**Safe Exam**

About:

* Safe Exam is an online exam application with a unique feature: it stores all exam data on the blockchain. This means that every answer and transaction during the exam is recorded in a secure, unchangeable way on the blockchain, ensuring the integrity and security of the exam process.
* The main goal of this app is to make exams more reliable and secure. There are many problems today like exam papers being leaked or data getting lost. Our app is designed to solve these problems by making sure everything about the exam is protected.
* It does this by using advanced technology to keep the exam process safe from tampering. This means that no one can change or interfere with the exam, from when it’s created to when it’s given. By keeping everything secure and trustworthy, our app helps ensure that exams are fair and honest.
* We have implemented an AI model that runs in the background. If someone tries to cheat, the model detects it and sends a signal to the admin about the suspicious activity.
* We also created a dashboard where the admin can view all student data, see analytics, and receive notifications if any anomalies are detected on specific wallet addresses.

Technologies:

* The GUI and Server are created using python making cross-platform and can be ran on Linux, Windows and Mac.
* We have stored every data related to student, examination and cheating activity on the blockchain (Algorand as of now since there is less network congestion and less gas fees required to write transaction) to ensure it remains secure.
* We have also used Python for other parts of the implementation. Python is a versatile and widely used technology, known for its flexibility and extensive capabilities.
* The AI models are built using python to monitor the activities of student based on various attributes to detect any cheating attempt.
* For the dashboard, we used Next.js as the main framework, and for design, we used Tailwind CSS, Shadcn UI, and some React components.

Problem Statement:

There are three major problems faced by anyone hosting an online examination

1. Paper getting leaked before examinations beings conducted.
2. Students trying to cheat during examinations.
3. Students complain about the fact that the results got manipulated and are different from the responses they had given.

Proposed solution:

With Safe Exam we want to make online tests safe and fair by using blockchain technology and AI. This will help prevent cheating, keep results honest, and protect student data.

**Secure Data Storage**

* **Blockchain:** All exam information (questions, answers, times) is stored on a blockchain, making it impossible to change or tamper with.
* **Unique Wallets:** Each student gets a unique wallet to keep their exam data secure.

**Preventing Paper Leaks**

* **Dynamic Questions:** Create exam questions that change based on when and where a student accesses them, making it hard to leak the exam in advance.

**Cheating Detection with AI**

* **Monitoring:** An AI system checks for suspicious behaviour during the exam, like changing answers too often.
* **Alerts:** If cheating is detected, the admin gets notified right away.

**User-Friendly Experience**

* **Easy Interface:** Make the exam and admin dashboards simple to use, so everyone can navigate them easily.

**Crash Recovery**

* **Auto-Save:** The system saves progress automatically, so if the app crashes, students don’t lose their answers.
* **Resume Exams:** Students can continue exactly where they left off after a crash.

**Data Management After Exams**

* **Secure Deletion:** After the exam, all student data is deleted to protect their privacy and prevent tampering.

Functionalities:

Refer to the diagram below to understand the basic workflow of the application.

A diagram of a data flow

Description automatically generated

**1. Wallet Creation:** When candidates login with their credentials, they are assigned a unique wallet address. This wallet is created to securely store their exam-related data.

**2. Recording Answers:** Each time a candidate answers a question, a transaction is recorded on the blockchain using their wallet. This includes the start and end times of their exam session, which helps verify how long they took.

**3. Handling Answer Changes:** If a candidate changes their answer, a new transaction is recorded. The latest answer is determined by the most recent transaction timestamp on the blockchain.

**4. Crash Recovery:** If the application crashes, it will automatically restart from where the user left off.

**5. AI Model:** The AI model detects cheating attempts and notifies the admin.

**6. Admin Dashboard:** The admin can access a dashboard to view all student data, anomalies, analytics, and more.

**5. Wallet Destruction:** Once the exam is complete and the results are displayed, the candidate’s wallet is destroyed, including its mnemonic and private key. This prevents any future alterations or tampering with the exam data.

This process ensures the security and integrity of the exam by keeping a permanent and unchangeable record of each response.

Benefits:

* **Secure Data:** All exam data is stored on the blockchain, making it safe and unchangeable.
* **Fair Exams:** Every action is recorded, ensuring that exams are honest and reliable.
* **Cheating Detection:** An AI system watches for cheating and immediately alerts the admin.
* **Crash Recovery:** If the app crashes, it restarts where you left off, so you don’t lose progress.
* **Easy Admin Control:** Admins can view all student data, get alerts, and check exam details on the dashboard.
* **Data Privacy:** After the exam, all data is securely deleted to prevent any future tampering.
* **Simple for Users:** Candidates can easily answer and change responses, with everything saved securely.
* **Time and Cost Efficient:** Automating the exam process saves time.
* **Scalable:** The app uses advanced technology, allowing it to grow and adapt to future needs.