SkillX: Skill Verification System

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Abstract:

The global employment landscape is undergoing a profound metamorphosis propelled by the rapid evolution of digital technologies, intensifying the demand for precise and reliable talent verification methodologies. Conventional approaches, epitomized by resumes and certifications, persistently grapple with issues of fraud, inaccuracy, and a deficit in transparency. Addressing this predicament, blockchain technology emerges as a promising solution, providing the foundation for a secure and immutable skill verification system. This abstract proposes an innovative blockchain-based skill verification system, harnessing the inherent decentralization of blockchain technology to uphold transparency, integrity, and trust throughout the verification process. The envisioned system empowers individuals with absolute control over their authenticated skills, concurrently endowing businesses and organizations with a dependable repository of skill validation through the utilization of a distributed ledger. Noteworthy in its automation prowess, the technology streamlines the verification process via smart contracts, alleviating the temporal and labor burdens borne by both individuals and certifying entities. Augmenting its reliability quotient, the system integrates a sophisticated reputation mechanism, allowing users to cultivate credibility over time, thereby enhancing the overall dependability of the verification process. The proposed blockchain-based skill verification system confronts pressing issues in the current talent validation landscape, encompassing fraud prevention, data integrity, and privacy concerns. In addition to its security features, the system presents a cost-effective and efficient alternative by circumventing the necessity for intermediary entities. Preliminary assessments attest to the viability and utility of the suggested system, hinting at its potential to revolutionize the validation and certification of abilities across diverse domains, including employment, education, and professional certifications.

Keywords — **BlockChain, Skill Verification, Skill badges**

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I. INTRODUCTION

Academic certificates are highly credible since they serve as additional indicators of the competence that their holders possess. These credentials contain an individual's capital, which includes knowledge, skills, and aptitudes that are acquired via schooling. Qualifications from school provide witness not only to one's knowledge, experience, and abilities, but also to one's abilities, accountability, and commitment. As far as holders of credentials are concerned, there is a relationship between higher levels of education and better job opportunities, which promotes financial stability.

However, because of the inherent importance of education, there has been an increase in fraud, with people creating fake certificates to fraudulently conceal their academic backgrounds. As of right now, there are almost two million fake diplomas in use in the US, along with three hundred unofficial colleges. Notably, Healy (2015) discovered that up to 35% of Australian job applicants fabricate their educational records to obtain work. The fact that educational credential fraud costs the world's employers a substantial sum of money every year, about $600 billion, demonstrates how widespread this problem is.

This research proposes employing blockchain technology as a solution to address this problem. Blockchain functions as a distributed ledger of records for all transactions or digital events, shared among participating parties. It is well-known as the underlying technology for digital coins like Bitcoin. Every transaction is verified by the majority of system users, and all transactions are kept comprehensively on record

by the technology. As blockchain is immutable and guarantees incorruptibility, it is a perfect tool to fight fraudulent educational credentials.

Blockchain began as the foundation technology for Bitcoin and gained popularity after "Bitcoin: A Peer-to-Peer Electronic Cash System" was published in 2008 under the pen name "Satoshi Nakamoto." The use of blockchain technology goes beyond cryptocurrency since it creates a distributed digital ledger of transactions. Prominent properties such as real estate, vehicles, and so on are registered on the blockchain, so reinforcing its function as a safe and impenetrable archive for vital data. The use of blockchain technology is a promising avenue to improve the veracity and safety of academic credentials in the context of widespread fraud, which will ultimately contribute to a more dependable employment landscape.

II. LITERATURE SURVEY

In paper [1], The suggested system is a consortium blockchain between universities, the colleges that are linked with them, the independent colleges, and the businesses. Universities typically add student certificates first, and then businesses or other verifiers can check the credentials using the student's Aadhar number or certificate transaction ID. No one will be able to alter the data contained in a blockchain or add new transactions with a back date.

In paper [2], In order to connect data science education to the industry, this initiative uses a Blockchain-driven method to alleviate the skills gap in the field. In order to assist learners in achieving their career goals, smart blockchain badges are used.

In paper [3], with the full implementation of their system, Corporate organizations, individuals, academic institutions, and governments can now verify any certificate issued to persons without prior consultation of the institution that issued it. Once the institution is registered with the organization that owns this software it can be easily verified. For instance, schools registered with accounts have access to some activities on a particular portal. Therefore this Enhanced web-based certificate verification system is designed to be an integrator between Candidates, institutions, and employers.

In paper [4], This paper is intended to propose a decentralized accreditation system i.e. digital certificate

issuance, verification, and validation using blockchain technology wherein, the system issues the certificates to the students, storing the digitally signed transactions on the blockchain network. The certified document provided by the student to the employers/authorities contains a QR code and a unique number that would be used to verify the certificate by the respective authorities.

