[1]

Employee Review Blockchain Network

Protecting organizations against the million dollar wrongful termination lawsuits

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***Abstract*— This paper explains how blockchain can help in protecting companies against wrongful termination lawsuits filed against them by their employees. Companies have to pay millions of dollars in terms of legal and lawyer fees just to prove that the termination action taken by them was indeed legitimate. This paper explains how we can use blockchain to solve this common problem and increase transparency at work. This paper also explains what technologies we used to build a complete end-to-to real world application, which can be integrated with any client organisation and put to use.**

***Index Terms*-- BlockChain, IBM Hyperledger Composer, Wrongful termination, ReactJS, MongoDB, Docker**

I. Introduction

Wrongful termination lawsuit are very common these days. After getting terminated many employees file wrong termination lawsuits against the companies primarily because of the easy availability of lawyers and supporting agencies and websites. However, the ground for filing a lawsuit is unclear many time.According to one survey, approximately 42000 cases were filed in 2016 under the category retaliation and only 86 were found to be solved and legitimate. Still, for the rest of the cases, the company has to bear all the legal expenses till the case is resolved. To save this extra financial overhead, we are proposing a new review system based on blockchain. From our study it was found that performance of the employee is not the only reason for which he/she may get terminated. There may be several other causes such as policy breach, taking too many long leaves, complaint due to bad behaviour with peers and even fake health issues.

Prior to this, there was no centralized and secured dataset maintaining these small yet relevant records. Moreover, even if the reason for termination was present in the record, employee lawyers would prove that the data was being modified and hence cannot be trusted. Hence, in-order build trust we are using blockchain to keeping employee records. Blockchain is governed by hash function which depends on the hashing of the previous block. Initial block is called the genesis block which is created at the start of blockchain network. Blockchain adds data in the blockchain network on the basis of consensus i.e mutual agreement between it peers. At any point existing data cannot be modified or updated due to the presence of strong hashing algorithm and consensus. To simplify and shorten the time of development we are using Hyperledger Composer framework which internally uses couchDB, NodeJS and yeoman to build our blockchain network and provide Rest API services can be integrated on any frontend platform. Express is used a backend along with MongoDB and CouchDB database and ReactJS and Redux as frontend framework.

In our project Manager, Employee, HR and Team Lead are the participants that are taking part in read/write access for adding any type of employee record. At the same time employee has right to view his history and track record. We are also demonstrating the transaction history so that we have a clear picture as in who added the record, when and for whom. To have a quick glimpse of employee review history, we are running heavy analysis on existing json data and using react-chartjs-2 to show meaningful graphical charts.Thus, the company has enough data to to prove its case on the other hand employee has clear understanding for his termination hence it is less likely to file a lawsuit for wrong termination.

We have posted our code on the below mentioned Github repository location:

Steps to to run hyperledger composer can be found in README file

https://github.com/SJSU272LabF17Project-Team-7.git

The working application can be access by using below url.

http://reviewnet.hopto.org

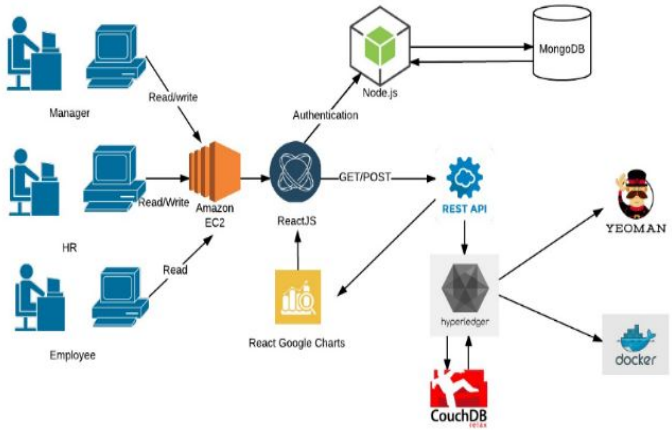

Figure 1
Architecture diagram of the application

[1]This paper contains technical information from open source official websites. We have used IBM hyperLedger Composer which provides playground environment for learning and developing blockchain applications.

II. Ease of Use

Our review network is designed and implemented in such a way that it can be easily integrated with any front-end framework (in our project we have used ReactJS). The Rest API service can be deployed on any Cloud Instance can its services can be utilized as and when required. We are also leveraging the power of Docker and providing the clients with readily deployable .bna file which can run on any OS platform like Linux, Mac and Windows. Even for quick analysis of blockchain data we have provided react-chartjs-2 charts that present quick and meaningful graphical data. Thus, our approach provides easy and practical solution for protecting companies from wrongful termination lawsuits as blockchain provides clear and secured to the company as well as to employees. This data indeed clearly defines the reason for termination taken by the company.

