

**SECURE BLOCKCHAIN FOR ADMISSION PROCESSING IN EDUCATIONAL
INSTITUTIONS**

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ABSTRACT

Blockchain technology with its secure mechanism of maintaining data and transactions in shared, immutable, distributed ledgers has become very relevant today and is increasingly used for financial applications. This paper proposes the use of consortium blockchain and smart contracts for secure, transparent and automated processing of student applications received by educational institutions. The students applying for admissions in educational institutions need assurance of a safe, secure and transparent platform that does not compromise their privacy. On the other hand, educational institutions too need assurance about the authenticity of the documents and the applicant. The use of consortium blockchain and smart contracts incorporating business logic for validating, verifying and filtering of valid applications provides a safe and secure platform for processing student applications. This paper looks at blockchain application beyond finance and explains how the student registration and admission process can be made safe and secure for all stakeholders. It promotes a seamless mechanism with reduced turnaround time and increased security and transparency.

INDEX : block chain , secure mechanism, educational institutions. Validating and verifying , seamless mechanism

1.INTRODUCTION

1.1 Introduction:

Blockchain Technology whose emergence is generally associated with bitcoins is now employed for secure, immutable applications in the sectors like finance, healthcare, governance and business operations. This technology has attracted attention as the basis of cryptocurrencies such as Bitcoin, but its capabilities extend far beyond that, enabling existing technology applications to be vastly improved and new applications that was not considered practical earlier to be now deployed. This paper proposes a secure, smart contract-based autonomous system of student admission processing that leverages the inherent security of blockchain technology to provide a secure and

transparent system of processing student applications. Blockchain has been already applied in a few fields in the education sector such as:

- a) A record keeping system for certificates and degrees.
- b) A system to enhance transactions and payments with security between two parties.
- c) A system promoting collaboration between universities.

We propose a blockchain based system for registering, validating and selecting the student applications for various university courses. Student applicants belong to different countries which may have different education systems. Besides, different countries may have their own rules pertaining to student visa and the required procedure and documents. Students applying for admissions are required to submit/upload various forms and documents. While students need assurance of a safe and secure platform that does not compromise the privacy of their data, the educational institutions too need assurance about the authenticity of the documents and applicant. This paper examines the possibility of using blockchain for a secure, automated smart contract which streamlines the admission process and assures both student and university of an unbiased, secure and authenticated process.

2. LITERATURE SURVEY

TITLE: Blockchain beyond bitcoin

ABSTRACT: The origin of blockchain dates back to 1991, when researchers Stuart Haber and W. Scott Stornetta outlined a system to document timestamps that could not be altered. However, it is most widely known as the underpinning of Bitcoin, introduced to the tech world when Bitcoin's pseudonymous creator, Satoshi Nakamoto, referred to it as "a new electronic cash system that's fully peer-to-peer, with no trusted third party." Soon after that, Blockchain became the next possible bedrock of record-keeping worldwide and the underlying distributed ledger technology (DLT) that powers many of the most popular digital currencies.

TITLE: Bitcoin: A peer-to-peer electronic cash system. (2008).

ABSTRACT: A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution. Digital signatures provide part of the solution, but the main benefits are lost if a trusted third party is still required to prevent double-spending. We propose a solution to the double-spending problem using a peer-to-peer network. The network timestamps transactions by hashing them into

an ongoing chain of hash-based proof-of-work, forming a record that cannot be changed without redoing the proof-of-work. The longest chain not only serves as proof of the sequence of events witnessed, but proof that it came from the largest pool of CPU power. As long as a majority of CPU power is controlled by nodes that are not cooperating to attack the network, they'll generate the longest chain and outpace attackers. The network itself requires minimal structure. Messages are broadcast on a best effort basis, and nodes can leave and rejoin the network at will, accepting the longest proof-of-work chain as proof of what happened while they were gone.

TITLE: Blockchain Beyond Bitcoin: Block Maturity Level Consensus Protocol.

ABSTRACT: This paper enlightens the stipulation of blockchain beyond the bitcoin and identifies the key challenges in the implementation of blockchain on a small scale or newly implemented projects based on the literature review, furthermore it also introduces Block maturity level (BML) as a Consensus protocol, which eliminates the 51% attack, the hardfork problem and small-scale problem by introducing sub-blocks as a defense mechanism against attackers. This technique can be used in the implementation of blockchain where the hash power and difficulty is lower and easy to match-up. This proposed consensus protocol would immensely secure the implementation of the blockchain on different projects.

TITLE: Application of blockchain technology in online education.

ABSTRACT: Blockchain is a data structure of data blocks arranged in chronological order. It is featured by decentralization, trustworthiness, data sharing, security, etc. It has been widely used in digital currency, smart contract, credit encryption and other fields. With the development of the Internet technology, online education, a novel education mode, has been greatly popularized. However, this education mode still faces many problems in course credibility, credit and certificate certification, student privacy, and course sharing. Through literature review and case analysis, this paper discusses the basic technical principles and application features of blockchain technology, and proposes a solution to the problems of online education based on blockchain technology. The blockchain technology can store learning records in a trusted, distributed manner, provide credible digital certificates, realize learning resource sharing with smart contract, and protect intellectual property through data encryption. The research shows that the integration of blockchain technology is a promising trend in the development of online education.

TITLE: Exploring blockchain technology and its potential applications for education.

ABSTRACT: Blockchain is the core technology used to create the cryptocurrencies, like bitcoin. As part of the fourth industrial revolution since the invention of steam engine, electricity, and information technology, blockchain technology has been applied in many areas such as finance, judiciary, and commerce. The current paper focused on its potential educational applications and explored how blockchain technology can be used to solve some education problems. This article first introduced the features and advantages of blockchain technology following by exploring some of the current blockchain applications for education. Some innovative applications of using blockchain technology were proposed, and the benefits and challenges of using blockchain technology for education were also discussed.

TITLE: Blockchain technology overview.

ABSTRACT: Blockchains are tamper evident and tamper resistant digital ledgers implemented in a distributed fashion (i.e., without a central repository) and usually without a central authority (i.e., a bank, company, or government). At their basic level, they enable a community of users to record transactions in a shared ledger within that community, such that under normal operation of the blockchain network no transaction can be changed once published. This document provides a high-level technical overview of blockchain technology. The purpose is to help readers understand how blockchain technology works.

TITLE: Blockchain: Blueprint for a new economy.

