

A Travelogue on IOT - Cloud Computing Based Agriculture Management

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ABSTRACT: Issues concerning agriculture, countryside and farmers have been always hindering China's development. The only solution to these three problems is agricultural modernization. However, China's agriculture is far from modernized. The introduction of cloud computing and internet of things into agricultural modernization will probably solve the problem. Based on major features of cloud computing and key techniques of internet of things, cloud computing, visualization and SOA technologies can build massive data involved in agricultural production. Internet of things and RFID technologies can help build plant factory and realize automatic control production of agriculture.

KEYWORDS: IOT, Cloud computing, Agriculture management.

I. INTRODUCTION

Issues concerning agriculture, countryside and farmers have been always hindering China's development. The only solution to these three problems is agricultural modernization. However, China's agriculture is far from modernized. The introduction of cloud computing and internet of things into agricultural modernization will probably solve the problem. Based on major features of cloud computing and key techniques of internet of things, cloud computing, visualization and SOA technologies can build massive data involved in agricultural production. Internet of things and RFID technologies can help build plant factory and realize automatic control production of agriculture.

II. RELATED WORK

WHAT IS CLOUD COMPUTING???

Cloud computing is a kind of computing method based on the internet, which enables shared software and hardware information to be delivered to computers and other equipment on demand. Cloud computing describes a new way of adding, using and exchanging IT service based on the internet which involves providing dynamic, expandable and most of the time virtualized resources by using the internet. Generally speaking, cloud computing have the following five features: on-demand service, internet access, resource polling, rapid elasticity and calculability.

Why IOT is essentially needed???

IOT is defined as put sensors in electricity grid, railway, bridge, tunnel, road, building, water supply system, dam, oil and gas pipes, appliance, etc., and connect the internet, so as to operate certain programs and realize remote control. IOT technologies include radio frequency identification technology, sensor technology, sensor network technology and internetwork communication, all of which have been involved in the four links of IOT industrial chain, namely, identification, sensing, processing and information delivery

How it can be implemented???

The architecture of a agricultural information cloud technology consists of four layers: physical resource layer, resource pool layer, management of middleware layer and SOA construction layer. The physical resource layer include various kinds of resource servers, memories, internet facilities, database and software in relation to agricultural information the resource pool layer builds a large amount of resources of the same kind into isomorphic or approximate isomorphic

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resource pools, like computing resource pool and data resource pool. Management of middleware layer is the core for agricultural information cloud. It is responsible for management of cloud computing resources and dispatching of various kinds of tasks, so that resources can serve application with higher efficiency and security; the SOA construction layer encapsulates cloud computing capacity into standard Web Services and incorporate them into SOA system for management and using, including service registration, searching, visiting and constructing workflow for services.Fig.1.

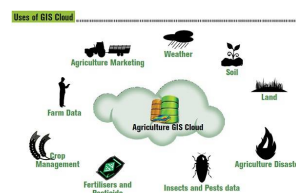


Fig 1. Agriculture and Cloud

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II. PROPOSED SYSTEM

The main aim of the proposed system is to analyze the study and application of Cloud Computing and the Internet of Things on agriculture and then we put forward an idea that making a combination of the two techniques and analyze the feasibility, applications and future prospect of the combination. The application of cloud computing will contribute to the rapid development of agricultural economy, speed-up the modernization process of agriculture , and open up a vast range of prospect for agricultural economy information. . The IOT offers tremendous potential to innovate in agricultural field.

How our idea can be benefited??

- Cloud computing in planting management-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.
- Cloud computing in estimation of productivity effect and management measures: Cloud computing estimates productivity effect of plants with production function constructed by using computer simulation and mathematic modeling.
- Cloud computing in tracing and control of farm produce security: By using information technology of computer network, cloud computing is able to build a tracing system for regional farm produce, thus enhances security monitoring of farm produce.
- Cloud computing in monitor of plant growing: Cloud computing is able to identify the growing of plants by using pattern identification technology and perform dynamic monitor of plant growing with help of other sensing equipment.

Construction of plant factory based on IOT : IOT technology in terms of modern farm produce mainly consists of soilless culture and culture solution control technology, artificial photosynthesis technology, growing environment control technology(carbon dioxide density, humidity, wind pressure and speed) intelligent irrigation technology etc.IOT technology and method is used in farm produce production with plant factory technology as integration.

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Fig 2. Agriculture and IoT

III. EXPERIMENTAL RESULTS

How it will be Useful???

- ❖ Safety of agriculture product: Food safety traceability system is an application in IOT. Consumers can get a receipt which contains retrospective food safety code to know all the information on origin place, abattoir and quality supervision about the product.
- ❖ Agriculture information transmission and Intelligent Detection : Information like climate, soil acidity and alkalinity, seeds selecting, fertilizer, insects' control, seeding cultivation and reaping are so vital to farmers. With real-time sensor to monitor crops' condition in irrigation and soil air and gather data about temperature, humidity, wind force, atmosphere, rainfall capacity, nitrogen concentration and pH value of soil to make correct prediction, it finally helps farmers to cultivating wisely and avoids disasters.
- ❖ Intelligent cultivation control: Intelligent cultivation control is a significant sign in modern agriculture and forestry. We can get parameters which have influence on agriculture parks environment in time and monitor the whole parks by installing an ecological information wireless sensor as well as other intelligent control system. According to the parameters, the workers control infrastructures like irrigation system and heat preservation system to make sure the perfect growing conditions for crops.

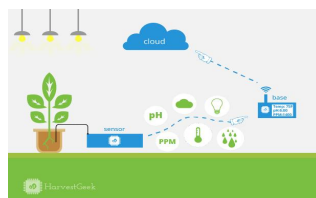


Fig 3. Agriculture with Cloud and IoT

How our idea can be benefited??

- Improvement in the use efficiency of Inputs (Soil, Water, Fertilizers, Pesticides, etc.)
- Reduced cost of production.
- Increased profitability.
- Sustainability.
- Food safety.
- Protection of the environment.

IV. CONCLUSION

IOT is closely related to cloud computing in a way that IOT obtains powerful computing tools through cloud computing and cloud computing finds the best practicing channel based on IOT. Agricultural information cloud is constructed based on cloud computing and smart agriculture is constructed with combination of IOT and RFID. Hardware resources in agricultural information network are integrated into resource pool by using vitalization technology, achieving dynamic distribution of resource and balance of load, significantly improve efficiency of resource using. Large amount of data obtained by using radio frequency identification, wireless communication, automatic control, information sensing techniques of IOT are handled with agricultural information cloud, truly realizing smart agriculture.

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