A Survey on Blockchain for Verification of Academic Certificates in Higher Educational Institutes

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Abstract:- Blockchain technology plays an important role in various sectors including education. Higher Educational Institutes (HEIs) maintain the academic data of student's semester wise including attendance, marks and their achievements. At the end of the course HEIs issues the certificates to the students which are highly valued as they serve their professional careers. The issuing process of certificates by the university is not transparent and verifiable which can lead to creation of fake certificates easily. Therefore blockchain technology comes as a boon for authentication and to identify the fake certificates. A number of research studies have been carried out in how blockchain technology is used for verification of academic certificates. This paper presents a study on blockchain based framework for educational certificates verification.

Keywords:- Authentication, Certificate Verification, University.

I. INTRODUCTION

Higher educational institutes have to maintain the details of each student from the time of joining the course till the student completes the course and gets degree certificate. The details of student which are maintained are fee details, attendance, marks of each semester, achievements and scholarships. Once the student completes the course by satisfying all the required criteria the institute issue the mark certificates for each semester and at the end degree certificate. The certificates issued by the institutes are of great value as it holds the skills, competencies, knowledge and aptitude of the student which are achieved through the education. Academic qualification plays a vital role of a student in employment situation as they serve as a guarantee of not just the knowledge, expertise and skills of the student but also ability, reliability and dedication [1].

The student is eligible to get employment opportunity in a reputed concern only by producing the academic certificates issued by the higher educational institutes. The employer whosoever trusts the certificates to be genuine when it is been issued by a university. Wherever job opportunity exists academic qualifications has more weightage and so there is a chance that people produce fake certificates to get employed.

According to the recent Annual Trend Report [2], in 2020 India Fake degree submission constituted for nearly 28% of education discrepancies and degrees from fake universities constituted for nearly 27% of education discrepancies. Not only in India but also in other countries there are cases of fake degree circulation.

There are five different sources of fake academic certificates. They are 'Degree Mills'[3], 'Fabricated Documents', 'Modified Documents', 'In-House Produced' and 'Translations'. Because of the tremendous increase in fake certificate production, Blockchain technology was introduced to improve the document verification process. Blockchain technology simply can be defined as a distributed database that chronologically stores a chain of data packed into sealed blocks [4]. In this paper a study on different blockchain technology used to identify the fake certificates will be presented.

II. BLOCKCHAIN TECHNOLOGY: FEATURES AND CHARACTERISTICS

Blockchain technology doesn't use a single technique but has a combination of many techniques such as cryptography, mathematics, algorithms and distributed consensus algorithms [5], [6], [7]. A blockchain has six key elements [8] as follows:
- Decentralized
- Transparent
- Anonymous
- Consensus Base
- Immutable
- Open Source

➢ *The structure of Blockchain is that in each block it has five elements and they are:*
- Main data
- The hash of the previous block
- The hash of the current block
- The timestamp
- Other information

➢ *Blockchain technologies are divided into three types:*
- Public Blockchain (permissionless)
- Consortium Blockchains and
- Private Blockchain (permissioned)

➢ *Security Themes for Educational Certificates in Blockchain*
- Authentication[9]
- Authorization[10]
- Confidentiality[11]
- Ownership[12]
- Privacy[12]

➢ *Blockchain for Education*

The Blockchain for Education platform helps in secure access and management of certificates to those who are in need of it. The first higher education institute that used Bitcoin blockchain is the University of Nicosia [13,14]. SHA-256 is the hash algorithm used for sharing certificates in the form of PDF. It creates a hash from the certificate but it doesn't do the reverse process. The certificate's genuinity is achieved by locating the certificate's SHA-256 within the index document. If the code gets matched, the certificate is genuine. The improvement to be done is to make the validation of hash publicly.

Blockcerts an open source, which aims in creating, sharing and verifying blockchain based academic certificates, was developed by the MIT Media Lab Learning Initiative jointly with Learning Machine. The academic certificates contain details like name of the receiver, the name of the issuer and date of issue and will be registered on the Bitcoin blockchain and signed cryptographically. Blockcerts does the verification like to whom the certificate was issued to and by whom and the content of the certificate will be validated. [15,16].

TrueRec is a secured and trusted digital wallet introduced by the company SAP in July 2017 where professional and academic credentials based on Ethereum are stored. 4500 students who were enrolled for the course IoT by SAP Leonardo received their certificates with the help of TrueRec [17].

TNO, Netherlands Organisation for Applied Scientific Research, has introduced blockchain project self sovereign identity framework where the official details are stored in digital form and can be stored in mobile phone [18,19].

Sovrin is another infrastructure that aims to support digital identities on a global scale [20]. For notarization, ownership existence and integrity of documents are important. The Apostille notarization service by McDonald and Oliverio describes the car ownership or digital media licenses [21].

SmartCert, another blockchain based uses cryptography to verify fake academic certificates. The verification of certificate is done by sharing the hash with the employer. But this method doesn't give a proper verification as data security is not ensured when cryptography is used. [22].

Records Keeper also based on blockchain to verify academic certificates where a receipt will be provided to the user at the time of issuing the certificate. The receipt will be used to verify whether the certificate is authentic by a third party. [23]

In [24] has proposed a framework based on Hyperledger Fabric framework where only permissible participants can join the network, view and do transactions. The proposed system takes care of authentication, authorization, confidentiality, privacy and ownership for the academic certificates.

In [25] Blockchain for Education platform was used for issuing, validating and sharing of certificates. A conceptual system was been used and then platform implementation like management of certification authorities and certificates, smart contracts as well as services for certifiers, learners and third parties such as employers. Use cases and first evaluation results were gathered from end user tests with certifiers.

III. CONCLUSION

The need for verification of academic certificates is very important because academic certificates play an important role in one person's career. Lot of fake certificates are been created throughout the world. The introduction of blockchain technology is a boon in identifying the fake certificates. In this paper a study on various blockchain technologies available for identifying fake certificates has been discussed. The educational institutes can adopt the blockchain technology in issuing the academic certificates.

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