ABSTRACT: Bitcoin is starting to come into its own as a digital currency, but the blockchain technology behind it could prove to be much more significant. This book takes you beyond the currency ("Blockchain 1.0") and smart contracts ("Blockchain 2.0") to demonstrate how the blockchain is in position to become the fifth disruptive computing paradigm after mainframes, PCs, the Internet, and mobile/social networking. Author Melanie Swan, Founder of the Institute for Blockchain Studies, explains that the blockchain is essentially a public ledger with potential as a worldwide, decentralized record for the registration, inventory, and transfer of all assets not just finances, but property and intangible assets such as votes, software, health data, and ideas. Topics include: Concepts, features, and functionality of Bitcoin and the blockchain Using the blockchain for automated tracking of all digital endeavors Enabling censorship? resistant organizational models Creating a decentralized digital repository to verify identity Possibility of cheaper, more efficient services traditionally provided by nations Blockchain for science: making better use of the data - mining network Personal health record storage, including access to one's own genomic data Open access academic publishing on the blockchain This book is part of an ongoing

O'Reilly series. Mastering Bitcoin: Unlocking Digital Crypto-Currencies introduces Bitcoin and describes the technology behind Bitcoin and the blockchain. Blockchain: Blueprint for a New Economy considers theoretical, philosophical, and societal impact of cryptocurrencies and blockchain technologies.

TITLE: Blockchain Technology in Education System: A Review.

ABSTRACT: Blockchain technology can be used to solve many educational problems and can help educators as well as learners to monitor the learning outcomes. The data can be stored securely and tamper proof format when it's stored onto the blockchain network. The Blockchain for Education platform helps us to make the tamper-proof certificates and their correct and the overall permanent allocation of these certificates to learners, as well as verification of certificates. It can reduce the overall frauds and tampering of the degrees and certificates. Here smart contracts can be designed and deployed on to the Ethereum blockchain that can be designed using the solidity programming language. Blockchain can be applied to private, public and consortium sectors depending upon the usage and the scope of the blockchain.

3. PROBLEM STATEMENT

This technology has attracted attention as the basis of cryptocurrencies such as Bitcoin, but its capabilities extend far beyond that, enabling existing technology applications to be vastly improved and new applications that was not considered practical earlier to be now deployed. Blockchain is the core technology used by cryptocurrency, bitcoin, through the maintenance of immutable distributed ledgers in thousands of nodes. This was the definition given by Satoshi Nakamoto. As the name suggests, blockchain is a single list of chained blocks in which each block contains various transactions or some kind of data/information. A blockchain network is known for its safety and security of data. Each block in the blockchain network mainly contains its own hash value, the data/information and hash value of the previous block.

3.1 LIMITATION OF SYSTEM

Susceptibility to Fraud: Paper applications and manual record-keeping are vulnerable to forgery and manipulation. **Inefficiency:** Processing paper applications can be time-consuming and labor-intensive for institutions.

4. PROPOSED SYSTEM

In this paper, we address the issue of a secure, transparent, tamper-proof and automated admission processing by proposing a consortium blockchain based autonomous system. We propose to exploit the autonomous feature of smart contract to automate the process of application validation. The business logic in smart contract validates each stage of application processing such that each stage in the process is automatically triggered on the occurrence/completion of a task/stage. This system makes the admission process efficient and secure by addressing the following key problems: i) How can we streamline the entire process making the process more meticulous and efficient? ii) How can we authenticate documents received? iii) How can we filter out applications based on specific criteria? iv) How can the stakeholders i.e. the applicants and the institution be assured about the security of the data? Student Application processing typically involves the following steps:

Applicants apply online for admissions to educational institutions. They do so by registering/filling in the requisite online application form. They are required to provide personal details, academic/educational data, recommendations, digital credentials issued by the qualifying universities, financial statements and proof of payment of application fees. The consortium blockchain gets notification of this application or transaction. The smart contract which works on the 'if-this-then-that' logic filters and selects the valid applications. Since smart contracts are deterministic in nature, they can be run on any node and they yield the same output for the same input. The filtering of applications takes place on the basis of the criteria defined, for example the number (correct number) of documents submitted, the nationality of the applicant, financial standing and minimum score/grade. Smart contracts have the feature of being automatically executable and enforceable. The completion of one task/step automatically triggers the next step, thereby resulting in the execution and fulfilment of the smart contract.

ADVANTAGES:

Enhanced Security and Immutability: Data stored on a blockchain is encrypted and distributed across a network of computers. This makes it tamper-proof and nearly impossible to alter or forge documents, significantly reducing the risk of fraud. **Data Privacy and Control:** Students can have more control over their data on a blockchain. They can choose what information gets shared with institutions and track its use. This fosters trust and empowers students to manage their educational records.

5. METHODOLOGY

The blockchain-based admission processing system can be organized into several key modules to facilitate its functioning. Here are five essential modules:

User Registration and Authentication Module:

This module manages the registration of users, including both students and educational institutions, on the blockchain platform. Implements a secure authentication mechanism to verify the identity of users and prevent unauthorized access. Establishes a user profile with relevant information for seamless participation in the admission process.

Application Submission Module:

Facilitates the submission of student applications through a user-friendly interface. Integrates smart contracts to validate and standardize the submitted information, ensuring that applications meet predefined criteria. Manages the secure storage of application data on the blockchain, maintaining an immutable record of submitted documents.

Document Verification and Validation Module:

Utilizes smart contracts to automate the verification of documents submitted by students. Implements business logic for validating the authenticity of academic transcripts, certificates, and other required documents. Flags and filters out applications with discrepancies or fraudulent information, ensuring the integrity of the admission process.

