BLOCKCHAIN BASED RECRUITMENT MANAGEMENT SYSTEM

Ramachandra(22111036)
Abhilash(22111071)
Vatsal(21111066)   CS641 2023-II

April 15, 2023   Department: CSE

1   ABSTRACT

Recruitment management is a crucial aspect of any organization's operations, and it is essential to hire the most suitable candidate for a position. However, the recruitment process can be complex and challenging to manage, leading to inconsistencies, delays, and even biased decisions. To address these challenges, this paper proposes a blockchain-based recruitment management system that leverages the transparency and security of the blockchain technology. The proposed system aims to provide a fair and transparent platform for companies to hire candidates and for candidates to apply for open positions. This project proposes the development of a blockchain-based recruitment management system for companies to hire suitable candidates and for candidates to apply for open positions. The platform aims to provide fairness and transparency in the recruitment process. The proposed platform allows companies to create job postings and candidates to apply for them. The proposed system seeks to enhance the recruitment process by increasing fairness, transparency, and accountability in the process. The proposed system has the potential to revolutionize the recruitment process and lead to better outcomes for organizations and job seekers alike.

2   INTRODUCTION

The recruitment process is a crucial part of any organization's operations. It involves various stages, from posting job vacancies to shortlisting candidates, conducting interviews, and finally selecting the best candidate. However, this process can be tedious, time-consuming, and expensive. Moreover, there is always a risk of human error or bias, which can lead to the recruitment of the wrong candidate.

To address these challenges, many organizations are turning to blockchain technology to streamline their recruitment processes. Blockchain-based recruitment management systems offer a transparent and secure platform for managing job applications, candidate profiles, and hiring decisions. The system operates on a decentralized network, which ensures that data is immutable, transparent, and auditable.

The purpose of this report is to analyze the potential benefits of a blockchain-based recruitment management system. The report will discuss how blockchain technology can improve the recruitment process by eliminating the need for intermediaries, ensuring data privacy and security, and reducing the risk of fraud. Additionally, the report will examine the potential challenges and limitations of implementing such a system, including regulatory compliance, technical complexity, and the need for skilled resources.

In conclusion, the blockchain-based recruitment management system has the potential to revolutionize the recruitment process by providing a transparent, secure, and efficient platform for managing job applications, candidate profiles, and hiring decisions. By implementing this system, organizations can streamline their recruitment process, reduce costs, and improve the quality of their hiring decision

3   RELATED WORK

- "A Blockchain-Based Framework for Decentralized Recruitment" by N. Biswas, S. Kar, and S. K. Das: In this paper, the authors propose a blockchain-based recruitment framework that aims to make the recruitment process more transparent, secure, and efficient. The framework uses smart contracts to automate the recruitment process and allows job seekers to control their personal data.

- "A Blockchain-Based Approach for Secure Recruitment in the Public Sector" by F. G. De Jesus, S. R. A. Do Nascimento, and

R. A. De Lemos Meira: This paper proposes a blockchain-based recruitment system for the public sector that aims to increase transparency, security, and efficiency. The system uses blockchain technology to ensure the authenticity and integrity of job seekers' data and provides a transparent recruitment process.

- "Blockchain-Based Recruitment: A Systematic Literature Review" by A. Alraimi, H. Almuhaideb, and A. Alarifi: This paper presents a systematic literature review of the blockchain-based recruitment system. The authors analyze the existing literature on blockchain-based recruitment systems and identify the benefits, challenges, and future research directions.

4 SYSTEM DESIGN

4.1 REQUIREMENTS

1. Install Hardhat in VS code terminal.
2. Install web3 and flask.
3. install metamask(chrome extension).
4. run the command **npx hardhat node** and you will able to see set of accounts.
5. After setting up the metamask connect to the local host 8545 network.
6. Copy a private key from the terminal window where you have accounts.
7.In metamask select import account and paste the private key.
8. import yet another private key to have another account.
9. Now run the command **npx hardhat run –network hardhat scrpits/deploy.js** to deploy and compile the contract.
10.now run **python src/app.py** to run the local server

4.2 FRONT-END

The front-end of the Blockchain based recruitment (DaPP) was developed using Bootstrap-based HTML and a JavaScript framework. Bootstrap was utilized to create responsive and mobile-friendly design elements, such as buttons, forms, modals, and navigation menus, which were easily customizable and seamlessly integrated into our website. To facilitate the development environment for Ethereum framework, we utilized NodeJS, a JavaScript framework.