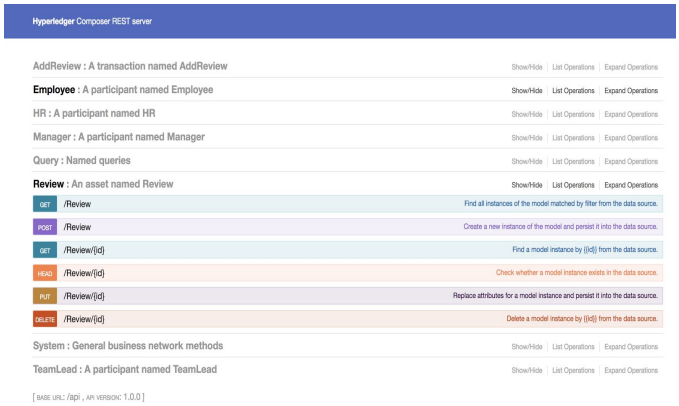

Figure 2
HyperLedger Composer Rest API deployed on AWS EC2

III. Technical Work Preparation

We have developed a MERN based web application where employee and employer of an organization can use it to keep the records transparent for both the parties. Latest technologies were used to implement this application.

A. *Node.js*

Node.js is an asynchronous event driven open source application which provides cross-platform runtime environment for developing server-side Web applications in software development. Node is similar in design to, and influenced by, systems like Ruby's Event Machine or Python's Twisted. Node takes this model a bit further and presents an event as a runtime construct. HTTP is in Node is designed with streaming and low latency in mind. These design choices aim to optimize throughput and scalability in Web applications with many input/output operations, as well as for real-time Web applications. [1]

B. *ReactJS with Redux, HTML5, MaterialUI*

React.js is a JavaScript library that was created by Facebook. It is the view part of the model-view-controller architecture. React uses JSX which allows the developer to work with HTML and JavaScript in combination. [3]

C. *Bootstrap*

Bootstrap is an open-source Javascript framework developed by the team at Twitter with the objective of mobile-first projects on the web. Bootstrap can be used for frontend framework only using HTML, CSS and Javascript. Bootstrap is a collection of tools for creating a websites and web applications. It contains HTML- and CSS-based design templates for typography, forms, buttons, navigation and other interface components, as well as optional JavaScript extensions. The primary reason programmers leaning towards using Bootstrap Framework is that it effortlessly and efficiently scales the websites and applications with a single code base, from phones to tablets to desktops with CSS media queries. [5]

B. *Blockchain*

A blockchain, is a continuously developing collection of records, called blocks, which are connected and secured using cryptography. The blockchain is an advanced ledger for economic transactions that can be customized to record not simply budgetary exchanges but rather for all intents and practical purposes. Each block typically contains a hash pointer as a connection to a previous block, a timestamp and transaction data. The blockchain is a decentralized technology, this design results in the transparency and security of data.[4]

C. *Chain code*

Chaincode is written in Go programming language, and eventually has been written in other programming languages such as Java, that implements a concept of interface. Chaincode runs in a secured container i.e., Docker container confined from the endorsing many of the peer process. Chaincode initializes and oversees ledger state through transactions that have been set up together by the applications.[6]

D. *react-chartjs-2*

react-chartjs-2 is a JavaScript based charting library which is used to improve web applications by adding graphical charts based on the information provided by the user. *react-chartjs-2* provides different types of charts including but not limited to pie charts, line charts, area charts, spline charts, bar charts etc.

User specifies input in the form of a JavaScript embedded in React component and react-chartjs-2 returns the output in the form of an image of the chart.

react-chartjs-2 is the most interactive API to generate graphs that lets the user to connect experiences that are integrated to the webpage by analyzing data and creating complex graphs and tree on a dashboards. Charts are programmed using HTML5/SVG technology to provide compatibility across various browsers and portability across different platforms such as iPhones, iPads, and Android. [7][8]

D. Github

GitHub is a web repository that hosts services that provides version control. It provides the source code management (SCM) and the version control functionality of Git and also adds its own features. Github provides a web-based graphical interface and desktop as well as mobile device integration for the code to be reviewed by the community. It also provides tools to track changes in the code across various versions and several other collaboration features such as bug tracking, feature requests, task management.
GitHub offers various plans for various needs including but not limited to hosting open source projects, private repositories and enterprise repositories. GitHub helped in the proliferation of open source projects by providing tools to efficiently collaborate and share ideas. [9]

E. Consensus

It is a general agreement in which the ledgers can make changes to only those transactions which are confirmed by the participants. Ledgers need to update the transactions in the same order. This helps in keeping synchronization across the network.[14]

F. Hyperledger composer, hyperledger modelling language, Yeoman

Hyperledger Composer is a tool which enables developers to build blockchain applications. It is build with Javascript and thus leverages latest technologies like NodeJS, CLI, node package manager etc..

Hyperledger Composer includes an object-oriented modeling language that is used to define the domain model for a business network definition.

Yeoman is a generic scaffolding system which enables creation of variety of types of application.. It doesn't make any kind of decisions. Every decision is made by generators which are basically plugins in the Yeoman environment. There's a lot of publicly available generators and it's easy to create a new one to match any workflow. Yeoman is always the right choice for your scaffolding needs.[16]

G. Express

Express.js is a Node.js web application server framework, which is designed to build hybrid applications. Express is the backend environment of the MERN stack, together with NodeJS JavaScript runtime, MongoDB and ReactJS as frontend framework.