The paper [5] In this paper, we have proposed SSLight, a novel fake certificate detection mechanism based on attribute dependency. SSLight is demonstrated to be able to detect fake certificates issued from trusted, but compromised, CAs with a relatively low false positive. In particular, SSLight shows its practicability to expose real-world fake certificates issued by DigiNotar and Comodo. Although the design of SSLight is only for HTTPS applications, this attribute dependency-based detection method can be extended to other SSL-/TLS-based applications and protocols.

In paper [6], This paper gives a framework for conducting Skill Tests online and verifying the scorecard using Blockchain technology. The framework proposed is highly decentralized, transparent, and dependable. Because blockchain records cannot be changed or deleted, the proposed framework addresses issues common in centralized exam systems such as paper leaks, copying, and forging exam results, and certificates.

In paper [7], The benefit of this paper is that the blockchain itself contains all the information needed to verify and validate the certificate. The job applicant does not need to contact the university to verify the certificate.

In paper [8], deploying the system to issue and verify digital certificates based on blockchain technology will solve the problem of counterfeit certification which there is not any prior technology that addresses it. In this study, it is proposed to implement an issuing and verifying model called UniCert based on UniCoin which is a digital currency built on blockchain technology. This can be extended to address many other issues such as anti-counterfeiting, copyright protection of music products, patents, etc.

SL NO.	PUBLIC-ATION YEAR	TITLE	METHODOLOGY	DRAWBACKS
1.	2021	Proposing a reliable method of securing and verifying the credentials of graduates through blockchain	• The data stored in a blockchain will be protected as no one can tamper it • No one can add new transactions to it with a back date.	• Technological Complexity and Cost • Privacy Concerns
2.	2018	Smart blockchain badges for data science education	• Smart Blockchain Badges are employed to support learners towards accomplishing their career goals	• Computational difficulties. • Smart Contract Vulnerabilities.
3.	2020	An Enhanced Web Base Certificate Verification System	• Enhance web-based certificate verification system is designed to be an integrator between Candidates, institutions and employers.	• Technological Complexity. • Scalability challenges.
4.	2021	Decentralization of Credential Verification System using Blockchain	• Proposes a decentralized accreditation system. • The digitally signed transactions are stored on the blockchain network.	• Verification of Offline Credentials • Legal considerations.
5.	2015	On the Detection of Fake Certificates via Attribute Correlation	• A novel fake certificate detection mechanism based on attribute dependency • Can be extended to other SSL-/TLS-based applications and protocols	• SSLight is only used in HTTPS applications
6.	2022	Survey on SkillVio: Skill Verification System Using Blockchain	• Uses a framework for conducting • SkillTests online and verifying the score card using Blockchain technology. • Addresses issues such as paper leaks, copying, and forging of exams and certificates.	• Verification of Offline Credentials.
7.	2022	Blockchain-based model to track and verify official certificates	• The blockchain itself contains all information needed to verify and validate the certificate. • The hash generated through the validation should match the one in the digital certificate.	• Regulatory considerations • Legal Considerations
8.	2018	Issuing and Verifying Digital Certificates with Blockchain	• Deploying the system to issue and verify digital certificates based on blockchain technology will solve the problem of counterfeit certification. • It is proposed to implement an issuing and verifying mode.	• Governance of the data collected • It is difficult to maintain standards set.

III. METHODOLOGY

In an era of digital revolution, online document authentication is a crucial invention that streamlines the time-consuming background check procedure and ushers in a new level of efficiency. This paradigm change is in line with the larger global trend toward digitization and meets the changing needs of employers, educational institutions, and students alike. Under this proposed framework, it is the administration's or university's responsibility to use a Decentralised Application (Dapp) to facilitate the easy uploading of student academic data to the blockchain.

A distinct Certificate ID is generated in this decentralized ecosystem, and it is sent by email to the appropriate student alone. It is the responsibility of the student to provide their unique Certificate ID when a potential employer wants to confirm the applicant's qualifications. Using this identity, recruiters can access and validate academic certifications that are safely kept within the immutable blockchain. The strong interplay between blockchain technology and data security guarantees data immutability, bolstering the dependability of the online authentication procedure as a whole.

By doing away with middlemen, the proposed decentralized application overcomes the drawbacks of conventional verification systems. As a result of its universality, employers and students can access it, making it a user-friendly experience that doesn't require the assistance of a third party. The proposed system, which provides a straightforward but effective method for viewing and validating academic credentials, is expected to have a significant influence in the not-too-distant future.

