Simplified Recruitment Process

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Abstract*— Employee recruitment is a long and tedious process. Searching for candidates from a pool of applicants, picking based on requirement, background checks and all can take up to weeks. Checking the education history, previous work experience and other background checks are an important part of the recruitment process. This process can be simplified by implementation of this using blockchain technology. This makes it easier to view the employee history as well as assure the authenticity of this information. The authenticity of this information is maintained because of the blockchain technology used. Once the data is filled in by the authorized participant, it is added to the chain. Any updates in this information is added in this chain. This way one can check for the history of the candidate. The participants here being any Education institute, company or a test laboratory, can add candidate information which is appended to the chain. During recruitment, an employer can check for a candidate's work history, education history or drug test history using candidate's unique identification. This can aid a company in their recruitment process by making it easy to carry out these background checks and verify information provided by the candidate about his work and education. Using this proposed solution companies can save time and money and quicken their recruitment process.

Keywords*— Recruitment, Company, Candidate, Job History, Educationa History, Hyperledger Composer, Blockchain, Permissioned Business Network

I. Introduction

The employee recruitment process is the most cumbersome task for any company. It involves long duration of waiting for records about the candidate from various organizations/institutions such as-Universities, Previous Companies, Police, Workers' Compensation Claims etc. Blockchain technology, with its immutable blocks has made it easier to validate a particular candidate. Moreover, its secure and distributed nature has made it a must-have for large organizations and companies. In this project, we have strived to achieve such an implementation that reduces the manual workload that the third-parties have to indulge into. This website utilizes Hyperledger Composer as the infrastructure and Fabric as the network. It successfully manages to create blocks for each candidate, with its unique identifier. This chain is distributed over a network of peers that share a ledger, that keeps records of that particular employee. Such a robust and fault tolerant structure provided by the blockchain technology is sure to be a boon to all the companies that have to scrutinize the candidate.

II. Proposed Methodology

A. Selection of Blockchain Technology

Blockchain is defined as "an open, distributed ledger, that can record transactions between multiple parties efficiently and in a verifiable and permanent way [1]. It is typically managed by a peer-to-peer network collectively adhering to a protocol for validating new blocks. Once recorded, the data in any given block cannot be altered retroactively without alteration of all subsequent blocks, which requires collusion of the network majority [1].

Since the problem that is to be solved is related to the recruitment industry, it involves various parties like educational institutions, companies, drug test centers, police department etc. and it also involves sensitive information like individual's educational history, Job History, background check information. Also, there is a chance where the candidates might fake their previous experience etc. Since Blockchain is immutable, distributed it is the perfect answer for all the challenges mentioned.

B. Permissioned Blockchain Network

Blockchain network is mainly two different types. Permission less and Permissioned Network. Permissioned Blockchains uses an access control layer to govern who has access to the network. Network Admin will provide the access to the registered participants and the access level varies based on the type of the participant in the business network.

The various participants involved in the Simplifies Recruitment Process network are:

- Candidate
- Educational Institute
- Company
- Drug Test Centre
- Police Department.

The Access of the different participants are defined as below:

- Candidate – Can only view the details of his educational, Job, drug test reports and criminal history (if any) records.

- Educational Institute can only view and update the educational details of their students.
- Company – Companies can view all the details like Educational records, Job history, drug test reports and the criminal record history of the candidate. They can only view the details if they have the candidate's id that is registered in the network and they can only update the job history of the candidates who are working in their company.
- Drug Test Centre: Authorized Drug Test Centre's who registered with this network can add the drug test reports of a candidate if a registered company has approached it for the test conduction.
- Police Department: Police department can view and add the criminal history details of only the candidates who has done a crime or offense.

III. IMPLEMENTATION

A. *Architecture Diagram for "Simplified Recruitment Process"*

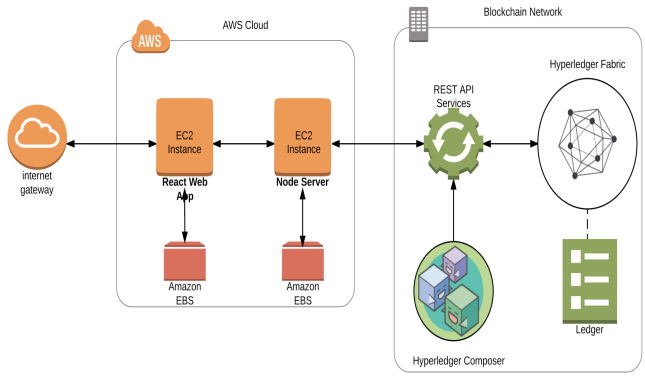

Fig 1: Architecture Diagram for "Simplified Recruitment"

