Healthcare Assisted by Grid Computing and Fog Computing Using Healthcare IoTs: Practices and Challenges

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INTRODUCTION

Complex health issues rise with the increase in population and medical needs of people such as assistance for aged patients, chronic diseases and hospital operational expenses [1]. The health of individuals can be monitored by the health conditions and environmental factors, specifically the aging people who are more prone to chronic diseases. The health monitoring can improve the quality of life of the individuals. Traditional health monitoring and other practiced medical procedures are very time consuming and insufficient with the increased population. Therefore, the development of healthcare applications and services are implemented to provide efficient medical solutions. These solutions can be helpful to reduce operational expenses and improve the quality of healthcare provided to the general public.

The advancements in grid computing and Internet of Things (IoT) can assist in the implementation of efficient healthcare solutions. These computing platforms provide promising results and developments in the healthcare sector. There are many grid computing projects already in practice, such as BioSimGrid [2[-[3], FightAIDS@Home [4] and e-DiaMoND [5]. IoT and cloud computing have been employed in healthcare as reported in [6]-[8]. Among the emerging solutions, grid computing provides promising features to tackle healthcare problems.

With respect to the IoT solutions and other distributed computing infrastructures, grid computing is considered a more promising technology, as it provides economic benefits with enormous computing power, storage and throughputs.

The grid computing infrastructure is not only offered by a single provider but many providers and resources are more heterogeneous than they would be in a cloud [9]. Healthcare IoTs needs to transfer the most time-sensitive data to end-users. Fog computing nodes have very close proximity with healthcare IoTs due to this fog node can process the most time-sensitive data in real-time and send the data to end-users [10].

GRID COMPUTING AND HEALTHCARE

Grid computing provides the basic infrastructure to run tasks that require higher throughput, extensive computational power and storage. It creates an impression of a super computer while all of its resources are distributed. Most often, grid is utilizing the unused computing power and storage space of dedicated or volunteered resources thus creates a pool of small networked resources. It also leverages scientific organizations to collaborate on their projects using their compute and data resources which are either dedicated or trusted. Among the grid organizations, HealthGrid [11], Open Science Grid (OSG) [12], World Community Grid [13], Globus Alliance [14], Open Grid Forum (OGF) [15] are a few prominent names.

E-Health Projects

The spread of chronic diseases and difficult access to the specialised hospitals, consultation requirements, complex medical case monitoring by many specialists requires real-time access and processing of medical records. These records might need to be shared among doctors globally, which is possible through the use of grid computing medical services.

Grid computing is capable of solving the medical requirements and the associated challenges by providing the robust and fault-tolerant infrastructure to run the healthcare applications, services or projects