SchooldApps

Building Better Education with Blockchain

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Table of Contents

Overview

In the last few decades, technological integrations of modern software systems into scholarly ecosystems has proven time and time again to be indisputably profitable for students, teachers, administrators, and staff. After the initial adjustment phase, the best implementations exceed value propositions by providing personalized programs that meet critical needs, facilitate otherwise cumbersome form-based processes, and provide a locus of universal data truth for multi-party reference. The time- and labor-saving value of such technological applications for school systems cannot be overstated. Stakeholders expect their dollars to go further than ever before, and in meeting this challenge schools must seek to expedite and maximize processes to the fullest extent. Enter SchooldApps.

SchooldApps is a decentralized (blockchain) school management system which uses smart contracts and KECCAK-256 cryptographic hashing to create a safe, fast, affordable method of record storage. The schooldApps system can be used for academic progress, health records, educational program data, essential curriculum materials, childcare systems, and more. The possibilities are limitless. Created by experienced data analyst and local Georgia parent Angeleen Wilson, SchooldApps answers the call to equip the academic experience with reliable blockchain technology.

Key Definitions

A.I.
Artificial Intelligence (abb.). In our context, artificial intelligence applied is the implementation of technologies such as facial recognition for identity verification

API (application programming interface) Integration
Tools for building software that require components to interact and function together

Blockchain
A ledger of information computed as a series of sets, called blocks, secured and linked together through a cryptographic hashing sequence

Blockchain technology
For our purposes, any software or system implemented to create or use a blockchain

Cryptographic hashing
The coding system that creates security of information on the blockchain, in conjunction with a set of keys. Popular systems include KECCAK-256 (Ethereum) and SHA-2, or -3 (Hyperledger Fabric)

Decentralized
The function of data not being centrally located, allowing for an immutable record and universally acknowledged "truth" for reference by multiple parties

Decentralized Application (dApp)
Any application of blockchain technology which uses a decentralized method of storing, accessing, or distributing information

Digital Record
Records stored in a digital format, such as in apps, dApps, on a computer, in a phone, in the cloud, etc. Anything not on paper

Peer-to-Peer
The efficiency-friendly technology architecture of shared nodes which allows for a shared workload in and between systems

Platform

Any place where software (such as a dApp) is launched or executed

Smart Card

Plastic card containing a circuit, typically used in school systems for authentication or identification

Smart Contract

A piece of code, typically a file, that is run on each node and completed block of the blockchain, providing immutable and non-negotiable standards for a transaction

Product Goals

1. Common user database model

2. Geolocation data processing module

3. Instant transaction validation and open source tracking for all modules

4. Smart pay API gateway for district gifts, pledges, and fundraising campaigns

5. Search modules based on A.I. and machine learning technologies

6. Comprehensive training, help, and assistance in product realization

7. Secure processing and distribution of grade records

8. Transcript encryption and validation of grade records

9. Facilitated data access supporting analysis and tracking for grants, program expansion, program proposal, and other support typically handled solely through offices of institutional research

10. Administrative truancy management

11. Employee service- and record-keeping, as well as a validated reference for pay scales and duties

12. Daycare, after-school, and extracurricular tracking, billing, and record-keeping

Industry Analysis

Superintendent of Schools Dr. Brian V. Hightower presented "We Are! Educating the Emerging Generation" at the 2018 Council for Quality Growth. In this presentation Dr. Hightower demonstrated a commitment to transparency and growth by highlighting the *Bus Stop Look Up* and the *SafeSchools Alert System*. These forward-thinking programs are indicative that Cherokee County is dedicated to "Educating the Emerging Generation."

The 2018-2022 Strategic Plan states the following "Strategic Statement" on page 1:

> The School District will maintain and communicate at all levels of the organization a purpose and direction for continuous improvement that commits to high expectations for learning, as well as shared values and beliefs about teaching and learning.

"Shared values" are reached easily and unequivocally through smart contract chaincode parameters blockchain consensus algorithms. "Communication at all levels" is a hallmark of transparent information sharing, yet another feature of blockchain technology. All stand to benefit from a implementation of a permissioned blockchain ecosystem.

Cherokee County School System Alignment with Blockchain

CCSC 2017-2020 Three Year Technology Plan contains several applicable sections corresponding to blockchain implementation. Below is a sampling of applicable areas:

Section 3. "Gap Analysis," b. Administrative Gaps, ii. Streamlined Business Practices

> Blockchain allows for secure access to information between institutions and offices. This method of information storage facilitates "collection, processing, archiving, retrieval, reporting and dissemination of data at the Administrative level, [and] within all departments and areas." Such storage cuts time and information costs of annual reviews and evaluations.

Section 3. "Gap Analysis," c. Parent/Community Gaps, iii. Reduction of Paperwork

> Blockchain reduces paperwork by offering a shared system wherein systems and programs share information. Information can even be auto-populated into new systems, reducing the need for repeated requests for information in new situations.

Stakeholder Analysis

Already implemented on the CCSD website is, for example, Emergency Notification, as well as many other services. These systems currently require extensive maintenance and hands-on support by staff, making the content subject to human entry errors. Blockchain allows for seamless automatic data entry to ledger through well-defined smart contracts.

