

A PROJECT REPORT ON

**COMPANY EMPLOYEE WALLET PROGRAM
USING BLOCKCHAIN TECHNOLOGY**

SUBMITTED TO THE SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE
IN THE PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE AWARD OF THE DEGREE

OF

**BACHELOR OF ENGINEERING
(COMPUTER ENGINEERING)**

SUBMITTED BY

**PRAGYA GUPTA
SHAIKH SOHEL
ANNIE KOUL
NIRAV SHAH**

**Exam No: 71701124M
Exam No: 71701204C
Exam No: 71700709L
Exam No: 71701199C**



**DEPARTMENT OF COMPUTER ENGINEERING
PUNE INSTITUTE OF COMPUTER TECHNOLOGY**

DHANKAWADI, PUNE - 411043

SAVITRIBAI PHULE PUNE UNIVERSITY

2019-2020



CERTIFICATE

This is to certify that the project report entitled

"COMPANY EMPLOYEE WALLET PROGRAM USING BLOCKCHAIN TECHNOLOGY"

Submitted by

**PRAGYA GUPTA
SHAIKH SOHEL
ANNIE KOUL
NIRAV SHAH**

**Exam No: 71701124M
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are bonafide students of this institute and the work has been carried out by them under the supervision of **Prof. P. R. PATIL** and it is approved for the partial fulfillment of the requirement of Savitribai Phule Pune University, for the award of the degree of **Bachelor of Engineering** (Computer Engineering).

Prof. P. R. PATIL
Internal Guide,
Dept. of Computer Engg.

MRS. MUKTA SUNIL TAKALIKAR
Head,
Dept. of Computer Engg.

Dr. P. T. Kulkarni
Principal,
Pune Institute of Computer Technology

Place: Pune
Date:

Certificate of Completion

This certificate is hereby bestowed upon Final Year Students at PICT Pune


- 1. Pragya Gupta**
- 2. Shaikh Sohel**
- 3. Annie Koul**
- 4. Nirav Shah**

for the exceptional performance that has led to successful
completion of

'Company Employee Wallet Program Using Blockchain technology'

conducted at Script Lanes
under the guidance of Amit Yedurkar
between 1st October 2019 to 31st March 2020.

The activity was awarded by:

For SCRIPT LANES

Partner
ROHAN LUNAWAT

Rohan Lunawat
Script Lanes (Co-ordinator)

Place : Pune
Date: 14th May 2020.

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Pragya Gupta

Shaikh Sohel

Annie Koul

Nirav Shah

ABSTRACT

The distributed ledger underlying Bitcoin cryptocurrency called Blockchain which is decentralized and possesses data management technology, has attracted attention and stimulated rich discussions within fin-tech and government organizations in order to eliminate financial inefficiencies and mitigate risks.

A swarm based peer-to-peer network is designed for the proposed e-wallet system along with the introspection of cloud database and smart contracts which are used to exchange data in a transparent and in a trusted manner. Value of Blockchain gets estimated in three ways such as issuing cryptocurrency, information encryption and institutional intermediaries elimination. This value stands as a reference point for IT industries who intend to use Blockchain to digitize their industries further.

This project ascertains the enhancement of a platform using to give a boost to employee training with on-site and provide inspiration to take new online courses and workshops by building accessible Ethereum tokens and smart contracts.

Therefore, not only the transparency is cost-effectively preserved in store's ledger, but also employee's interests shall be protected whilst using digital wallet.

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List of Abbreviations

<i>ABBREVIATION</i>	ILLUSTRATION
<i>BPCS</i>	Business Planning and Control System.
<i>DAPP</i>	Decentralized Application.
<i>ERC</i>	Ethereum Request for Comments.
<i>NPM</i>	Node Package Manager.
<i>SDLC</i>	Software Development Life Cycle.