4.3 SMART CONTRACTS

A blockchain ledger consists of blocks of data, with each block containing numerous transactions. In our Blockchain based recruitment system, the transactions are subjected to verification by the smart contract before they can be stored in the blockchain ledger. Any transactions that fail the verification process will be rejected and cannot be added to the blockchain.

To write the smart contract, we used the Solidity programming language. To ensure the correctness of the smart contract, we employed the Remix platform, which provides an environment for testing and debugging smart contracts. We rigorously tested and verified the smart contract to eliminate any errors before deploying it onto the blockchain network.

With the deployment of the smart contract, we were able to provide a secure and transparent platform for recruitment

4.4 BACK-END

The backend services of the Blockchain based recruitment (DaPP) were developed using Flask and Web3.py. Flask is a powerful web framework that is commonly used for building web applications. It provides all the necessary tools and functions to connect the backend to the front-end and the database seamlessly. In this project, Flask interacts with the database server to store and retrieve Job posting details to and from the front-end.

To interact with Ethereum nodes, we utilized Web3.py, a Python library that offers a high-level interface for working with Ethereum blockchain data. Job posting related transactions were carried out with the help of Web3.py and smart contracts.

4.5 DATABASE

For our Blockchain based recruitment (DaPP) , we utilized SQLite to store off-chain data on the database, whereas on-chain data was stored

on the Ethereum blockchain. SQLite allowed us to store and manage data efficiently, and provided an ideal solution for storing non-critical, off-chain data. On the other hand, Ethereum blockchain was used to store the critical on-chain data, providing an immutable, secure, and transparent record of all job-related transactions.

5 METHODOLOGY

- Create/Delete a candidate profile: The system allows candidates to create a profile with their name, username, link to their portfolio and other relevant details. They can delete their profile at any time.

- Create/Delete a company profile: Similarly, companies can create a profile with information such as their name, industry, link to their website and other relevant details. They can delete their at any time.

- Create/Delete a job posting: Companies can create job postings for open positions, specifying details such as job title, location, and other related details. Once created, some of the details of the job posting may be immutable, such as the job title, salary, etc.

- Candidates can apply to 10 jobs at any given point in time: The system restricts candidates from applying to more than ten job postings simultaneously. This limitation helps candidates focus on relevant job openings and allows them to make better-informed decisions.
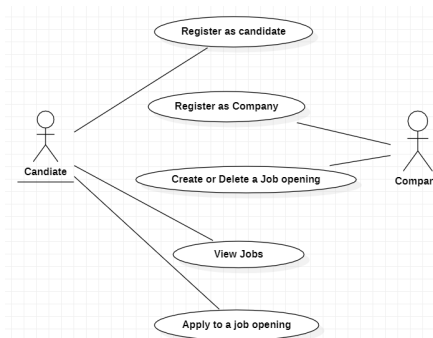
- Companies can post at most 10 job roles at any given point in time: The system limits the number of job postings a company can create to ten, ensuring that companies do not overload the platform with job openings, leading to confusion and a poor candidate experience.

- A candidate must not be able to apply for two job roles at the same company: To prevent conflicts of interest and ensure fairness, the system prohibits candidates from applying for multiple job roles at the same company.

- A candidate cannot apply to all the job roles present on the platform: Similarly, to avoid candidates applying indiscriminately and spamming the platform with applications, the system limits the number of job postings a candidate can apply to.

- A candidate cannot view/list other candidates who applied for the same job posting: To ensure confidentiality and privacy, the system prohibits candidates from viewing or listing other candidates who applied for the same job posting. This restriction prevents candidates from unfairly comparing themselves to others and promotes a fair and equitable hiring process.