According to the Cherokee County School District Website:

> Cherokee County School District is a high-performing public school system in Metro Atlanta, with 40 schools and centers, 4,800 employees and more than 42,200 students.
>
> The Cherokee County School District consists of:
>
> - 23 elementary, Grades K-5;
> - 7 middle schools, Grades 6-8;
> - 6 high schools, Grades 9-12;
> - ACE Academy, alternative daytime program, Grades 6-12;
> - Polaris Evening Program, alternative evening program, Grades 9-12;
> - Tippens Education Center;
> - CCSD Preschool Centers: Ralph Bunche Center and Johnston Preschool.

(Info taken from https://www.cherokeek12.net/Content2/about-ccsd)

Parents

Blockchains take the guesswork out of information location. A distributed ledger portal would contain all information across blockchain systems. One key would hold all the information needed for each student in one place.

Instructors

Blockchains provide a indisputable record. A centralized place to upload and record sensitive data could be time-stamped and approved without dispute.

Administrators

Blockchains reduce liability. Because cryptographic hashing does not allow centralization of records, hackers and other malicious parties would be unable to access all information at once. Each individual wallet would contain a particular key to his/her own information, and malicious activity could be traced back to an individual.

Product Models

There are a variety of permissioned blockchain systems available to meet the needs of each service proposed in the Product Goals listed on page 7. In addition, the extensive expansion of permissioned systems are ongoing, including the addition of sidechains and various connected secure services. Subsequent models listed below are meant to guide, not restrict. Actual implementation may vary.

Transcript Encryption and Grade Record Model

A transcript chain would eliminate the need to manually approve and answer requests for grade records by automating the process through smart contracts.

Institutional Research Model

Each school's information could be recorded on a permissioned blockchain and would reduce time informational time lags that hinder appropriate filings for grants and other financial funding opportunities.

Truancy Management Model

Posted absenteeism would allow quicker automated response times for potentially hazardous situations. Liability is eliminated and appropriate actions could be taken to safeguard everyone involved in the event of a worst-case scenario.

Milestones

I. ## Idea Conception: Q2-Q3, 2017

    Generation of initial product, initial draft of white paper, informal product viability surveys and unique product model formation. Research and development phase initiated.

II. ## Founding Team Collection: Q4, 2018

    Assembly of key team and advisors critical to diverse perspectives necessary to achieve program outcomes.

III. ## Meetings and Research with Key Stakeholders: Q1-Q4, 2019

    Production of product website, business plan, marketing plan, and white paper. Product roadmap expanded. Processing of data necessary to pinpoint use cases and beta-tested product options within current system. Minimum viable product validation.

IV. ## Enactment of Initial Phases of Marketing Plan: Q4-completion

    Website expansion to include site news and development updates. Newsletter subscribers receive exclusive updates and crowdfund event notifications. Telegram subscriber expansion with reward bot. Subscribers converted to contributors through engagement via Twitter, Steemit, Medium, and other media channels. Meetup groups and informative events held to engage target market locations.

V. ## Product Specification Design for Initial Implementation of MVP: TBD

    Data from marketing research collated and used to refine product specifications. System requirements and cross-functional applications articulated between stakeholders and creators. Document specification sheet for first implementation explicitly spelled out, including proposal for location, use case, and potential setbacks. Contractual requirements proposed to school system for approval. Success measures delineated.

VI. ## Expansion of Developer Team: TBD

    Necessary workforce sourced through agreed-upon labor channels

VII.   Development/Hackathon: TBD

Potential source for innovation and implementations. Possible collaboration with local dev schools and bootcamps.

VIII.   Beta-testing of first Implementation: TBD

Rollout of demo to users and other interested parties. Sign-off results in full implementation. Training and education conducted

IX.   First Implementation Operational: TBD

Full roll-out

X.   Feedback on Implementation: TBD

Surveys and troubleshooting logs provide information regarding successes and failures. Reflection document created and integrated in future projects. Scalability and sustainability for other demographic locations and products assessed.

XI.   Expansion: TBD

Next phases planned and executed following comprehensive plan above. Learn from mistakes and move forward with approvals. Rinse, lather, repeat.

Special Considerations

Permissioned Blockchains offer the perfect combination of distribution, transparency, and security.

Anonymization and Privacy

Cryptographic hashing systems make information nearly impossible to obtain by malicious agents. Regardless of how confidential documents try to be, at any point a file may be accessible on a desk. Blockchain takes the inherently non-secure nature of paper and traditional, hackable databases out of the equation. Each parent, teacher, and administrator holds a public key that corresponds to their own private key. This makes public information untraceable to an individual, but simultaneously easily accessible to the interested party.

Piracy

Blockchain reduces the need to copy and share information on insecure locations, such as in the case of files on a desktop computer. The information is always accessible and posted permanently on the blockchain, eliminating the need to copy information in order to share it. Access between departments, schools, and institutions is available with key sharing, traceable to the individual granting access. This process eliminates the guesswork out of how to share sensitive information without risking liability. Unintended consequences of careless information transference are eliminated.

Conclusion

SchooldApps system is a model for the future. School partnerships and the "Emerging Generation" of students expect informational distribution to increase in efficiency and security with each year. Record storage and maintenance incur exorbitant costs each year, and federal and state regulations show no signs of decreasing the needs for attention in this area. With a distributed ledger system, key stakeholders in Cherokee County can spend less time devoted to logging, checking, and ensuring compliance, and more time doing the work they love: nurturing the best of CCSD's future generations.