Blockchain Based Skill Verification System

Synopsis

Submitted for Bachelor of Technology

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PROBLEM STATEMENT

Introduction:

A blockchain-based skill verification system can help reduce the time spent on conducting competency checks, skill verification and build more trust in the skill and competency management within the organisation. With Blockchain, an employee can have his/her skills recorded on an available network which are also verified and approved by their previous managers/employers. Thus with a skill chain based on the blockchain for an employee, we can be completely assured of the skills, experience, learning goal progress and their competency level along with a transparency of who have endorsed the employees on these skills. Further, this will help organisation to help optimally leverage credible employees for respective business needs.

Objective:

The objective of a blockchain-based skill verification system is to create a secure, decentralized platform that ensures the authenticity and transparency of individuals' skills and qualifications. By leveraging blockchain's immutable ledger, the system allows for efficient, tamper-proof verification, empowering individuals to control their credentials while reducing fraud and streamlining the verification process for employers and institutions globally**.**

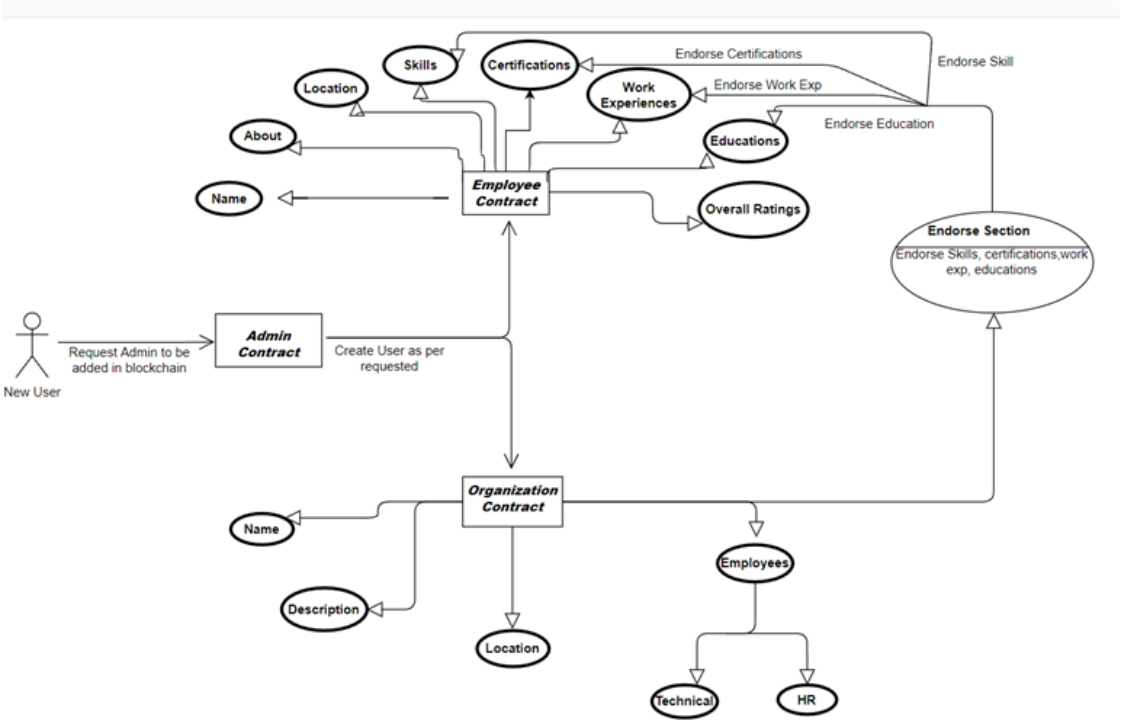
Use Cases:

1. **Can be used by the HR for Smooth Hiring Process**
2. **Can be used by the employee to get into the company of his dreams**
3. **Can be used to do competency checks**
4. **Can be used to chat with organizations and employees**

Features

- The Website has a ***search feature*** for both employee and HR for searching perticular person for Job requirement matches.
- ***Notificaton*** System to alert the employee for the scheduled interview.
- Notification For Certifications and skill endorsements.
- ***Charts and graphs*** in the employee profile page to show the endorsement ratings, certifications time and date.
- ***Barcode scanner*** to scan the the barcode generated from the public key hash of the employee and organization to make connecting more easy.
- In App ***chat feature*** to allow employees and HR connect with each other.Employees can request for a endorsement for a skill,certification and experience and HR can connect with employee for a interview.
- Chats are ***end to end encrpted*** using public-private key cryptography.
- Login is being handled by your metamask account so there is no requirement for the signup/signin.