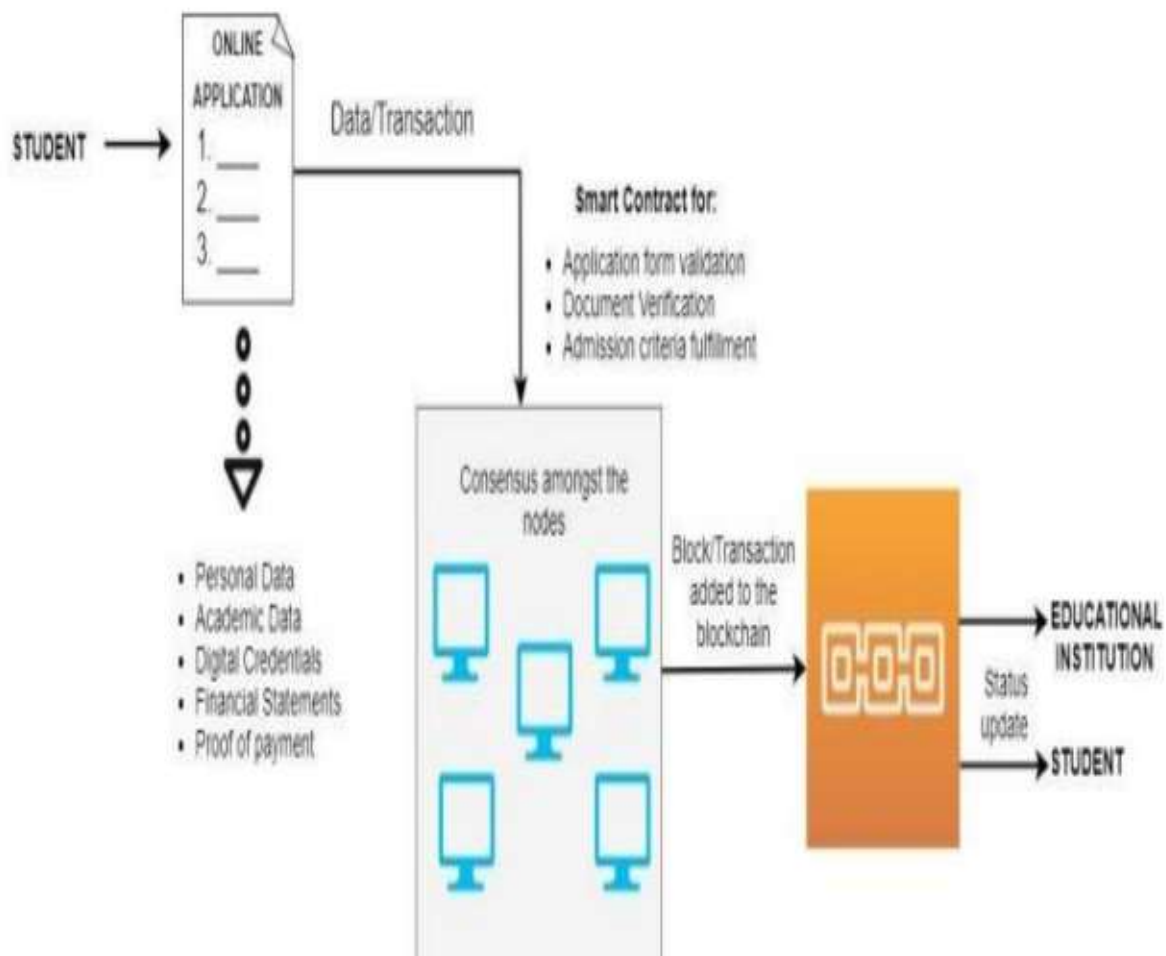
Decision and Approval Module:

Involves smart contracts to automate decision-making processes, incorporating predefined criteria for admission. Allows educational institutions to review and approve/reject applications based on established admission policies. Records decisions on the blockchain, providing an auditable and transparent trail of the admission outcomes.

Audit and Reporting Module:

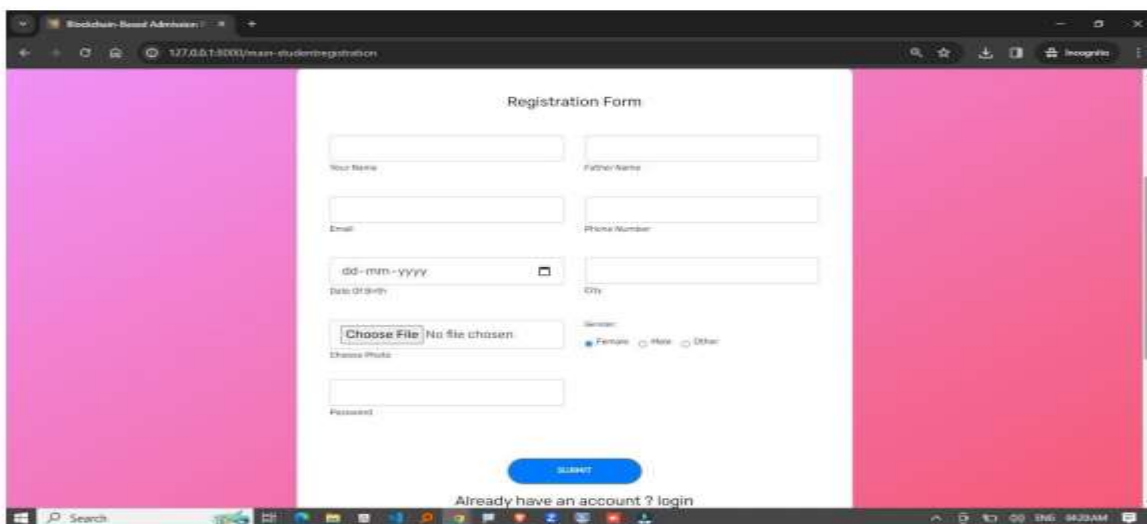
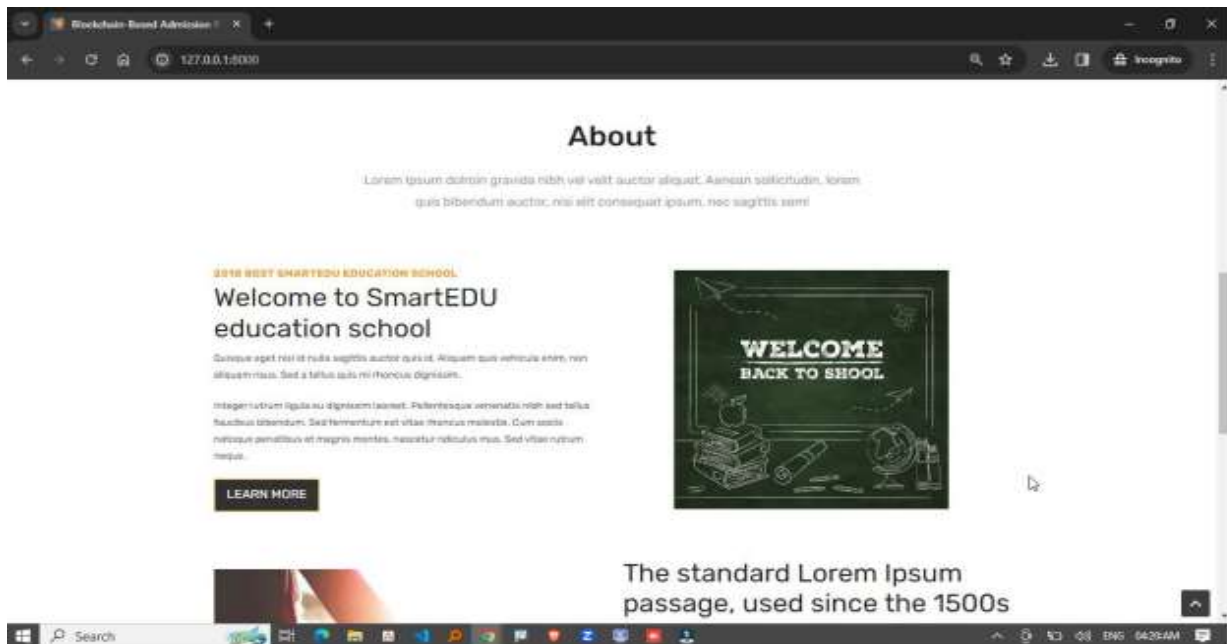
Provides tools for auditing the admission process, offering insights into system activities, decision-making, and user interactions. Generates comprehensive reports for educational institutions and administrators to assess the efficiency and fairness of the admission process. Ensures compliance with regulatory requirements and supports continuous improvement through data analysis.

