

**RESEARCH ON THE APPLICATION OF CLOUD COMPUTING IN MEDICAL FIELD****Muhammad Shahid F.\* and Kadher Nivas R.**

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Article Received on 18/02/2019

Article Revised on 08/03/2019

Article Accepted on 30/03/2019

**ABSTRACT**

Cloud computing is a model which provides on-demand delivery of Information Technology (IT) related capabilities or resources through the Internet to the outside world. Despite the advantages of cloud computing, the security of the data and resources is still doubtful which affect the cloud adoption. The raising amount of personal and confidential data brings up attention on storing the data securely. Data can be composed of financial transactions, vital documents, and multimedia contents. In a broad sense m-health represents the delivery of healthcare services through mobile devices, the function of which is to capture, analyze, store and transmit health information from multiple sources, including sensors and other biomedical acquisition systems. This paper surveys IoT for healthcare together with services and applications, security and technologies for promoting the corresponding services. In addition, this paper is going to invoke cloud-based technology and health IoT including Internet of medical things. Next, current standardization activities and recommendations are outlined. Proposals for the future work conclude the presentation. Paper also shed light on the constraints associated with cloud adoption for medical field. Paper concludes that medical field can take advantage of cloud services to offer novel patient care applications, reduce costs and management, and ultimately provide quality healthcare services.

**KEYWORDS:** Cloud Computing, Cloud Security Challenges and services, Health Care.**INTRODUCTION**

Cloud computing is a model that enables the development, deployment and delivery of products and services to the customers with a pay-as-you-go model. It is a service model that involves the idea of storing and accessing the resources over the Internet rather than storing them on premise. Basically, cloud computing has motivated academia, industry, businesses to take over this technology to host their applications on the cloud so as to cut-off the cost of buying the on-premise local server. As per Gartner survey<sup>[1]</sup>, the cloud market is anticipated to rise from \$76.9B in 2010 to \$210B in 2016. These revenues connote that it is a promising platform.

Cloud computing as a new business model has a profound impact on the entire computer industry. Cloud computing will be integrated into the Medical applications of various University and research cantors, which will be over the years accumulated business and medical knowledge integrated into the Cloud computing, will reflect a deeper level of value.

Cloud computing research is nearly two years to become a hot spot, on the Cloud computing research, from abroad, mainly some of the world's leading large-scale IT companies in the promotion and use, such as Google, IBM, Sun, Souq, Awak, Nadi, Microsoft, These

companies have more mature corresponding Cloud computing products and services in sales. In contrast, the relevant research in the domestic cloud computing is in its infancy, the main task is still in the stage of promoting the concept of cloud computing, but at the same time, we can also find that some companies have launched a cloud-based Of the related products, such as Ali software proposed 'e-commerce cloud computing center', eight hundred customers launched a cloud-based CRM system.<sup>[2]</sup>

In the recent years, the cloud computing hype has attracted many businesses, organizations and institutions that require collaborative, flexible, scalable and cost effective computational infrastructure. Healthcare industry too is getting fascinated by this surge. Leading information technology (IT) companies like Google, Microsoft, and Amazon etc have extended their cloud services for medical world.<sup>[3,4]</sup>

This paper is structured as follows. We start with presenting IoT for healthcare and cloud computing in medical field. It highlights services and applications, security as well as appropriate technologies. Next section is going to describe cloud-based technology together with health also IoT. Standardization activities and frameworks, together with proposals for future work conclude the presentation.

**Research status at home and abroad**

At present in Saudi Arabia medical and health authorities have increased the importance of health care and national health issues, and adopted a series of measures. Saudi Arabia increase health investment, relying on science and technology to develop health industry, to lift, reverse and reduce the spread of chronic diseases and health hazards and other development goals. It is the responsibility of the government to establish a system of access to basic medical and health services for all. Saudi Arabia will have to achieve 'everyone is healthy' development goals by 2020.

While in the foreign health care cloud has been developed to a certain stage. As early as 1996, the United States applied cloud computing to the medical field, when a group of doctors led by American medical scientist Craig and Mark Smith used Microsoft's development tools to pool hundreds of information across all hospital patients. Of the health information, as a real-time medical diagnosis and treatment of auxiliary information system, this forward looking attempt to obtain an unprecedented success. Azyxxi software provides physicians with integrated, rich patient information, including file scanning, electrocardiogram, nuclear magnetic resonance, PET scanning, X-ray fluoroscopy, dynamic imaging and ultrasound images, which greatly improve work efficiency and diagnostic accuracy. Later, Microsoft acquired Azyxxi, and based on cloud computing to establish a set from the clinical development of a set of medical information solutions development strategy.

