Blockchain Based Academic and Professional Credentials

Dr.K.Srinivasa Rao[1], Palla Shirisha[2], Mopuri Navaneswar[3], Kummetha Chaitanya[4], Katakam Harsha Nithin[5]

[1]Professor, Department of AI&ML, KSRM College of Engineering(A), Kadapa (A.P), India.

[2,3,4,5]B.Tech. Students, Department of CSE, KSRM College of Engineering(A), Kadapa (A.P), India.

Emails*: ksr@ksrmce.ac.in[1], 209y1a05b7@ksrmce.ac.in[2], 209y1a05a0@ksrmce.ac.in[3], 209y1a0586@ksrmce.ac.in [4], 209y1a0578@ksrmce.in[5]*

Abstract

This undermines the traditional education system. We will focus on how to verify digital certificates using the Ethereum platform and smart contracts. Traditional paper certificates are converted into digital certificates at the request of students, and their tokens are calculated using a cryptographic hash function and stored in the blockchain. A unique validator ID and transaction hash is generated and then used to validate tokens through a common platform.

Keywords: *Blockchain; Digital Certificates; Ethereum; Hash Value.*

1. Introduction

The concept of blockchain technology was first introduced by research scientists Stuart Haber and W. Scott Stornetta, but gained popularity in 2009 when Bitcoin was created by Satoshi Nakamoto. Blockchain technology is widely used in many use cases in the field of education - publishing and verifying documents (electronic documents), high-cost document storage, etc [1]. automated learning platform, publishing and copyright protection, payments via cryptocurrency. The traditional system of submitting degrees and certificates in paper form and then validating these documents involved a lot of paper work, emails, phone calls, and the whole process was slow and cumbersome. There are many issues related to the system, such as missing or damaged certificates, and the issue can occur again, which is also a problem. Other problems, such as falsifying paper documents, can result in unskilled labor costs and losses for the company [2]. This problem can be avoided if it can be verified digitally. Smart contracts are contracts that are executed automatically with the terms of the agreement written directly into the programming code [3]. Testing a smart contract involves verifying its functionality, security and adherence to business logic. Blocks that are linked together in a chain. Therefore, you can use blockchain technology to create an immutable or tamper-proof ledger to track orders, payments, accounts, and other transactions. The system has built-in mechanisms to prevent unauthorized transaction access and ensure consistency in the shared view of those transactions [4].

1.1. Domain Description

Blockchain uses cryptographic algorithms to ensure certificates are tamper-proof, prevent fraud, and increase trust in academic and professional credentials. Networking facilitates easy access to certified brands, reduces time and costs and increases trust and accountability. Blockchain-based digital certificates can be easily accessed and shared globally, streamlining the verification process across organizations [4].

1.2. Importance of Blockchain

There are many challenges in traditional data technology for recording financial transactions. For example, consider buying real estate [5]. When money is transferred, ownership of the property passes to the buyer. Buyers and sellers can record cash transactions, but neither source can be trusted.To avoid legal issues, trusted third

party must monitor [6].

