SaaS layer in cloud will help the experts to gain information to update in database which would be collected from various other sources. Farmers will achieve the solutions through expert systems that is trying to be available for them in their local languages.

Than the next layer would be PaaS which would help the interacting person by constituting of Application Program Interface that will help process and perform an analysis on the given collected data and provide security. It would be made sure that the data made available to them is authenticated and provides expertise solution to

the farmer in their required domain. The services will process the data and convert them in a unified format and would be stored as knowledge based and that may act as IaaS. That will be basically be used to provide solutions to the farmers. The data can be segregated into Image data, Statistical data and Business Related data and they would be stored in suitable database. Appropriate encryption and decryption can be performed if required on the data to keep sharing of data limited to a secured format.

The data storage will include infrastructure provisions that will have facilities that would help in getting accurate results. Image knowledge would help in making decisions based on the images that are available Statistical Database would allow to make us decisions on the basis of quantity of seeds needed, amount of fertilizers required, and also the quantity of seeds that may be needed. Business Knowledge Database would complement in taking decisions related to monetary and business purpose. Comparing business region wise and calculating business from any particular decision is possible.

The main goal is to provide cheap, reliable and expert mentorship to farmers in rural and less-developed areas to solve their day-to-day problems using the database PaaS, IaaS, SaaS. If there is any image data it could be sent to the image expert system and the crop disease would be identified and apt fertilizer and remedy would be given for the cultivation land. Data in the database extracted from various domain experts and which form the knowledge base is tried to be kept in a very structured format. There are also many ways by which we use for representation of data. If-then rule could be applied for knowledge representation

Dairy related doubts about the unusual colour of milk or unhealthy symptoms of animals in the milk business can be solved here. There can be data maintained about the agriculture related complementary business such as poultry farming too that may be as an aid to the income of farmers. Relevant and authenticated data about the work force that can be used in agriculture and correct information is also planned to be structurally stored and contacted to when required.

II. COLLECTION OF DATA

Collection of data can be done by remote sensing. It can also be the seasonal data. Data may also belong to records relevant to sampling of any type of the soil. Data can be collected by drawing some inference from the conditions of the crop. We can also gather data by monitoring the yield. We can collect data by proper samples and updating the records of the inferences and conclusions gathered through it. Moisture of data can also be used for gathering the data for future inference and reference. [5]

III. FUTURE PEROSPECT

IOT can be an integral feature that we would implement along with cloud portals that may help in gathering and providing solutions to farmers. Major IOT technologies that will be used may include radio frequency, technologies used for identification and sensor technologies too. IOT is an intelligent technology that basically comprises of identification, sensing and intelligence. IOT helps in identifying patterns, sensing, collecting information and processing. Smart agriculture would soon be a reality that would be conducive for the growth of India's economy as such and also growth of farmer and his economic stature.

IV. CONCLUSION

Implementation of cloud and IOT can change the scenario of agriculture sector. With availability of advanced sensors, better cloud platforms and high processing mobile devices it is also practical to implement such solutions. Now it is practical to design a system where most of the operations can be controlled with smart phones. All the technologies which are used in the background are scalable. We can also implement a feature where people can contact other people and will create more opportunity for employment. However the overall system will be complex but will be much easy to maintain.

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