

Chapter 6

Diabetes Patients Monitoring by Cloud Computing

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ABSTRACT

The healthcare system is important due to the focus on human care and the interference with human lives. In recent years, we have witnessed a rapid rise in e-healthcare technologies such as Electronic Health Records (EHR) and the importance of emergency detection and response. Cloud computing is one of the new approaches in distributed systems that can handle some of the challenges of smart healthcare in terms of security, sharing, integration and management. In this study, an architecture design of a cloud-based pervasive healthcare system for diabetes treatment has been proposed. For this, three different components are defined as follows: (1) The home context manager which gathers necessary information from patients while simultaneously providing feedback, (2) a patient health record manager that is accessible by nurses or physicians at the hospital, and (3) a diabetes management system which is located with the cloud infra-structure for managing and accessing patient's information. The performance of proposed architecture is demonstrated through a user scenario.

DOI: 10.4018/978-1-5225-1002-4.ch006

INTRODUCTION

Information technology can play a vital role in healthcare services in terms of electronic health. Recent advances in e-health can be broadly defined as the application of information and communication technologies in healthcare systems (Varshney, 2009). Making use of the internet for storing, accessing and modifying healthcare information and digitizing many processes and tasks is a necessary step for realizing e-health. In this case, we have the advantages of e-health such as a rise in the quality of services in aging societies, reduction in cost and in medical errors and the ease by which data can be moved to the right place. However, digitizing paper-based records, collecting and storing medical information as well as lack of suitable technology for preventive care can become rather challenging.

After the emergence of the pervasive computing paradigm, pervasive healthcare technology has been proposed to support a wide range of applications and services including patient monitoring and emergency response. However, they simultaneously introduce several challenges including data storage and management, interoperability, availability of resources and ubiquitous access issues (Ziefle & Rocker, 2010).

Diabetes is one of the major chronic diseases in the world. Diabetes, often referred to by doctors as diabetes mellitus, describes a group of metabolic diseases in which the person has high blood glucose (blood sugar), either because insulin production is inadequate, or because the body's cells do not respond properly to insulin, or both. Diabetes manifests itself in three types:

Type 1: This type of diabetes is usually diagnosed in children and young adults, and was previously known as juvenile diabetes. Only 5% of people with diabetes have this form of the disease. In this type of diabetes, the body does not produce insulin.

Type 2: Is a problem with your body that causes blood glucose (sugar) levels to rise higher than normal. This is also called hyperglycemia. Type 2 is the most common form of diabetes; About 90 percent of people with diabetes have type 2 diabetes.

Type 3: Gestational Diabetes is a temporary condition that occurs during pregnancy. It affects approximately 2 to 4 percent of all pregnancies and involves an increased risk of developing diabetes for both the mother and child.

All forms of diabetes increase a patient's risk of emerging different health complications. Short-term complications such as hypoglycemia and hyperglycemia (very low and high blood glucose), and long-term complications such as eyes, heart, kidneys, nerves and feet failure are serious and life-threatening. The proper management of blood glucose levels reduces the risk of developing these complications. Factors

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