1.3. Architecture of the Model

The University/College will generate the digital certificate based on some details of the student. A unique Certificate Id and Transaction hash value would be generated and the e-certificate with these details would be given to the student. The students will receive their e-certificate having the Certificate ID/IPFS hash and Transaction hash value. The recruiter can verify the proof of existence and proof of authenticity of the certificates of the student either by Certificate Id or Transaction Hash in a matter of few minutes in Figure 1.
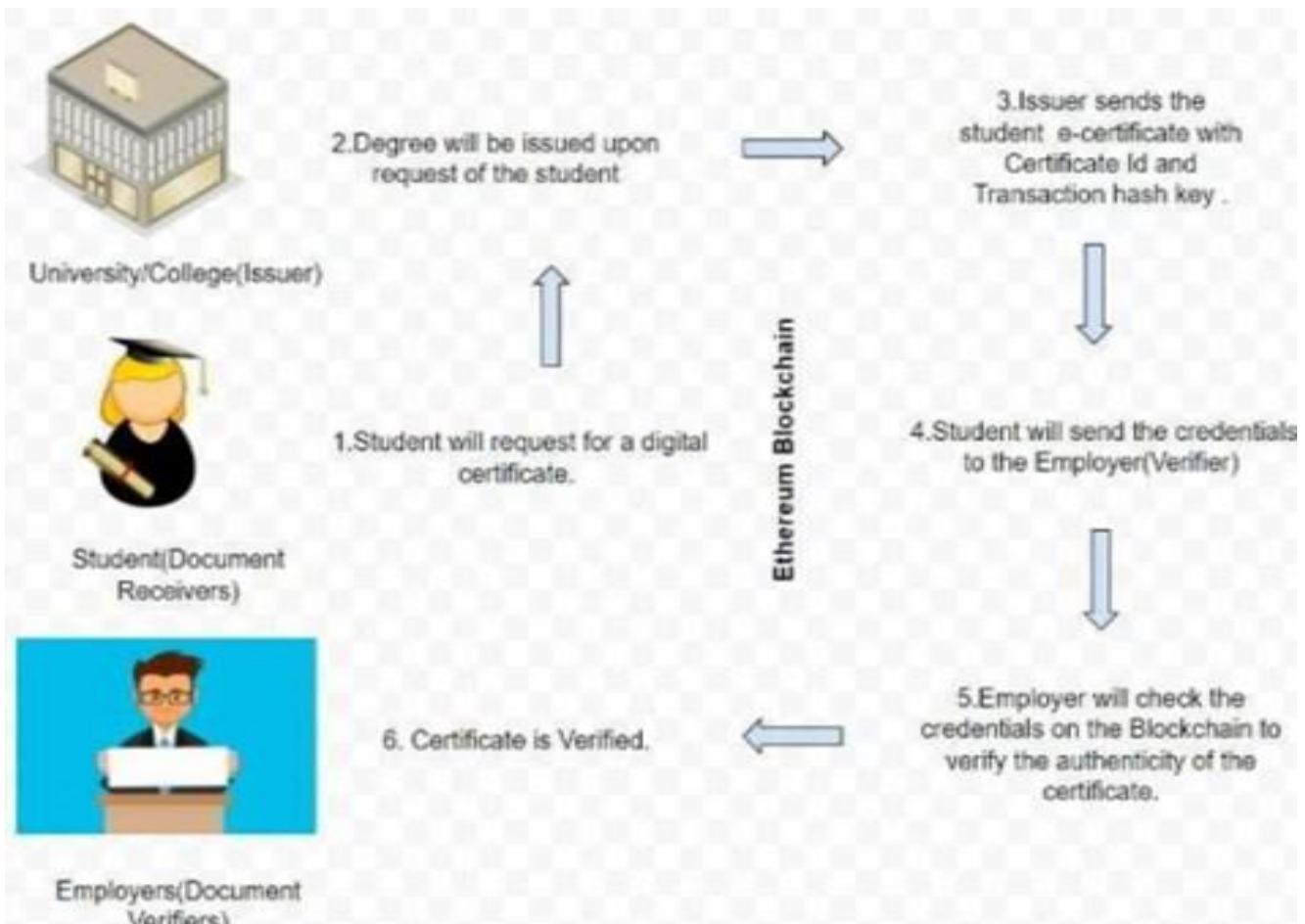

Figure 1 System Architecture

1.4. Proposed Solution

Transition from paper-based to blockchain-secured digital certificates ensures tamper-proof records, easing verification and reducing the risk of loss or damage. Employers can instantly verify credentials through decentralized blockchain networks, eliminating lengthy verification processes and reducing hiring delays [7].

Immutable records on block chain prevent forgery and ensure the authenticity of educational documents, enhancing trust among employers and institutions in Figure 2.

1.5. Data Flow Architecture

Another name for a DFD is a bubble chart. a straightforward graphical depiction of the data

