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24 January 2016

CSCE 221-507

**Depth-First Search and The Electronic Health Record System**

The electronic health record system (EHR) is a new concept that is being implemented in both doctors’ offices and hospitals. It systematically collects patient’s personal health records (PHRs) and uploads them to a secure cloud server. This has many positive effects. It allows doctors to have easy access to PHRs and also computerizes them, which eliminates poor penmanship and increases readability. It also improves the quality of healthcare and reduces cost. To make a system like this possible and secure enough to be practical, many different algorithms are used.

In the article “Designing Cloud-Based Electronic Health Record System with Attribute-Based Encryption,” the authors describe a surplus of algorithms used in the implementation of the EHR system. Some include: Setup(λ), which takes a security parameter as an input and outputs a public key, KeyGen (Ikey, msk), which takes an access structure and a master key as input and outputs a private key, Encrypt (m, Ienc), which takes a message and an attribute set as input and outputs a ciphertext, and Decrypt (ct, sk), which decrypts the ciphertext. However, the depth-first search, which is used in accessing PHRs on the cloud, will be more fully evaluated and discussed.

A depth-first search algorithm is used to traverse a tree or graph data structure by picking an arbitrary node as a root and searching an entire branch before backtracking. This process is repeated until all nodes have been searched. In the cloud, the PHRs are organized into a tree data structure using patient’s symptoms as the links between nodes. To access PHRs, a doctor inputs a set of symptoms that he/she is qualified to treat. The server then does a depth-first search on the encrypted PHRs and returns any records that have a set number of symptoms that correspond to the doctors input set. The sever then runs the decrypt algorithm and presents all of the decrypted PHRs to the doctor. However, there is a problem with efficiency. Since a depth-first search has to access every PHR at least once for a single time search, the efficiency cost at the cloud server is O(l), where l is the number of PHRs stored in the server. If there are a lot of PHRs stored on the server, the search could take a while to terminate.

As stated before, the electronic health record system has made a huge impact on both society and the economy. Since all the records are now computerized it saves money and reduces paper consumption which is good for the doctor/hospital implementing it and the ecosystem. It also helps improve the quality of health care and the speed of treatment because doctors can now access a patient’s record instantly without having to contact the office that has the patient’s record.

In conclusion, the electronic health record system has revolutionized record keeping in health care. As stated above, the use of many different algorithms and data structures has made this system both practical and safe to use. The depth-first search algorithm is used in searching and accessing the PHRs on the cloud but can be inefficient. In despite of this, the use of the EHR in health care is very beneficial to society and the economy.

Bibliography

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