At the same time, some well-known medical research institutions have begun to use the 'healthy cloud'. Harvard Medical School is one of the earliest medical institutions to deploy and use the cloud computing platform, and its private 'medical cloud' has become an indispensable part of its daily medical and research work.<sup>[2]</sup>

**Research significance**

Cloud computing used in the construction of regional medical information, you can use less cost to enhance the level of the overall information industry to speed up the IT industry changes, the rapid response to social needs. Cloud computing can also provide data storage services for the medical field, reducing the company's investment in storage devices. Cloud computing with its multi-copy data backup redundancy technology for enterprises is to bring data management convenience and security. Cloud computing is also virtue of its own characteristics for enterprises to provide resources and information sharing services. Thus, cloud computing technology for pharmaceutical companies, including software, platforms, data storage, infrastructure, communications and hardware, including a variety of forms of application services for medical institutions to provide efficient, low-cost technology solutions. Its own highly reliable, easy to manage and other characteristics, greatly reducing the

enterprise in the information technology investment costs, which will be in the medical field, have been more and more widely used.<sup>[2]</sup>

**Cloud computing services for the medical field**

The key to the development of medical and health information lies in the sharing of information, mobility and intelligence application with patient as the center. Therefore, only through the advanced means of information technology, the establishment of shared services and health services in the whole link are to achieve synergies and integration in order to promote the medical institutions of the flexible flow of resources and structural optimization. Based on this situation, the establishment of a new medical system platform is imminent. This requires a new platform for its services, based on internet cloud computing platform will play an important role in which. In the construction of medical and health information, through the cloud computing provided by a variety of virtualization services, can be a good solution to the problems at this stage.

**Online and Data software services**

For hospitals, the unified online software service provided by cloud computing providers is able to support almost any type of medical software application to be performed by the hospital and can be instantly updated and maintained online. In addition to the hospital can be customized according to their needs in different software applications, but also can be shared by a large number of systems connected together to form the infrastructure. This service greatly reduces the cost of the hospital at the time of payment of software licenses, only need to pay when the service costs.

The data storage service provided by the cloud computing service provider, the construction of the medical information integration platform, the integration of the business processes between the hospitals, the medical information resources in the hospital to get the necessary sharing, especially in the search and access to external information (such as other Hospital specialties) and the patient in the hospital referral, through the medical information integration platform, the patient information to get the necessary collection and storage, and the relevant information will be added to the electronic health file, other hospitals if necessary, can be very Easy to get.

**IoT for healthcare**

Starting from the potential of IoT-based healthcare technologies, a lot of experiments are carried out worldwide. The obtained results are optimistic in the domain of numerous applications, services and prototypes. Network architecture and platforms as well as interoperability and security are included, too. As initial IoT based healthcare technology, the wireless sensors networks (WSNs) are considered. The IP-based sensor networks using IPv6-based low-power wireless personal area network (6LoWPAN) are adopted.<sup>[5]</sup> A

heterogeneous computing grid collects medical vital parameters such as blood pressure (BP), body temperature, electrocardiogram (ECG), and oxygen saturation.<sup>[6]</sup> IoT network is formed while transforming into hybrid computing grids the heterogeneous computing and storage capability of static and mobile electronic devices such as medical terminals (**Table, 1**).

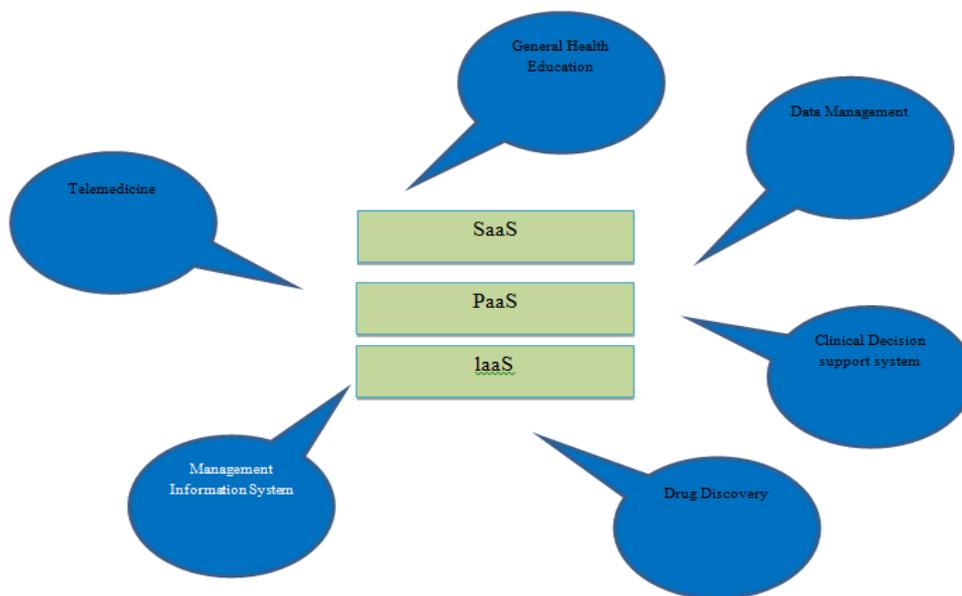
**Figure 1**, presents cloud driven healthcare service model. Model could be used as a reference to provide various services to the healthcare industry. Following is the description of these cloud services to the medical industry that can improve the traditional healthcare procedures and reduce management overhead and cost of IT procurement.