that the system receives as input, the data that the system processes, and the output data that the system produces. Among the implements. It is employed for simulating system elements. These elements consist of the information flow within the system, the external entities that interact with it, the data that the system processes use, and the system processes themselves [8-9].
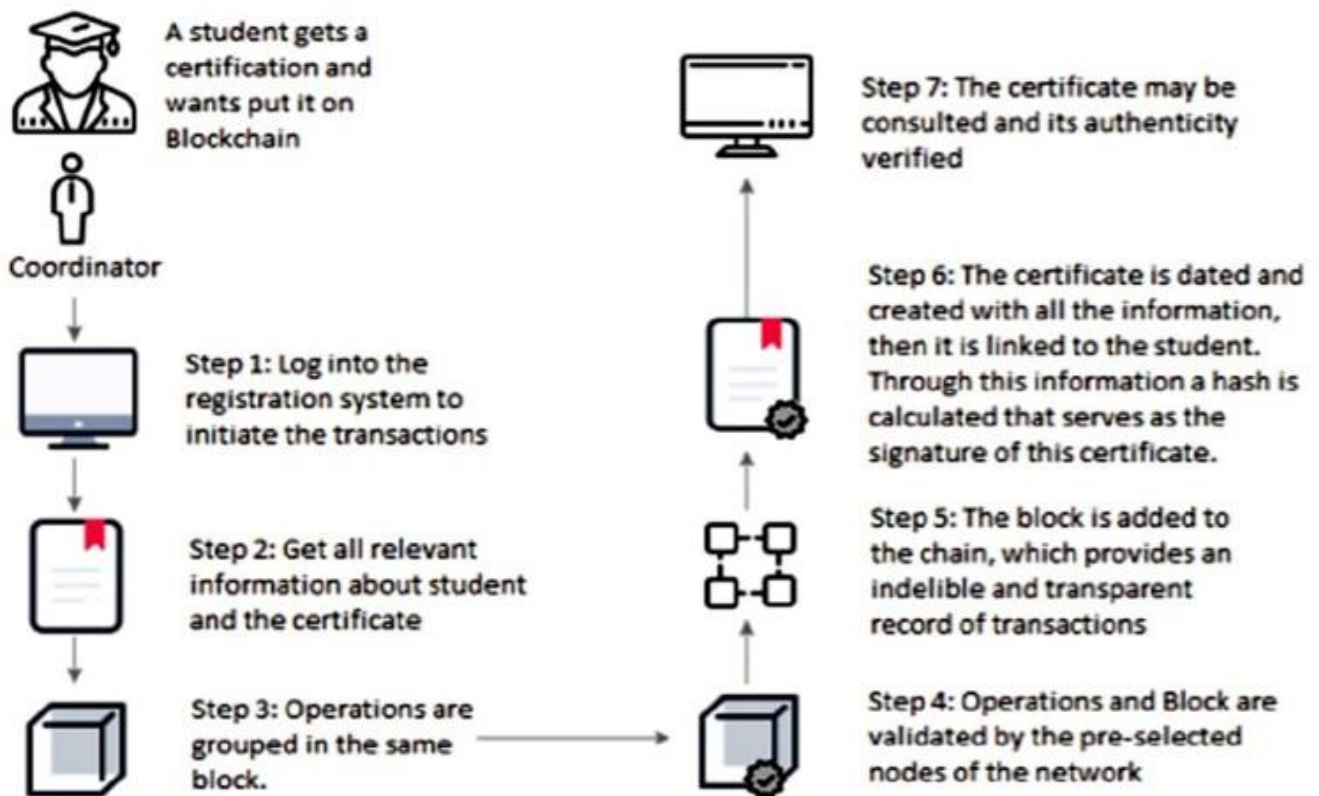

Figure 2 DFD Architecture

2. Advantages and Result
2.1. Advantages

The system is immutable, scalable, and vulnerable, and can verify documents directly without the need for a third party. The proposed system uses blockchain technology to store files using a public blockchain and smart contracts called Ethereum and peer-to-peer storage called IPFS.

3. Result

This project has solved two main shortcomings in the existing method of certificate issuance and verification by the concerned parties in the field of education. The proposed system provides the features of immutability, decentralization and tamper-proof documents which can be verified directly without the need of a third party.The Blockchain technology allows the generation of e-certificates with unique hash values which are then further used to verify the certificates. The unique hash values corresponding to each certificate makes this system more secure and forgery proof.

Conclusion

In conclusion, the advent of blockchain-based verification for educational and professional certificates marks a significant leap forward in the realm of credential authentication. This transformative technology offers a plethora of benefits, including enhanced trust, transparency,

and efficiency in the verification process. Blockchain's immutable ledger ensures that certificate data remains tamper-proof and verifiable, safeguarding against fraud and manipulation. Educational institutions can streamline enrollment processes, verify student credentials, and issue digital certificates securely. Employers can verify the qualifications of job applicants quickly and reliably, reducing the risk of hiring unqualified candidates. Professionals can showcase their skills and credentials with confidence, knowing that their certificates are securely stored and easily verifiable on the blockchain.

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