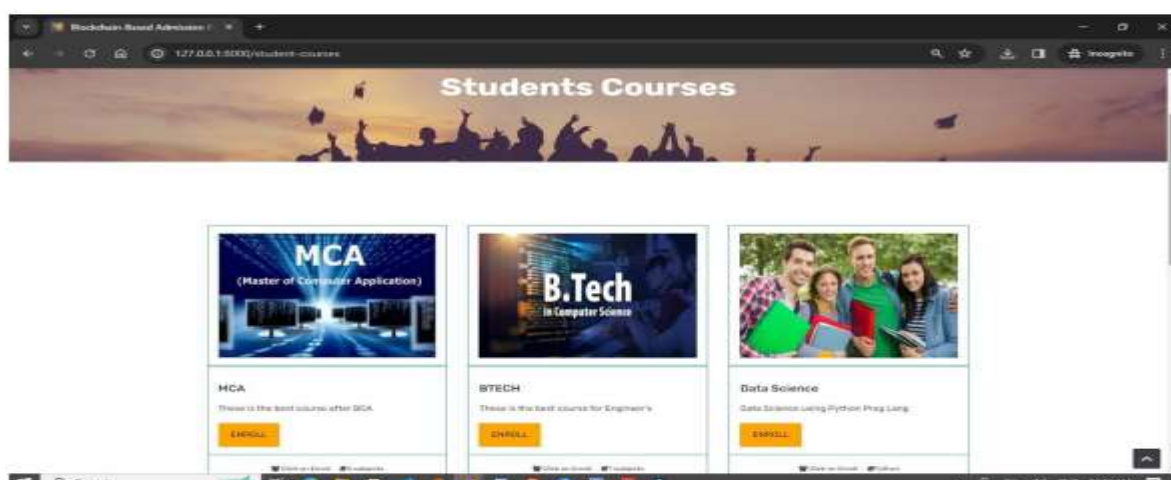
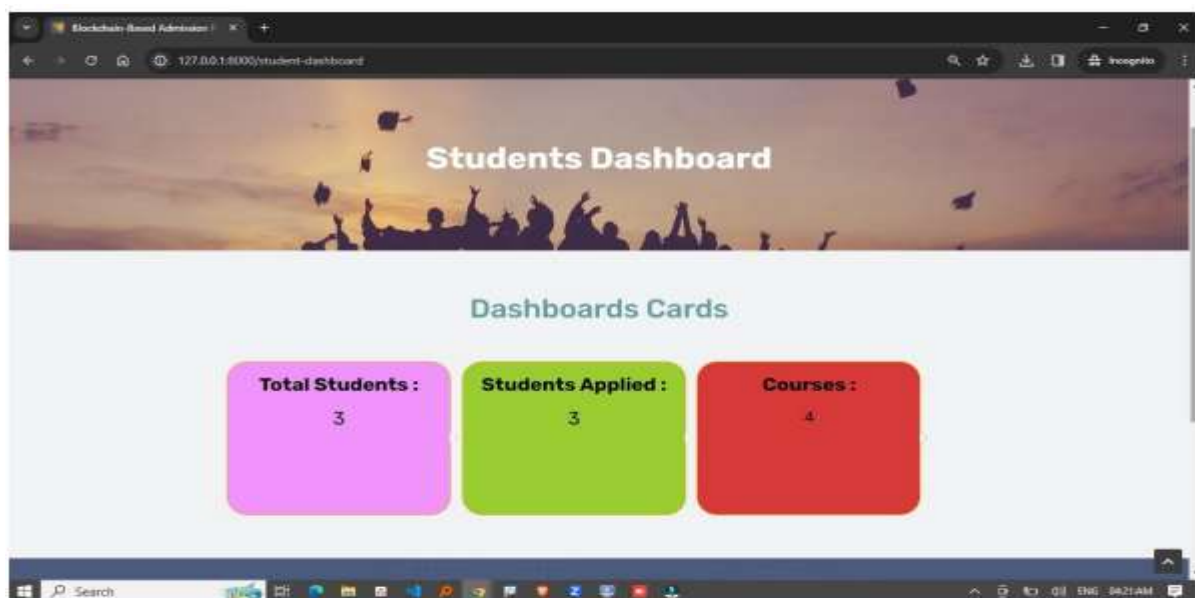
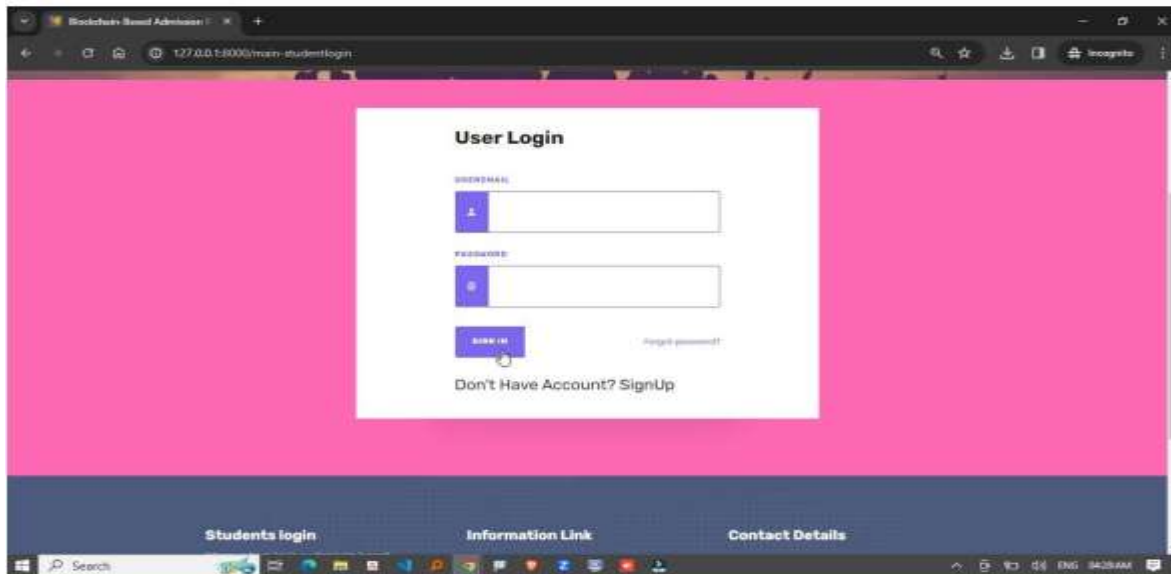
6. SYSTEM ARCHITECTURE