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CHAPTER 1

INTRODUCTION

1.1 Overview

“Employee Digitization” refers to the virtual communications between an employer and employee or his/her organization which focuses on the goal of making a physical and digital environment that enhances connection and collaboration by employing a designed approach of tokenization to form people feel supported throughout and incubate steady growth together with dynamics.

The involvement of a distributed database solution i.e., Blockchain that maintains an emerging list of information records that are confirmed by the participating nodes in it together with smart Ethereum contracts where it ensures establishment of a decentralized environment where no third party is up to speed of transactions and data.

Initially the company Employee Wallet assigns each employee a specific number of tokens – which do not have any cost and will be won to select particular courses. At the identical time, new tokens are often obtained when an employee takes online courses or gives training to his or her colleagues in a neighborhood of his/her expertise.

This new platform assigns value to training through tokens that certify each hour of coaching taken or given to other colleagues, and opens the doors to all or any employees – independent of their role – so they’ll take courses that up to now have only been available by invitation.

Digital wallets are slowly emerging as new mode of tap-and-go consumerism, making fiscal transactions seamless, transparent, safe and economic which shall foster the connectivity required for a corporation to boost their employee work lifestyle background.

1.2 Motivation

With the emergence of digitization and to improvise usage of technology, employees are offered access to a wide range of equipments along their journey to financial success along with convenience, transparency and security.

An internal Blockchain based solution is a perfect way to stimulate company employees with new incentives for innovation, participation in company events and overall growth. Our intention is to build a Blockchain based token system for companies where employees will be able to access wallets using an app or website within the company.

1.3 Comprehension of Idea

The abstract outline of project was comprehended during discussion with Mr. Rohan Lunawat, Managing Director - Scriptlanes in August 2019.

1.4 Problem Definition and Objectives

- Employee wallet transactions over Blockchain.
- Build Ethereum based tokens accessible over website and mobile applications.
 - The token will hold no value outside the company walls.
 - Build simple tokenomics impacting employees, company and other stakeholders as investors, the community and stakers.
- Build a platform that seeks to give a boost to employee training with on-site and online courses and workshops.

CHAPTER 2

LITERATURE SURVEY

2.1 Literature Survey

S. No.	Paper Name	Author	Method	Analysis	Summary
1.	An overview of Blockchain Technology : Architecture consensus and future trends.	Z.Zheng, S.Xie, H.Dai, X.Chen, H.Wang (2017 IEEE-6th International Congress on Big Data).	Descriptive and comparative approaches followed.	This paper is divided into three Blockchain sections : public, private and consortium which is split into Proof-of-work, Proof-of-stake, Practical-byzantine-fault- tolerance, Delegated-proof-of-stake, Render and Tendermint.	Overview of Blockchain architecture identified and comparison of some typical consensus algorithms used in different Blockchains.
2.	Peer-to-Peer Electronic cash system.	S. Nakamoto, October 2008	Peer-to-peer network using Proof-of-work approach.	System for electronic transactions without relying on trust was proposed and consensus mechanism was enforced.	System proposal for electronic transactions without relying on trust and CPU power voting.

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S. No.	Paper Name	Author	Method	Analysis	Summary
3.	Blockchain-based payment collection supervision system using pervasive Bitcoin digital wallet.	Po-Wei Chen, Bo-Sian Jiang, Chia-Hui Wang, 2017 IEEE 13th International Conference on Wireless and Mobile Computing, Networking and Communications (WiMob).	Blockchain technology with cloud databases.	Proposed BPCSS can collect payment cost-effectively and supervise the transactions between customer and market using implemented NFC-enabled Android Apps.	Propose and deploy a Bitcoin collection supervision system called BPCSS supported Blockchain technology with cloud databases for purchasers and merchandise stores.
4.	E-DOC Wallet Using Blockchain.	Nimisha Praveen, Suvetha Suresh, 2018 3rd International Conference on Communication and Electronics Systems (ICCES).	Blockchain technology along with smart contracts.	Individual's code forms a block with a particular hashed value and helps in forming an eternal blocks and are unalterable. It's secured using the user's fingerprint which is dissolved into text using steganography.	Helps in security and maintenance of the documents without involvement of middle man.