Figure: 1 illustrates a model that epitomizes the comprehensive architecture of a software system, employing diverse viewpoints to present a lucid and simplified portrayal. This model incorporates viewpoints from a range of stakeholders, including developers, testers, project managers, and end users, and functions as a narrative exposition of the entire system. In line with best practices in system analysis and design, this multifaceted approach improves the software system's clarity and comprehension.
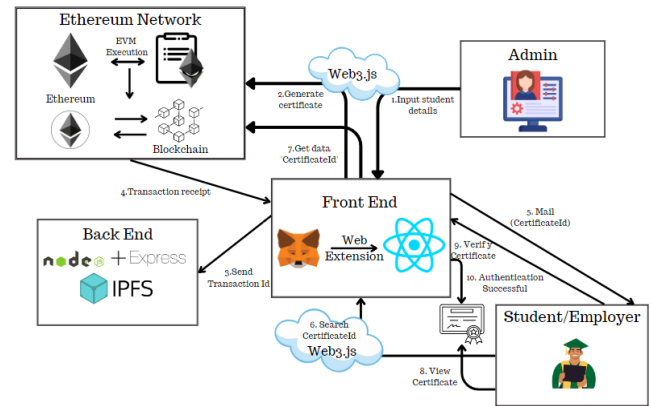

Fig 1: Service Architecture

SHA-256:
As a stalwart of secure hashing algorithms, SHA-256 effectively transforms variable-length inputs into an invulnerable 256-bit hash by acting as an unkeyed cryptographic force. Like an old guardian, this algorithm is still a mainstay in the world of cryptography, especially as a stable foundation in well-known blockchains like as Bitcoin, Bitcoin Cash, and Bitcoin SV.

SHA-256 plays a crucial role in the complex web of blockchain details, leaving a lasting impression at different points throughout the blockchain's lifespan. Its steadfast importance reverberates through digital corridors, having been instrumental in the development of safe transactions, the preservation of data integrity, and the strengthening of cryptographic security. Within the dynamic field of blockchain technology, SHA-256 bears witness to the robustness of cryptography, serving as a foundational element upon which the principles of immutability and trust are built.

In a blockchain, SHA-256 is employed at many stages, most notably:
**Consensus mechanism**:
In the Bitcoin consensus mechanism, miners use SHA-256 to iteratively adjust the nonce in a block, trying to get a hash that is less below the threshold. When hashing is successful, the block is validated and can be added to the ledger. The security and consensus are necessary for decentralized transaction validation are guaranteed by this complex dance of cryptographic calculations.

Chains of Blocks:
Each block in the ledger has a SHA-256 hash referencing the block before it in the chain.

Digital signatures:
SHA-256 hashing ensures the integrity of digital transactions. Data is encrypted using the sender's private key, creating a distinct signature. By verifying these signatures, miners validate transactions, guaranteeing a safe and impenetrable exchange within the cryptographic network.
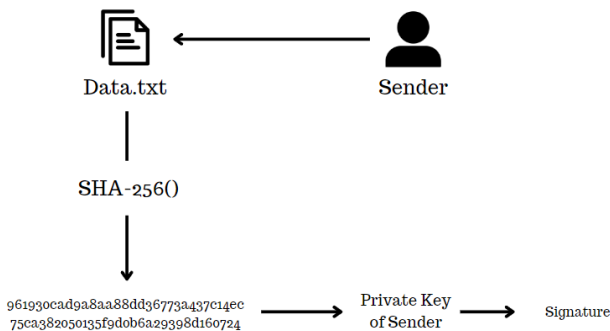
Fig 2: SHA256 Workflow

SHA-256 offers security and reliability. Here are some of SHA-256's key characteristics that make it ideal for use as a blockchain's primary hashing function:

Collision-proof:
Unique inputs at each stage produce unique hash values, guaranteeing every block in the blockchain record is unmatched in originality. Decentralized transaction security and integrity are strengthened by this cryptographic assurance.

Preimage resistance:
The irreversibility of hash values in Bitcoin's proof of work guarantees that miners are unable to determine the nonce by reversing acceptable hashes. This forces miners to use a brute force method, hence strengthening the process's security. Because of its intrinsic unpredictability, which requires a high level of computational effort to complete tasks, the system is kept intact.

Deterministic:
When it comes to digital signatures, consistency is crucial. Sender-receiver synchronization depends on the hash function, which produces an unwavering output from a stable input. This persistent feature guarantees the immutability of calculated hashes, securing the dependability and integrity that are essential to digital signatures in protocols for secure communication.