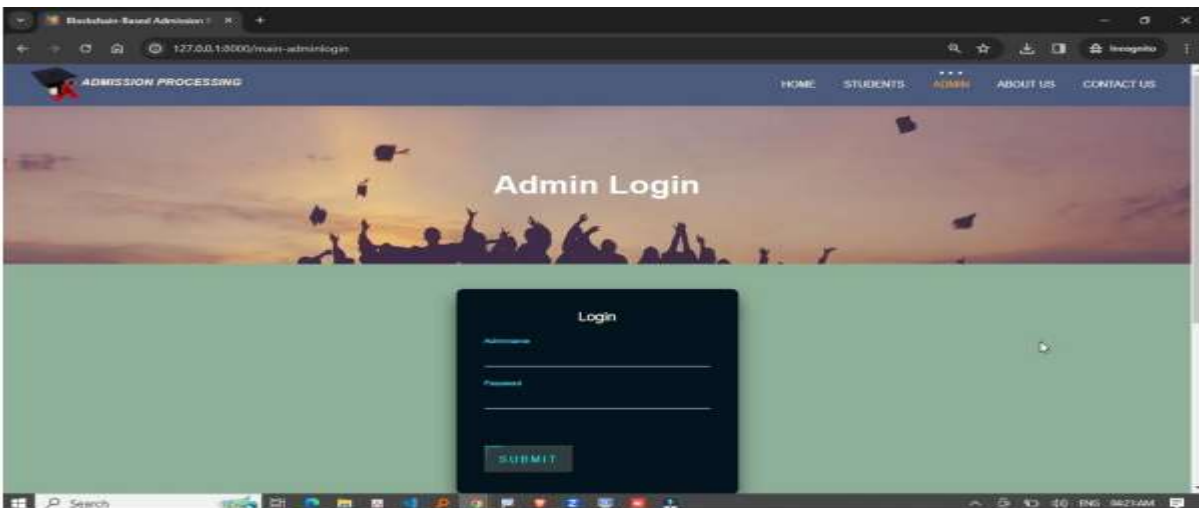
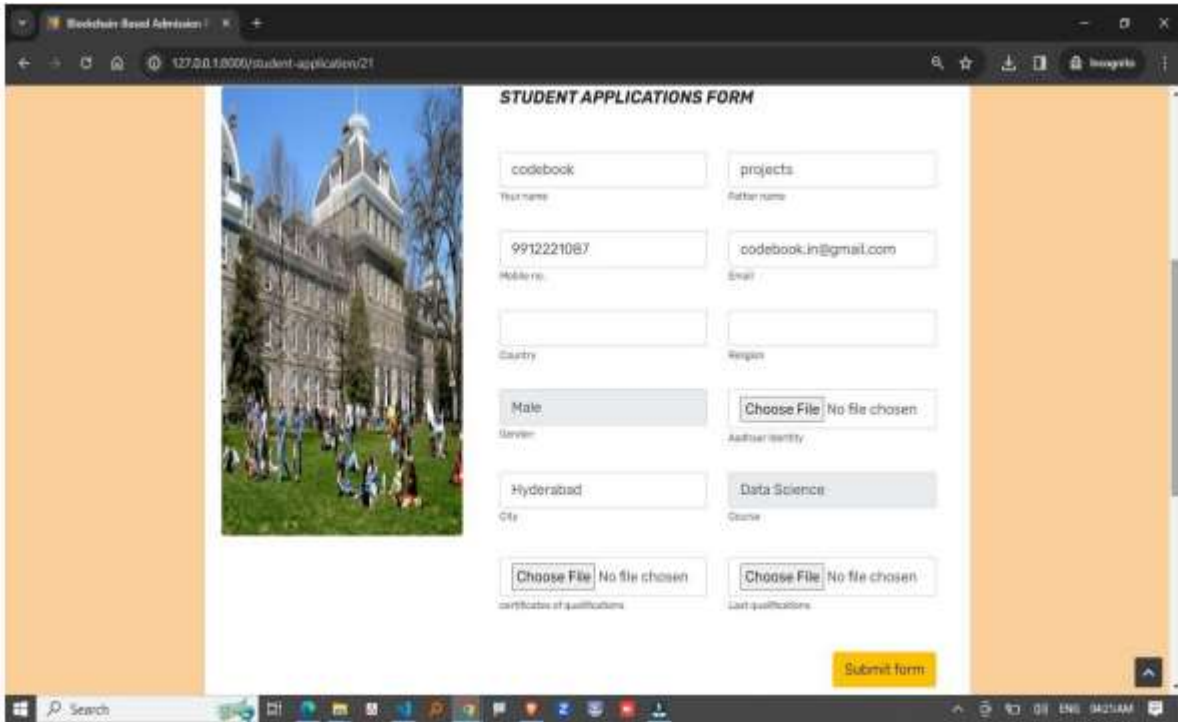