B. *Setting up the Blockchain Network*

The fundamental step for the simplified recruitment application is to setup the blockchain network. We are using the Hyper Ledger Fabric to setup the network. The three main components of the hyper ledger fabric are:

- Fabric Certificate Authority(CA): It issues PKI-based certificates to network member organizations and their users. The CA issues one root certificate(rootCert) to each member and one enrollment certificate(ECert) to each authorized user [2].
- Fabric Peer Service: It's a node that commits transactions and maintains the state and a copy of the ledger (see Sec, 1.2). Besides, peers can have a special **endorser** role [3].
- Fabric Orderer Service: It's a node running the communication service that implements a delivery guarantee, such as atomic or total order broadcast [3].

C. *Designing the BlockChain Business Network*

Hyperledger Composer is used to design and develop the blockchain business network. The main components of the blockchain business network developed using Hyperledger composer are:

- Model file
- Script file
- Access Control file
- Queries file

Model File: All the participants (Candidate, Company, Educational Institute and Drug Test Centre) and their attributes and operations are defined in this file.

Script File: The transactions that can be performed by the participants are defined in this file.

Access Control File: The authorization permissions for each type of the participants are defined in this file. Based on these only participants can access the various features of the application.

Queries File: The various queries to view the candidate's history are defined in this file.

After defining the business network, it is deployed into the blockchain network already setup and composer rest server is used to generate the "*Composer REST API*" based on the business network defined as above. This REST API is be accessed by the React JS to develop the frontend application.

D. *Client Side Application*

React JavaScript library was used for GUI of application. React was chosen considering its efficiency. Also, ReactJS uses a special syntax called JSX, which allows combining of HTML with JavaScript. These features made React good candidate for our application. Once the user logs in to the application, user is presented with a list of candidates. User will be able to select his specific category and see his information, but he cannot change information as blockchain implementation is designed to be immutable. The user can perform any valid transactions on the assets movements.

E. *Server Side Application*

The server side of the application is written using NodeJS. This application leverages functionality of Hyperledger fabric to realize blockchain functionality. All these services are provided as REST APIs. Hyperledger Composer was used to generate these REST APIs. User Authentication details will be stored in MongoDB. Application was designed to be fault tolerant and user can perform any number of transactions. Exception handling was implemented in all the services.

F. *Application Deployment*

The Application is deployed and hosted on Amazon Web Services (AWS). Client and Server application were deployed in different EC2 instances. Two EC2 Linux instances (Ubuntu Server 16.04 LTS) were created in AWS and EBS storage was

allocated to instances immediately. Server-side application was built into docker image before deploying to Amazon Web Services (AWS). Client application was cloned from GitHub into ubuntu instance. Application can be viewed from AWS public DNS. Public DNS is 'ec2-54-153-89-146.us-west-1.compute.amazonaws.com:3000'.

IV. Application Features

The Simplified recruitment process application offers many Features. These features are highly beneficial to many parties including employees, employers, education institutions. Following are the application features for various candidates.

A. Candidate

A Candidate needs to first register with this application. Admin of the Educational Institute who has access to creating a participant and issuing identity will create an account for a student. This ID will be used in our network hereafter. Each Candidate can only view his details like educational records, job profile records, drug test reports and criminal records (if any).

B. Educational Institutions

Educational institutes first registers to network. The registered institutions will be able to add student records to network. These records are immutable and are visible to the candidates in network after the transaction to these candidates. Education Institutions will be able to access information related to student records only. They are prevented from seeing other details. Updates to education records takes place when a valid user performs a transaction on student record.

C. Company

Company must first register with the "*Simplifies Recruitment Process*" consortium and request for access to the network. After the consortium verifies the company credibility it adds the company to the network. Each Company can view a candidate's complete details like educational history, Job history, drug test report details and criminal records(if any).

Companies can only update the job history of a candidate who is currently working with them. user performs a transaction on student record.

D. Drug Test Centers

Drug test centers get registered to network first. Once an employee is hired by employer, drug test centers get a request to provide drug test report to employers. Drug test centers provide the drug test reports via transactions and assets are updated accordingly. Again, Drug test centers are limited to access drug test reports only. Drug test centers can update reports of a candidate via update transaction.

V. Conclusion

Blockchain technology is indeed the most perfect fit for performing background checks for an employee since it produces immutable blocks with an added security factor and fault tolerant structure.

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