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S. No.	Paper Name	Author	Method	Analysis	Summary
5.	Adapting to Mobile Wallets: The Consumer Experience.	Susan M. Pandey, Ph.D. and Marianne Crowe Federal Reserve Bank of Boston June 16, 2017 (Revised).	4 methods were proposed such as Model 1: NFC “Pay” Wallets, Model 2: Cloud-based CoF Wallets, Model 3: Cloud-based CoF Card Network Wallets and Model 4: Merchant/FI QR Code Model.	Variations existed in underlying technology platforms, the enrollment and authentication processes, and where the solutions could be used – by channel and location out of which stood out was customer-facing.	Opportunities, descriptions and security measures along with explanations were defined.

Table 2.1: Literature Survey

CHAPTER 3

**SOFTWARE REQUIREMENT
SPECIFICATION**

3.1 Introduction

This section gives a scope description and overview of everything included in this SRS document. The User characteristics for this document is described along with the assumptions and the dependencies.

3.1.1 Project Scope

Company Employee Wallet works by initially assigning each employee a certain number of tokens that do not have any monetary value and that can be used to take courses. At the same time, new tokens can be obtained when an employee takes online courses or gives training to his or her colleagues in an area of his/her expertise.

This new platform assigns value to training through tokens that certify each hour of training taken or given to other colleagues, and opens the doors to all employees independent of their role, so that they can take courses that until now have only been available by invitation.

3.1.2 User Classes and Characteristics

There are two types of users that interact with the system: Employee of the company and administrators. Each of these two types of users has different use of the system so each of them has their own requirements.

1. The Employees can use the application to take online courses or gives training to his or her colleagues in an area of his/her expertise.
2. The administrators interact with the web portal. They manage the overall system within it. The administrator manages the User list, Company list and Courses.

3.1.3 Assumptions and Dependencies

It is assumed that the requirements described in this document have different levels of priority.

3.2 Functional Requirements:

3.2.1 Administrator

3.2.1.1 Operations Performed

The system shall allow the administrator to add, remove and modify user information of following fields:

1. Email.
2. Phone.
3. Company.
4. Designation.

3.2.2 User Role

1. The system shall authenticate users at the beginning of each session.
2. The system shall allow the user to view their Profile.
3. The system shall allow user to view their courses.

3.3 External Interface Requirements

This section provides a detailed description of all inputs into and outputs from the system. It also gives a description of the hardware, software and provides basic prototypes of the user interface.

3.3.1 User Interfaces

1. A first-time user should see the log-in page when he/she opens the application. If the user has not registered, he/she should be able to do that on the log-in page. If the user is not a first-time user, he/she should be able to see the home page directly when the application is opened. Every user should have a profile page where they can edit their email address, phone number and profile photo. He/she must be able to see courses offered.
2. An administrator should also be able to log in to the web-portal where he/she can administer the system by for instance editing, deleting and adding users information

3.3.2 Hardware Interfaces

The System will interact only with the provided web server and database server. Any additional system interaction will be handled directly by the operating system and any other supporting software systems.

3.3.3 Software Interfaces

The communication between the database and the web portal consists of operation concerning both reading, deleting and modifying the data.

1. Angular
2. NPM
3. RoboMongo
4. MongoDB
5. ExpressJS
6. Postman

3.4 Non-Functional Requirements :

3.4.1 Performance Requirements :

Performance Requirements associated with the project are.

1. Response time: The fastness of the query execution.
2. System Dependability: The fault tolerance of the system. If the system loses the connection to the Internet or to the Database, user should be informed

3.4.2 Software Quality Attributes :

The following is a list of Software Quality Attributes associated with the project.