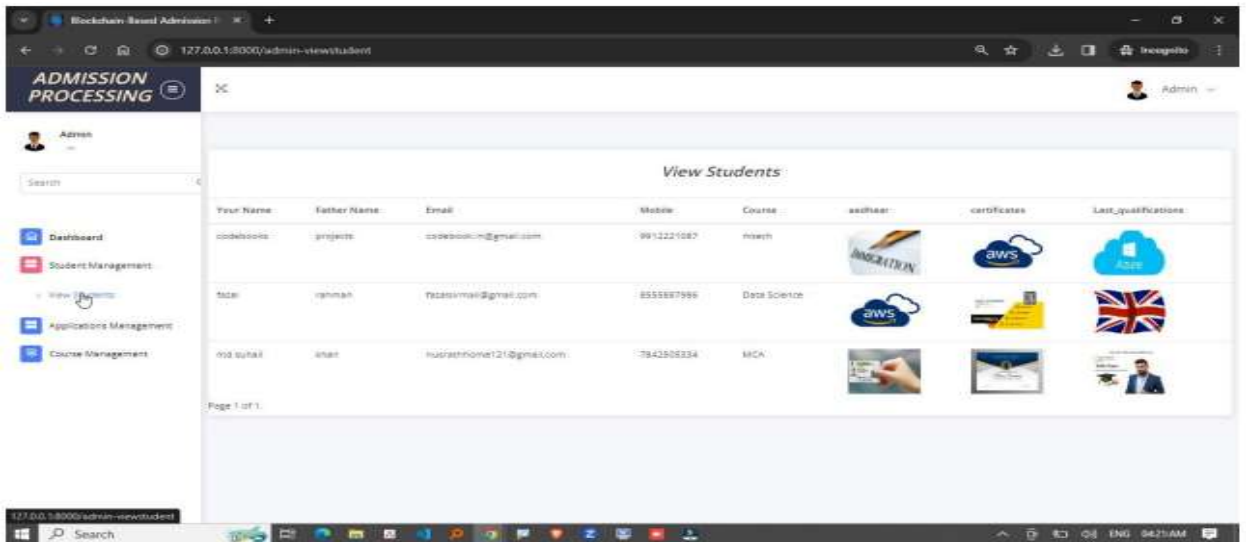
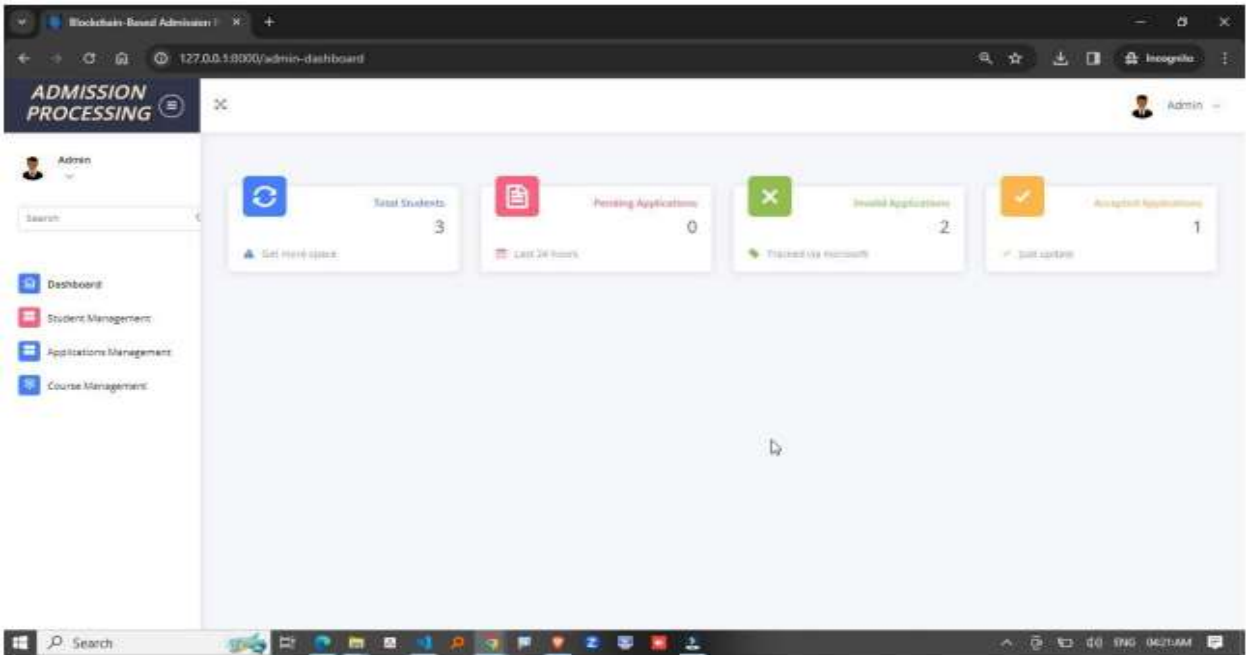
7.RESULTS ANALYSIS