Brief Flow Diagram



ROLES

1. **No Role**
   - A user having a ethereum account can send he admins his/her profile and cha with them as well.
   - He can request for any role employee or organization.
2. **Admin**
   - Registers a new user on the blockchain.
   - Controls any ambiguity in the blockchain.
   - Responds to role requests from users.
   - Maintains and scale users.
   - Can revove/reassign roles of users.
3. **Employees**
   - This smart contract is for the employee, It will be storing data regarding the employee:
   - Employee Name, overall endorsement Rating, each skill listed along with its endorsement rating(scale 1-10).
   - Certifications - There will be 2 types of certifications verified and not verified. A certification is considered verified when the organization providing the certificate approves it on the blockchain.

- Work Experiences - It will contain the fields like (Organization name, Job Title, Description etc.) it will be of two types verified and not. It is considered verified if the organization approves it on blockchain.
- Platform Ratings (Like Hackerearth, Codechef, Codeforces etc.) .These Ratings will be verified via a API call to the server of given platforms and the exact ratings will be displayed on the page so there is no need to click on a bunch of links to verify.
- Education Verification - These details are crosschecked with the transcript provided by the employee (or if the university/college provides a API domain to recheck the results it will be implemented) which is then stored in the blockchain.

4. **Organization Endorser**
   - This smart contract is for the organizations. It can be used by the organizations to verify the skillset, work experience, education, certifications of their employees.The smart contracts contains:
   - Organization Name.
   - It contains a mapping of the current employees of this organization, and these employees are certified to endorse a skill, work experience and education of another employee. Only the current employees are authorized to do so not the past employees.
   - It contains a list of all the HRs, Talent aquisition team and all the employees working in the organization.
   - It will be having a feature to update job title of a employee.
   - It will have a feature to grant a certificate to an employee for their achivements and it will be displayed on their profiles.
   - It will have a feature to search employees on the blockchain according to the job description and invite them for an interview.

MOTIVATION / NEED

1. Traditional methods face challenges of fraud and lack of trust, leading to the risk of hiring underqualified individuals due to forged certificates and exaggerated qualifications.
2. Blockchain offers a tamper-proof ledger, ensuring all credentials are authentic and verified, thereby enhancing trust and reducing fraud.
3. Traditional verification methods are slow and labor-intensive, requiring manual checks across multiple institutions.
4. Blockchain automates the verification process through smart contracts, enabling instant and accurate validation, reducing administrative burdens, speeding up hiring processes, and lowering costs.
5. Individuals often have limited control over their credentials in traditional systems, relying on institutions for verification and sharing.
6. A blockchain-based system allows individuals to own and manage their verified credentials, making it easy to share with employers or institutions, thus empowering them to manage their professional identity.
7. Cross-border verification of skills and qualifications is complex and inconsistent, creating challenges for individuals seeking international work or education opportunities.
8. Blockchain's decentralized nature ensures global recognition and verification of credentials, facilitating greater mobility for professionals and students.
9. Transparency issues in traditional systems can lead to discrepancies or disputes over credential validity.
10. Blockchain provides an immutable record of all transactions, allowing for easy tracing of credential history and authenticity, reducing disputes and ensuring confidence in the verification process.
11. Traditional processes can be costly due to extensive administrative work and reliance on third-party services.
12. Blockchain reduces the need for intermediaries by automating verification, lowering overall costs and improving efficiency.

METHODOLOGY

The methodology for developing a blockchain-based skill verification system involves several key steps, each focused on ensuring security, transparency, and efficiency in the verification process. Here's a detailed methodology:

1. Requirement Analysis and System Design

- **Define Objectives:** Clearly outline the objectives of the skill verification system, such as enhancing trust, reducing fraud, and improving verification efficiency.
- **Stakeholder Identification:** Identify key stakeholders, including educational institutions, employers, certification authorities, and individuals.
- **System Architecture:** Design the system architecture, specifying the use of blockchain technology, smart contracts, and decentralized applications (DApps) to achieve the objectives.
- **Blockchain Selection:** Choose an appropriate blockchain platform (e.g., Ethereum, Hyperledger) based on factors like scalability, security, and cost.

