Chapter 68
Cloud–Based Healthcare Systems:
Emerging Technologies and Open Research Issues

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ABSTRACT

Healthcare is one of the most important sectors in all countries and significantly affects the economy. As such, the sector consumes an average of 9.5% of the gross domestic product across the most developed countries; they should invoke smart healthcare systems to efficiently utilize available resources, vastly handle spontaneous emergencies, and professionally manage the population health records. With the rise of the Cloud and Mobile Computing, a vast variety of added values have been introduced to software and IT infrastructure. This chapter provides a comprehensive review on the new Cloud-based and mobile-based applications that have been developed in the healthcare field. Cloud's availability, scalability, and storage capabilities, in addition to the Mobile's portability, wide coverage, and accessibility features, contributed to the fulfillment of healthcare requirements. The chapter shows how Cloud and Mobile opened a new environment for innovative services in the healthcare field and discusses the open research issues.

1. INTRODUCTION

Healthcare provision varies around the world; almost all wealthy nations provide universal healthcare. Health provision is challenging due to the costs required, as well as various social, cultural, political and economic conditions. However, many nations around the world spend considerable resources trying to provide it. Based on the 2012 statistics mentioned in (Organization of economics co-operation

and development, 2013), most of the developed countries consumed an average of 9.5% of their gross domestic product. For example, The United States (17.6%), Netherlands (12%), France and Germany (11.6%) were the top four spenders in this sector. One of the most critical disease and daily consume a lot of healthcare resources is the diabetes.

Efficient healthcare systems are hence critically important and need to be smartly incorporated. Such systems should fulfill a list of urgent requirements. They should efficiently utilize and allocate the available health resource; i.e., equipments and medications. They also have to be fast enough to effectively cope with spontaneous emergency calls and cases handling. In addition, they should be more flexible to move toward the patients as well as being able to explore critical probes and provide a pro-active model for healthcare crisis management. However, these requirements are not yet totally achieved through the classical healthcare systems that depend on the old technologies.

With the rise of new technologies like Cloud and Mobile Computing, new solutions have been introduced in healthcare field. The smart mobile is emerged as a fast, portable, widely available and efficient connection channel with the patients. Through such channel, data can be vastly acquired from the field with very low expenses. Guiding instructions as well can be also delivered to the patients anywhere and anytime. Developed smart medical mobile applications have hosted and helped patients to fully mange their daily treatment process. The Cloud, on the other hand, has incorporated to accommodate the healthcare system due to its broadly availability, scalability, and storage capability that makes it possible to acquire real updated data and feedbacks from both patients and healthcare managers.

This chapter provides a comprehensive review on the new Cloud-based and Mobile-based applications that have been developed in the healthcare field. Solutions related to Hospital Management System, Emergency Healthcare Systems, Healthcare Records Systems, Social Healthcare Systems, and Medical Imaging systems are addressed and discussed in details; in terms of their features, functionalities and architecture. As illustrated and discussed along the chapter, these solutions have proven to fulfill the critical healthcare requirements and also Cloud and Mobile have opened a new environment for innovation in the healthcare field. The chapter also covers and discusses the hot research points that need to be addressed in this area.

The rest of this chapter is organized as follows. Section 1, introduces the background on the Cloud-based and mobile-based solutions in the healthcare field. In section 2, cloud-based and mobile-based healthcare systems are presented, and we illustrate their functionalities, features and architectures, along with discussions about their open research points. Finally, the road ahead is discussed in section 3 and the chapter is concluded in section 4.

2. BACKGROUND

This section provides a comprehensive background on the Cloud-based and mobile-based solutions in the healthcare field.

2.1 Cloud Computing and Healthcare

Healthcare and medical services consist of general and emergency medical services. General medical services involve provision of hospital numbers for appointments whereas emergency medical services consist of various pre and in-hospital activities. These activities are performed by various individuals

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