H. Amazon AWS EC2

Amazon Elastic Compute Cloud (Amazon EC2) is a web service that provides secure, resizable compute capacity in the cloud. Amazon EC2's simple web service interface allows you to obtain and configure capacity with minimal friction. It allows users to rent virtual computers with different computing power and software. Using Amazon EC2 we can select a configuration of memory, CPU, instance storage, and the boot partition size that is optimal for the choice of operating system and application. Amazon EC2 enables us to increase or decrease capacity of the instances dynamically based on the instantaneous requirement.

EC2 provides users with control over the geographical location of instances that allows for latency optimization and high levels of redundancy. Amazon EC2 offers a highly reliable environment where replacement instances can be rapidly and predictably commissioned. The service runs within Amazon's proven network infrastructure and data centers. The Amazon EC2 Service Level Agreement commitment is 99.99% availability for each Amazon EC2 Region. The pricing for various Amazon instances is as follows:[11]

I. Docker

The company Docker, Inc promoted Docker which is a software technology that provides containers. The virtualization at the operating-system-level on Linux and Windows gives the application a new secure and extra layer of abstraction and automation. The Linux kernel's features such as isolation i.e., cgroups and kernel namespaces, and a union-capable file system i.e., OverlayFS are utilized by Docker. Independent "containers" can be allowed to run within a single instance of Linux, which reduces the overhead of initiating and maintaining virtual machines every time (VMs).[12]

Docker makes it possible to get fundamentally more number of applications running on old servers and it also makes it simple to bundle and ship programs. Docker is built on top of LXC. Just like any other container technology, as far as the program is concerned, it has its own file system, storage, CPU, RAM, and so on. The key difference between containers and VMs is that while the hypervisor abstracts an entire device, containers just abstract the operating system kernel. It can get any more applications running on the same hardware than other technologies; it makes it easy for developers to quickly create ready-to-run containerized applications; and it makes managing and deploying applications considerably simple. [13]

IV. TABLE

Instance type	**vCPU**	**ECU**	**Memory (GiB)**	**Instance Storage (GB)**	**LINUX/ UNIX usage**
t2.nano	1	Variable	0.5	EBS Only	$0.0058 per Hour
t2.micro	1	Variable	0.5	EBS Only	$0.0116 per Hour

t2.small	1	Variable	2	EBS Only	$0.023 per Hour
t2.medium	2	Variable	4	EBS Only	$0.464 per Hour
t2.large	2	Variable	8	EBS Only	$0.0928 per Hour
t2.xlarge	4	Variable	16	EBS Only	$0.1856 per Hour
t2.2xlarge	8	Variable	32	EBS Only	$0.3712 per Hour
m5.large	2	10	8	EBS Only	$0.096 per Hour
m5.xlarge	4	15	16	EBS Only	$0.192 per Hour
m5.2xlarge	8	31	32	EBS Only	$0.384 per Hour
m5.4xlarge	16	61	64	EBS Only	$0.768 per Hour
m5.12xlarge	48	173	192	EBS Only	$2.304 per Hour
m5.24xlarge	96	345	384	EBS Only	$4.608 per Hour

TABLE I
SOME OF THE AWS GENERAL PURPOSE AVAILABLE INSTANCES

V. ACKNOWLEDGMENT

We thank Prof. Ranjan for his impeccable guidance and support.

VI. REFERENCES

Online References:

[1] https://nodejs.org/en/about/
[2] https://en.wikipedia.org/wiki/HTML5
[3] https://html5hive.org/react-tutorial/
[4] https://en.wikipedia.org/wiki/Blockchain
[5] https://en.wikipedia.org/wiki/Bootstrap_(front-end_framework)
[6] http://hyperledger-fabric.readthedocs.io/en/release/chaincode.html
[7] https://developers.google.com/chart/interactive/docs/https://developers.google.com/chart/interactive/docs/
[8] https://developers.google.com/chart/interactive/docs/
[9] https://www.thebalance.com/what-is-github-and-why-should-i-use-it-2071946
[10] https://en.wikipedia.org/wiki/Express.js
[11] https://aws.amazon.com/ec2/pricing/on-demand/
[12] https://en.wikipedia.org/wiki/Docker_(software)
[13] http://www.zdnet.com/article/what-is-docker-and-why-is-it-so-darn-popular/
[14] https://hyperledger-fabric.readthedocs.io/en/release/blockchain.html
[15] https://www.hyperledger.org/projects/composer
[16] http://yeoman.io/learning/

Books:

[17] R. Ranjan, *Enterprise Software Platform*

Technical Reports:

[18] J. W. Hagge, and L. L. Grigsby, "Preparation of a Formatted Technical Work for the IEEE Power Engineering Society" Power Engineering Society, IEEE