Large output:
The 256-bit output of SHA-256, with its 2^{256} possibilities, provides an unbreakable barrier against brute force attacks and the highest level of cryptographic protection possible for hash-cracking attempts.
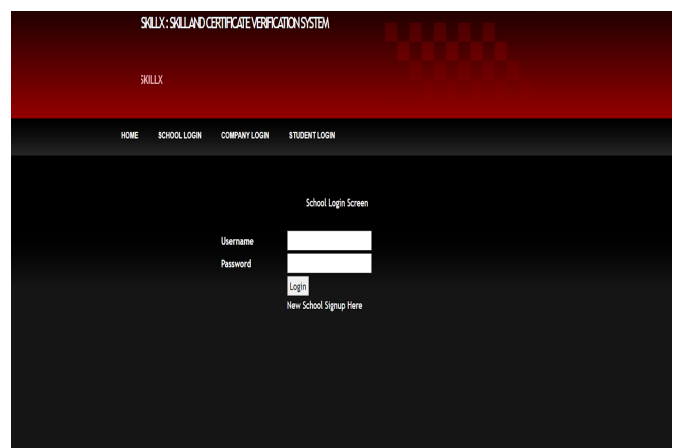
Avalanche effect:
A small adjustment to the input causes a massive change in the output, strengthening the hash against predictive inference. Because of its intrinsic unpredictability, the hash is protected from speculation based on input values, preserving cryptographic integrity.
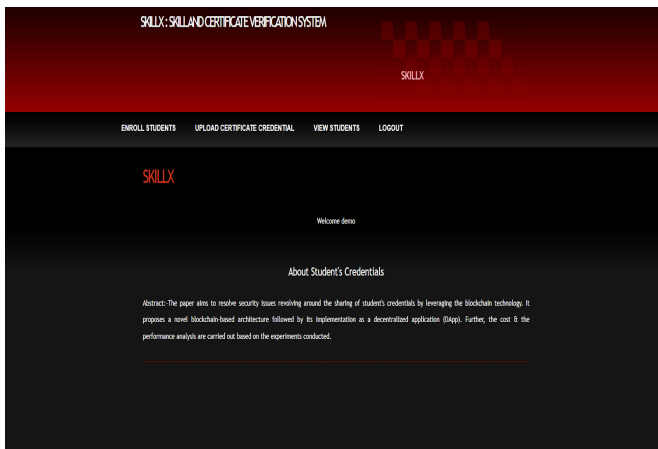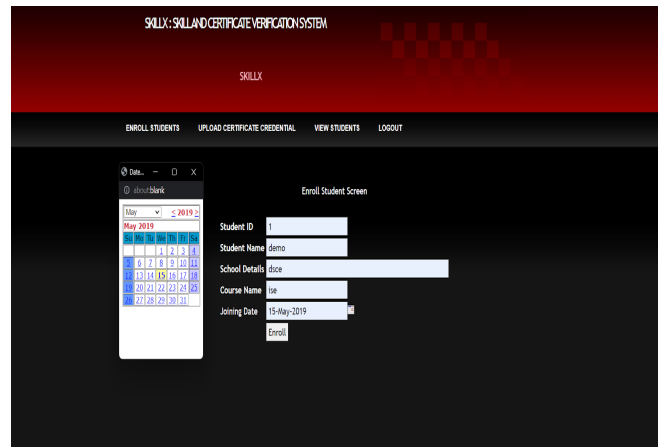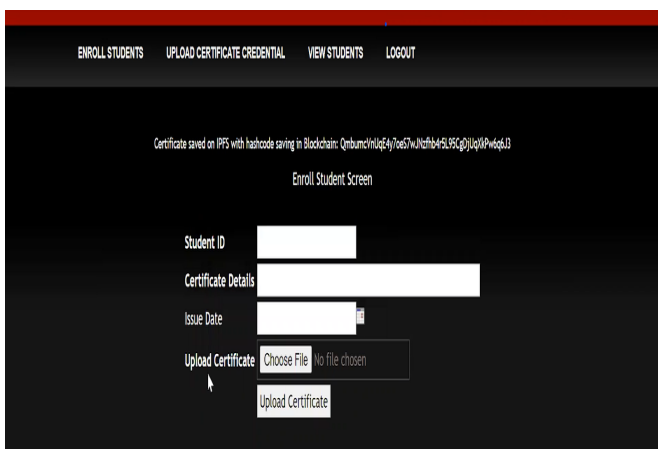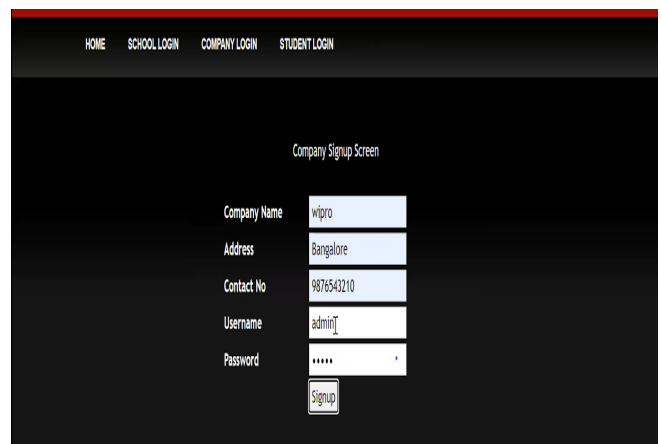
IV.   RESULTS