**Security challenges in deployment models**

To raise the facility of access in the organizations assorted users and departments across the organization allow sharing of assorted resources but alas lead to data breach problem. Cloning leads to the problem of data leakage concealing the machine’s authenticity. Basically, the cloning deals with duplicating and replicating the data. Resource Pooling refers to the unauthorized access because of sharing through the same network. Furthermore, in a shared multi-tenant environment when any user consumes some unequal amount of resources then some resource contention issues might occur. Authentication and Identity Management is one of the another big issue associated with deployment models in cloud-based systems.<sup>[7]</sup>

**Table 1: IoT Healthcare Applications and Services Categorization.**

Services	Applications	
	Single-condition	Clustered-condition
Ambient assisted living Internet of m-health	Glucose level	Rehabilitation system
Adverse drug reaction	sensing ECG monitoring	Medication management
Community healthcare	Blood pressure monitoring	Wheelchair management
Children health information	Body temperature	Imminent healthcare
Semantic medical access	monitoring Oxygen	Smartphone
Indirect emergency healthcare	saturation monitoring	healthcare solutions



**Figure 1: Healthcare services of Cloud driven.**

**Related Works**

Tawalbeh *et al.*, 2015<sup>[8]</sup>, proposed an efficient cloud storage model that provides confidentiality and integrity through data classification and minimizes the complexity and processing time needed to encrypt the data by applying TLS, AES and SHA security mechanism based on the type of classified data. They tested the proposed model with assorted encryption algorithms, and their simulation results showed the efficiency and reliability. This paper is established on the idea of manual

classification of data and not the automatic classification and other encryption algorithms such as RSA, Elliptic curve cryptography, and asymmetric public key can be used to provide the higher level of security and confidentiality.

Behl *et al.*, 2012<sup>[9]</sup>, investigated the security challenges based on the four views such as cloud architecture view, delivery model view, characteristics view, and the stakeholder view. They investigated few solutions

through which the dynamic cloud model can be secured. They discovered that how the existing issues exist in nowadays cloud model owing to confidentiality and integrity loss, SLA issues, elasticity, multi-tenancy, insecure management and cloud federation implications.

Prakash *et al.*, 2014<sup>[10]</sup>, proposed an efficient data encryption and decryption using 256 bit symmetric key with rotation for securing the highly critical remote data in cloud paradigm. They conducted an experiment on the variable size text files repository and it showed that the proposed method is superior to existing methods. Also, they introduced the mechanism for securing the cloud server from unauthorized users. In addition, they have also demonstrated the performance analysis of encryption and decryption algorithms.

Sengupta *et al.*, 2015<sup>[11]</sup>, designed an encryption algorithm Hybrid DESCAS to provide the security to the massive amount of data sent through the internet. Through proposed algorithm, they tackled the limitations of both DES and CAST Block Cipher Algorithm and analyzed that the computation time and complexity for encryption and decryption is higher than the respective DES and CAST algorithm. In addition to this, they concluded that combining 128-bit key and 64-bit key cipher algorithms, the brute-force attack and attacks via birthday problems were averted and the algorithm is more robust.

## CONCLUSION

Cloud computing in the field of medical applications to do a full study, the research results are the following aspects: Summarize the meaning and principle of cloud computing, including the status quo at home and abroad research. It combined with the characteristics of cloud computing, an overview of cloud computing in the medical field of application base. It combined with specific cases, a detailed description of the cloud computing for the medical field to bring the vitality and efficiency. For the development of the status quo, lists the problems of cloud computing itself and cloud computing in the medical field in the problems and challenges encountered. Application Prospects In general, cloud computing is a new technology, its application to the medical field is also a useful attempt, which will inevitably encounter some practical problems, we need to play a subjective initiative to analyze, to solve. I believe that in the near future, cloud computing will change the entire medical field infrastructure for the world to make a great contribution.

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