

CHAPTER I

INTRODUCTION

1.1 Background

As internet users increased, more and more data are stored digitally. Stored data can be as sensitive as a personal health record (PHR), which is a collection of medical histories as well as a communication platform between user patients and health care providers to exchange patient's medical information [1]. PHR need to focus more on security and availability it is affecting users in using a PHR [2]. PHR users such as patient, health care providers, and other affiliates needed the PHR system designer to focus on enhancing the PHR security [3].

As one of the most current secure data protection technologies, Blockchain ensures data security and immutability [4]. Now with blockchain technology, storing data can be carried out in a distributed manner with better security and immutability [5]. One form of Blockchain is Ethereum, a technology that is open to everyone with an internet connection and is run by a community that supports the cryptocurrency ether (ETH) and makes decentralized applications (DAPPS) [6]. DAPPS is an application whose backend runs on a decentralized peer- to-peer (P2P) network [7]. It runs on the Ethereum blockchain network which uses smart contracts as its business logic [8]. Smart contract is a digital contract that allows transactions between two parties without a central authority using ETH, which is Ethereum's digital currency to process transactions [9].

1.2 Problem Identification

Due to the explosion of blockchain users, the use of this technology is becoming more expensive, slow and resource-consuming in storing data, especially large-scale data [10] which affects the availability of user's data. Therefore, we need an alternative way to store data on the blockchain. The Interplanetary File System (IPFS) is a peer-to-peer (p2p) file sharing system that aims to fundamentally change the way information is distributed across and beyond the globe [11]. Although there were some risks while using p2p file sharing technology such as installation of malicious code and exposure of sensitive information [12], but IPFS enables large-scale and immutable storage by breaking it into small parts and providing timestamps and keeping data secure and highly available without having to store the data on the blockchain network [13]. It also creates a permanent and decentralized method of storing and retrieving data by storing a unique hash which is the location of the data [14]. This approach is expected to be a faster, less expensive and less resource-consuming way to store health data, because the data is guaranteed to be available, and it is stored on the IPFS and only the unique hash is being stored on the blockchain.

1.3 Scope of Problem

The research aims to design a Decentralized Application for storing personal health record using Interplanetary File System (IPFS) to ensure data availability and Ethereum Blockchain for data security.

1.4 Research Question

Following the problem scope and research objective, we define our research question: How to design a Decentralized Application for storing Personal Health Record using Ethereum Blockchain and Interplanetary File System.

1.5 Research Objective

This research objective is to design a Decentralized Application for storing personal health record using Ethereum blockchain and interplanetary file system to provide an alternative way to store medical data for both patients and health care facility providers.

1.6 Writing System

In our attempt to answer this question, we conduct this research as follows. Chapter 1, we give general introduction of the research. In Chapter 2 we discuss about theories supporting this research. Chapter 3, we discuss about similar previous research corresponding to this research. Chapter 4, we design the proposed system, components, and its architecture. Chapter 5, we discuss about how the Decentralized Application interact within the components in the system using this architecture. Chapter 6, we define a test scenario and examine the Decentralized Application then analyze its results. Lastly on Chapter 7, we gather our conclusions and refer to future research. Lastly, we attach references, appendix, and researcher biography.