1)Landing page
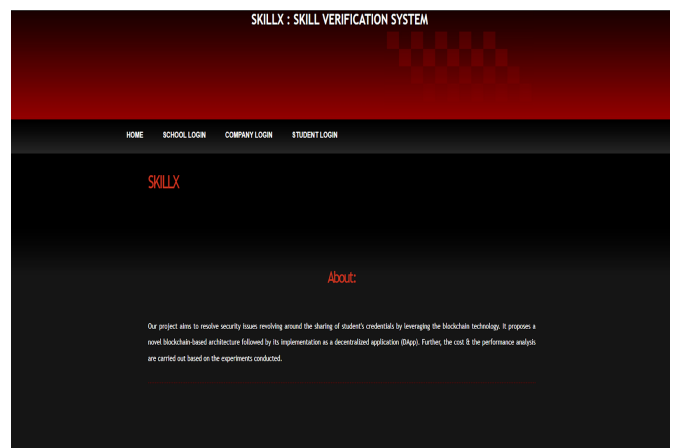
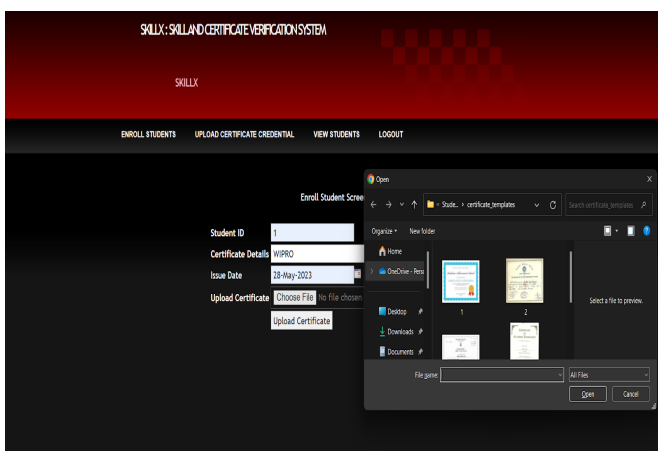2)School login page

3)School page
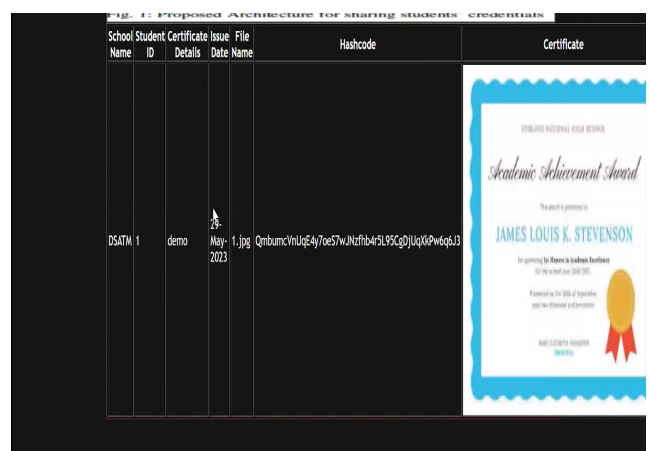

6)Certificate hash generation

4)Student Enrollment

7)Company login

5)Upload Certificate

8)Certificate seen by company

9)Ganache blocks

10)   Ganache transactions

V. CONCLUSION

In conclusion, our skill verification system driven by blockchain creates a transparent and safe mechanism by utilizing the immutable and decentralized characteristics of blockchain technology to ensure records that cannot be tampered with. Our intuitive and expandable solution guarantees that people may openly present their abilities, expertise, and learning goals. Through the systematic endorsements and skill set verification made possible by this open-source software, businesses, and programs can effectively verify qualifications during recruiting and background checks. Our method offers a game-changing solution that improves credential verification's effectiveness, security, and reliability while signaling a revolution in the field of skill and credential validation.

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