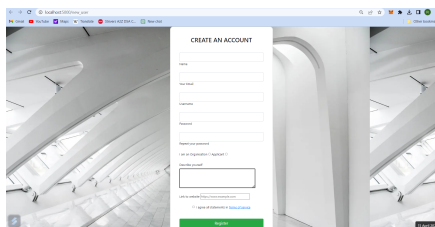## 5.1 USECASE DIAGRAM

5.2 SEQUENCE DIAGRAM
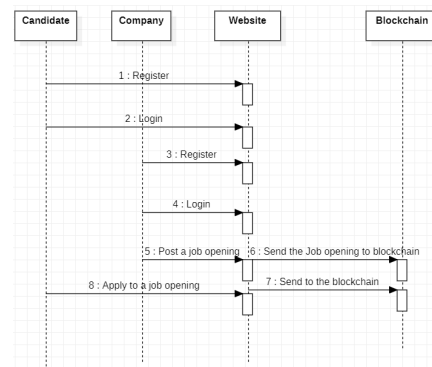
6 OUTPUTS

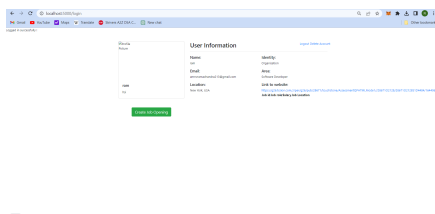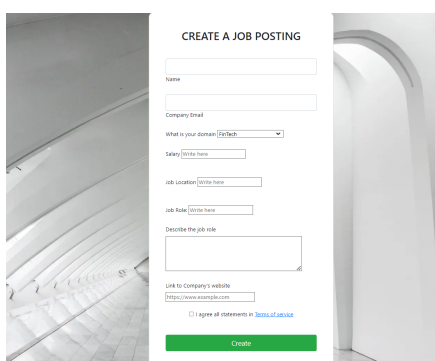## 6.1 LOGIN PAGE
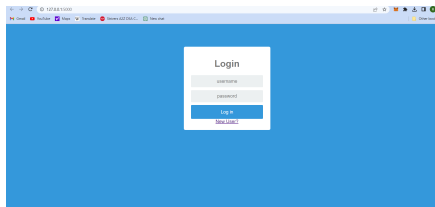
6.2 REGISTRATION PAGE

6.3 PROFILE PAGE

6.4 CREATE JOB POSTING

6.5 JOB OPENINGS

7 CONCLUSION

In conclusion, we have successfully developed a decentralized application (Dapp) for a blockchain-based recruitment management system with various essential features. The system allows for the creation and deletion of candidate and company profiles, job postings, and job applications while ensuring the immutability of critical information. The system also enforces specific rules to ensure a fair and transparent recruitment process, such as limiting the number of job postings and applications and preventing candidates from applying to multiple roles at the same company.

Overall, the system provides a secure and transparent platform for employers and job seekers to interact and conduct recruitment processes. The application of blockchain technology ensures a high level of security, integrity, and transparency in the recruitment process, mitigating the risk of fraud and corruption.

This project provides a promising proof-of-concept for the use of blockchain technology in the recruitment industry, and it has the potential to significantly improve the recruitment process's efficiency and fairness. Future work could include the integration of additional features such as background verification, candidate skill verification, and the integration of artificial intelligence to provide a more comprehensive recruitment solution.

8   Contribution of the entire team members:

- **Abhilash 22111071**: developed smart contracts and integrated the front end with the block-chain and Database

- **Vatsal 21111066**: developed some of the smart contracts and build the web application in flask.

- **Ram chandra 22111036** : developed smart contracts and Deployed smart contracts using hardhat and Web3.

References

[1] N. S. Dhanala and R. D., "Implementation and Testing of a Blockchain based Recruitment Management System," 2020 5th International Conference on Communication and Electronics Systems (ICCES), Coimbatore, India, 2020, pp. 583-588, doi: 10.1109/ICCES48766.2020.9138093.

[2] Blockchain Technology to SupportEmployee Recruitment and Selectionin Industrial Revolution 4.0,Happy Rhemananda, Dima Roulina Simbolon, and Olivia Fachrunnisa.

[3] XPChain: A Blockchain-Based Decentralized e-Recruitment Platform Shaila Sarker Abdullah – Al – Haris Shakib Ashiful Arefin