E-Transcript Management System Using Blockchain Technology

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ABSTRACT

Over the years, record keeping was done manually, keeping paper-based documents of all students' academic information. This system however has proven inefficient because it could not cater for unforeseen circumstances like fire accident, house demolishing or even the most obvious one - the student's record going missing. Researchers have come up with more effective ways of solving the paper problem, which led to several web-based student information management systems. However, these researchers did not fully eradicate the paper problem because the process still required an initial printing, then scanning of academic records which served as inputs into the system. Also, there was an increase in the occurrence of service unavailability because all storage and processes came from the same location, making the server vulnerable to unforeseen circumstances like power outage, loss of network connection and system malfunction. This research work however aims at implementing an E-transcript management system using blockchain technology, which is capable of eliminating the paper problem whilst ensuring that users experienced service uptime round the clock.

Keywords : Blockchain Technology, E-transcript, Service Uptime

I. INTRODUCTION

Effective Record keeping has been one of the backbones of academic institutions. Through record keeping, academic institutions have been able to keep track of past events including students' continuous assessments, examination scores, grades and transcripts.

researchers came up with more efficient ways to solve the paper problem by creating information management systems to manage student information. Although these systems solved the manual requesting of transcripts, they could not fully eliminate the paper problem because electronic transcript systems still required for schools to first print the record before it can be scanned and sent to its destination. Also, they all had a single repository for data storage. Invariably implying that a downtime in the system due to unforeseen circumstances, will result into termination of pending connections as well as future connections because all processes were done from a single location i.e. they all rode on Client-Server Architecture.

However, Blockchain which is a decentralized digitally distributed ledger provides a more proficient way to store and distribute information as compared to information distribution in existing systems [8]. This technology solves this problem by first eliminating the need of a single repository for storage i.e. database servers. All data is stored in a blockchain and this blockchain is distributed across all nodes within the network. Hence, this work aims at proposing an E-Transcript system using blockchain technology that can successfully tackle the server unavailability and manual processing of transcripts whilst suggesting a modern way of storing academic transcripts.

II. METHODS AND MATERIAL

This research proposes a new approach to information processing and dissemination is proposed, consisting of nodes connected together using cryptographic algorithms for direct communication as against data processing done from a single point as depicted in Figure 1.
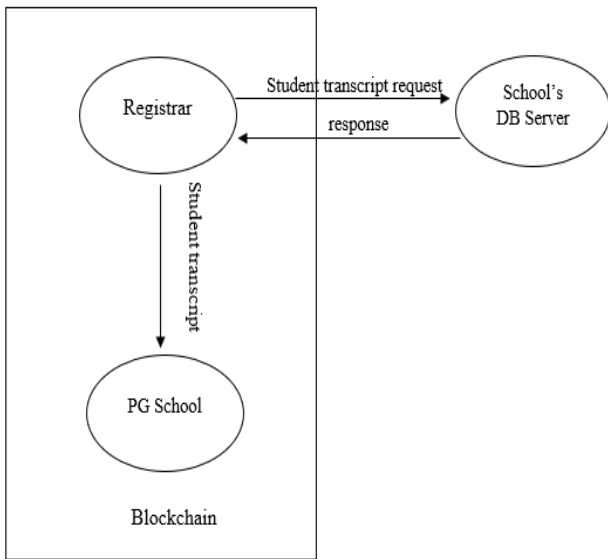

Figure 1. Architecture of the Proposed System

A. System Workflow

1) The desired student's transcript is retrieved from the school's database, the result is then generated into a PDF format.
2) This PDF file is then uploaded into the blockchain by the registrar.
3) The recipient (i.e. Post Graduate School) then views the file and can then decide to download or not.

III. RESULTS AND DISCUSSION

The resulting output of this application is uploaded to the blockchain as depicted in Figure 2. The files are grouped in streams. Streams are referred to as a document store in which documents are stored in a

"NOSQL" format like in a NoSQL database. Each document or information is uniquely identified by a hash which cannot be easily manipulated. Streams were introduced to allow distribution of all kinds of data or files and not just cryptocurrencies.
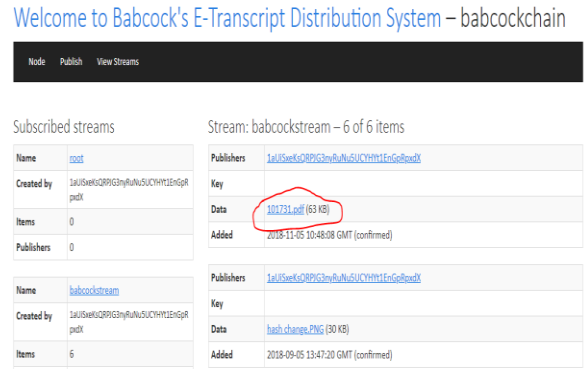

Figure 2. A PDF file uploaded to the stream of the blockchain

A. Testing and Evaluation

The system is evaluated using two metrics; fault tolerance and efficiency. Fault tolerance was used to ensure service uptime while efficiency was used to ensure that system resources do not suffer whilst meeting its aim. entire document should be in Times New Roman or Times font. Type 3 fonts must not be used. Other font types may be used if needed for special purposes.

IV. CONCLUSION

This research is channelled to ensuring the total eradication of manual processing of transcripts by providing a means of generating a summary of students' performance in a PDF format. It also ensures service uptime by ensuring that the already uploaded transcripts are still available even though the corresponding node is disconnected. Blockchain ensures service uptime because the storage and processing are not done from a single point, thus providing an efficient way of distributing immutable information whilst ensuring data integrity and non-repudiation.

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