2. Smart Contract Development

- **Contract Design:** Develop smart contracts that define the rules and processes for skill verification, including how credentials are issued, validated, and stored on the blockchain.
- **Credential Issuance:** Define the process for issuing digital credentials, ensuring that only authorized institutions can issue and sign these credentials.
- **Verification Logic:** Implement the logic for verifying credentials, allowing stakeholders to validate the authenticity and ownership of the skills recorded on the blockchain.

3. Data Integration and Security

- **Data Collection:** Integrate data from educational institutions, certification bodies, and other relevant sources, converting traditional credentials into blockchain-compatible formats.
- **Encryption:** Implement encryption techniques to protect sensitive data, ensuring that only authorized parties can access or modify credential information.
- **Data Privacy:** Ensure compliance with data privacy regulations (e.g., GDPR) by incorporating privacy-preserving techniques such as zero-knowledge proofs or permissioned blockchain.

4. User Interface and Experience

- **DApp Development:** Develop a decentralized application (DApp) that allows users to interact with the blockchain, including functionalities for issuing, verifying, and managing credentials.
- **User Authentication:** Implement secure user authentication methods, such as digital wallets, to allow individuals to access and share their credentials.
- **User Experience:** Design an intuitive user interface that simplifies the process of verifying and sharing credentials, ensuring that users can easily navigate the system.

5. Testing and Validation

- **Unit and Integration Testing:** Perform rigorous testing of smart contracts, DApps, and the overall system to identify and fix any issues or vulnerabilities.
- **Security Audits:** Conduct third-party security audits to ensure that the system is robust against potential threats, such as hacking or unauthorized access.
- **Pilot Testing:** Run pilot tests with a limited group of users (e.g., a select group of educational institutions and employers) to gather feedback and refine the system.

6. Deployment and Maintenance

- **Blockchain Deployment:** Deploy the system on the selected blockchain network, ensuring that all components are correctly integrated and operational.
- **Onboarding Stakeholders:** Facilitate the onboarding of educational institutions, employers, and individuals, providing training and support as needed.
- **Ongoing Maintenance:** Continuously monitor and maintain the system, including updating smart contracts, resolving technical issues, and implementing new features or improvements.

7. Governance and Compliance

- **Governance Framework:** Establish a governance framework that defines the roles, responsibilities, and decision-making processes for managing the blockchain network and the skill verification system.
- **Regulatory Compliance:** Ensure that the system complies with relevant legal and regulatory requirements, including data protection laws and industry standards.
- **Continuous Improvement:** Implement a process for continuous improvement, gathering feedback from users and stakeholders to make ongoing enhancements to the system.

8. Scaling and Future Enhancements

- **Scalability Solutions:** Implement scalability solutions such as layer 2 protocols or sharding to handle increasing numbers of users and transactions as the system grows.
- **Interoperability:** Ensure the system can interoperate with other blockchain networks or traditional systems, facilitating broader adoption and integration.
- **New Features:** Explore the addition of new features, such as AI-driven analytics for skill matching or integration with other digital identity systems, to enhance the system's value and functionality.

Conclusion

A blockchain-based skill verification system offers a transformative approach to validating and managing professional credentials in a secure, transparent, and efficient manner. By leveraging blockchain technology, the system addresses key challenges such as fraud, inefficiency, and lack of trust in traditional verification methods. It empowers individuals with full control over their credentials, ensuring global recognition and ease of access, while providing employers and institutions with a reliable and tamper-proof method for verifying skills. As the system evolves, it has the potential to become a standard for credential verification, fostering greater trust, mobility, and innovation in the global workforce and education sectors.

Summary of Achievements:

1. **Enhanced Security and Trust**
2. **Advanced Techniques**
3. **Enhanced Interpretability**
4. **Global Recognition and Accessibility**
5. **Robust Validation**
6. **Scalable and Future-Proof**