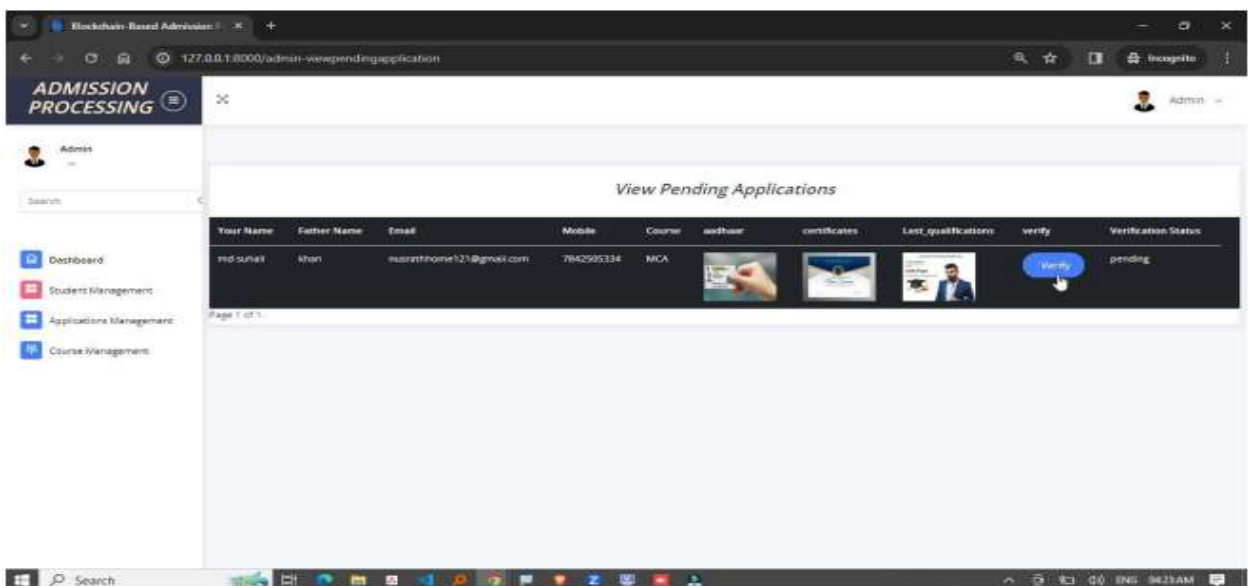
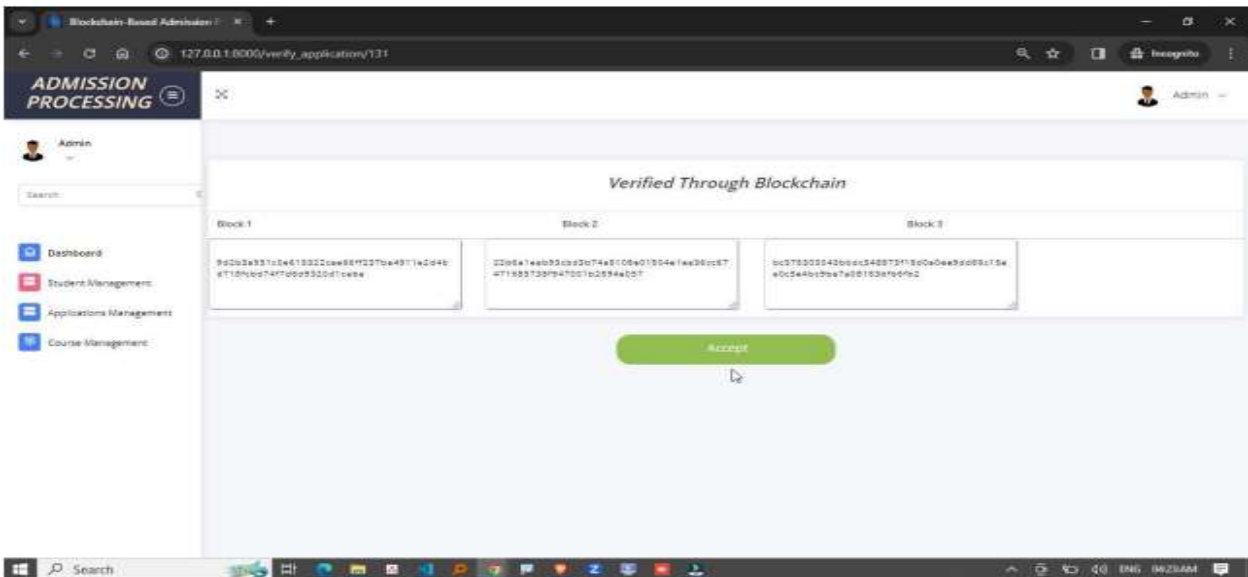
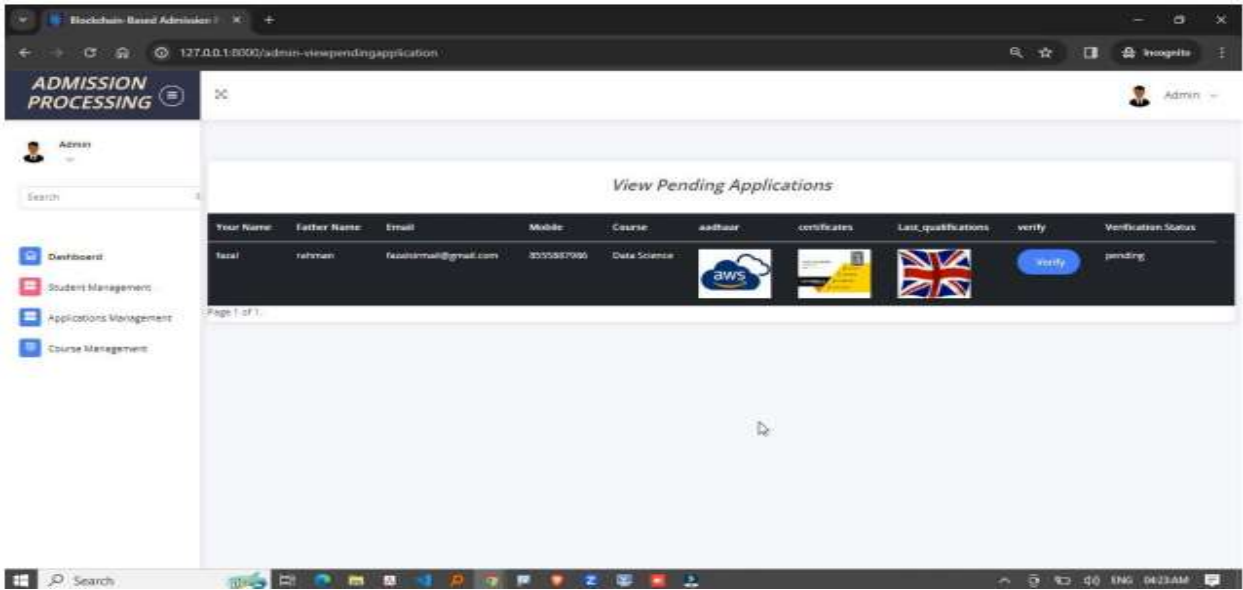


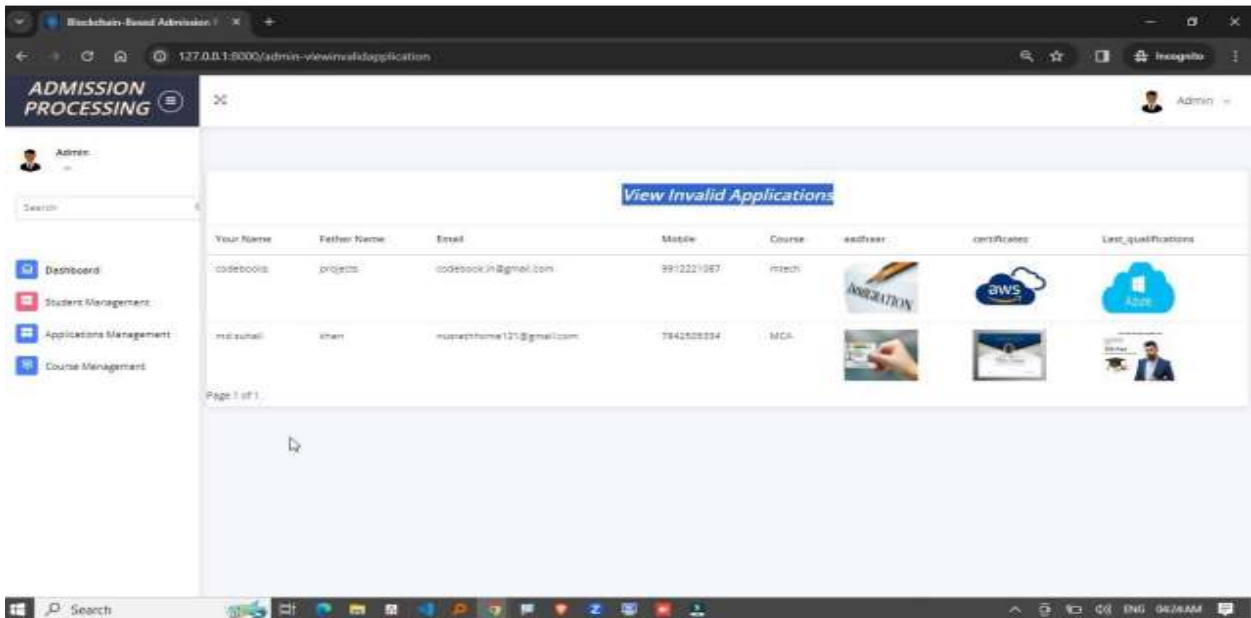
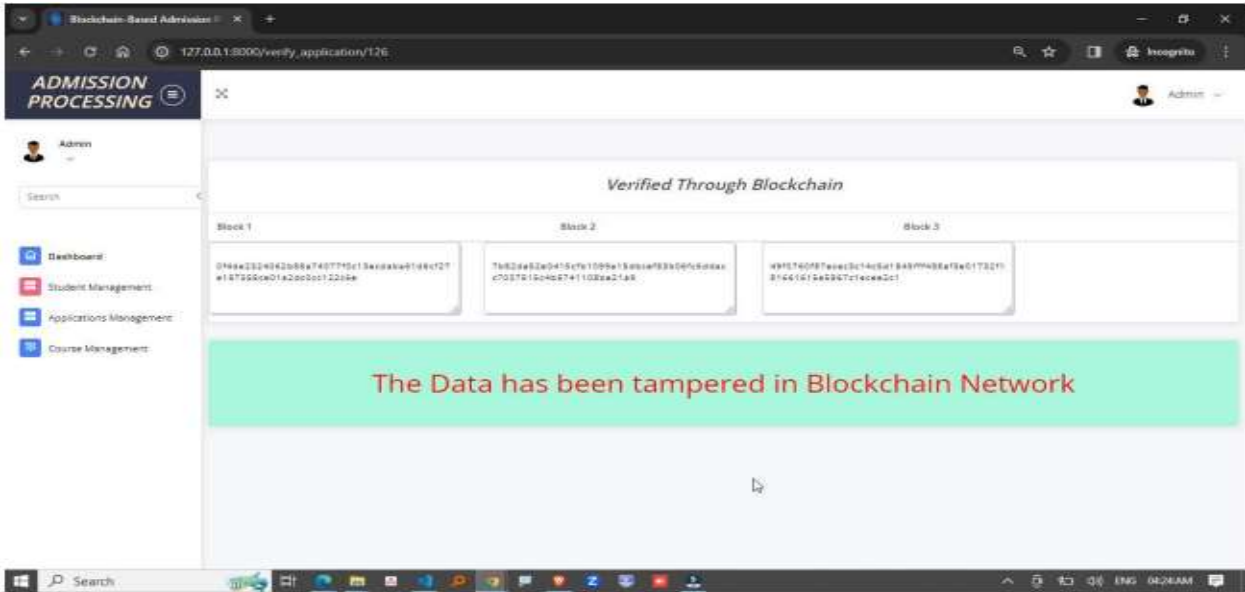


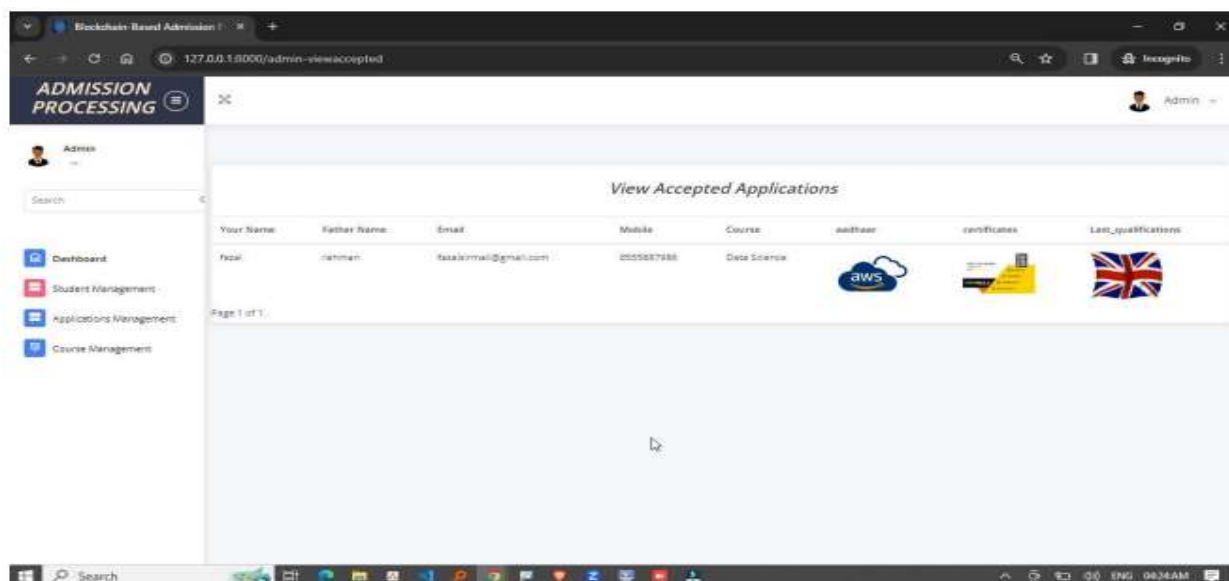












8. CONCLUSIONS

Consortium blockchain for student application processing provides a secure, transparent, autonomous and process based platform for admissions to educational institutions. The proposed blockchain-based student application processing system takes advantage of the inherent security features of consortium blockchain, and proposes the use of smart contract for automating the different steps involved in the validation and verification of applications. This paper also examines the potential benefits and limitations of such a system.

9. REFERENCES

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