1. Reliability: The product should be capable of fast response to user demands.
2. Portability: The product should be portable.
3. Usability: System should be user-friendly.

3.5 System Requirements

3.5.1 Database Requirements

1. Oracle Database 12c or above.
2. MongoDB

3.5.2 Software Requirements

1. Node JS - Server
2. Windows server 2016 or above
3. NPM Packages

3.5.3 Hardware Requirements

S. No.	Minimum Requirements	Recommended Requirements
1.	8 Core Server	16 Core Server
2.	16/32 GB RAM - Memory	64 GB RAM - Memory
3.	256 GB SSD +5 TB HDD	500 GB SSD +5 TB HDD
4.	Unmetered Bandwidth with dedicated port	Unmetered Bandwidth with dedicated port
5.	Dedicated IP	Dedicated IP
6.	SSL Certificate	SSL Certificate

Table 3.1: Hardware Requirements

3.6 Analysis Models: SDLC model to be applied

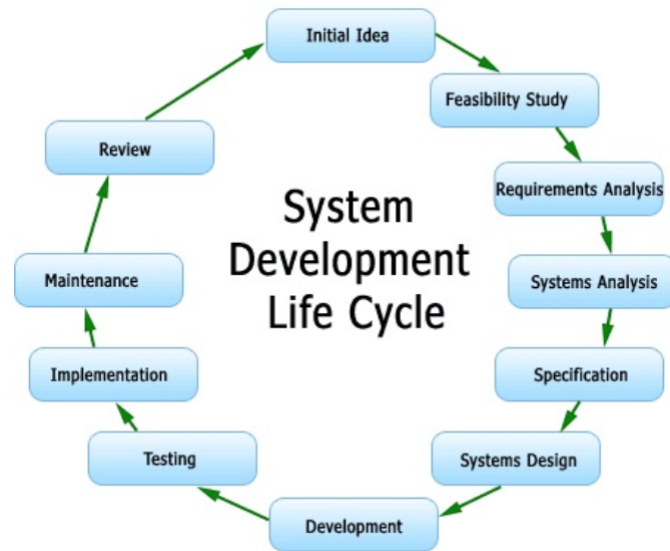


Figure 3.1: SDLC MODEL

- A waterfall approach has been chosen for the implementation of the project(Figure 3.1 is representation waterfall model).
- In this approach the most time occupying task is of requirement gathering.
- Then we perform analysis on the requirements which are been gathered.
- Code implementation starts after design phase.
- Usually along with Implementation, testing is also taking place.
- The final step in this method is of evaluation. Where we check the quality of the product produced and the expected product.
- This model is used as we know the overall requirements of the project and can be implemented in one SDLC (Figure 3.1, for reference) cycle, instead of an iterative one.

3.7 System Implementation Plan

Company Employee Wallet works by initially assigning each employee a certain number of tokens – that do not have any monetary value and that can be used to take courses.

At the same time, new tokens can be obtained when an employee takes online courses or gives training to his or her colleagues in an area of his/her expertise.

This new platform assigns value to training through tokens that certify each hour of training taken or given to other colleagues, and opens the doors to all employees independent of their role, so that they can take courses that until now have only been available by invitation.

S. No.	Task to Perform	Start date	End Date
1.	Requirement Gathering and Feasibility	1/7/19	15/8/19
2.	Planning Activities	16/8/19	31/8/19
3.	Designing Modules	1/9/19	20/10/19
4.	Implementation	21/10/19	13/1/20
5.	Documentation	21/10/20	10/2/20
6.	Testing	14/1/20	15/2/20
7.	Deployment	16/2/20	28/2/20
8.	Report	28/2/20	15/3/20

Table 3.2: Schedule

CHAPTER 4

SYSTEM DESIGN

4.1 System Architecture

- The following figure gives a brief idea about the overall system architecture.
- It shows how the system takes the input and process it to generate corresponding output.
- Input here describes the images of the object and output is the FAIR Report.

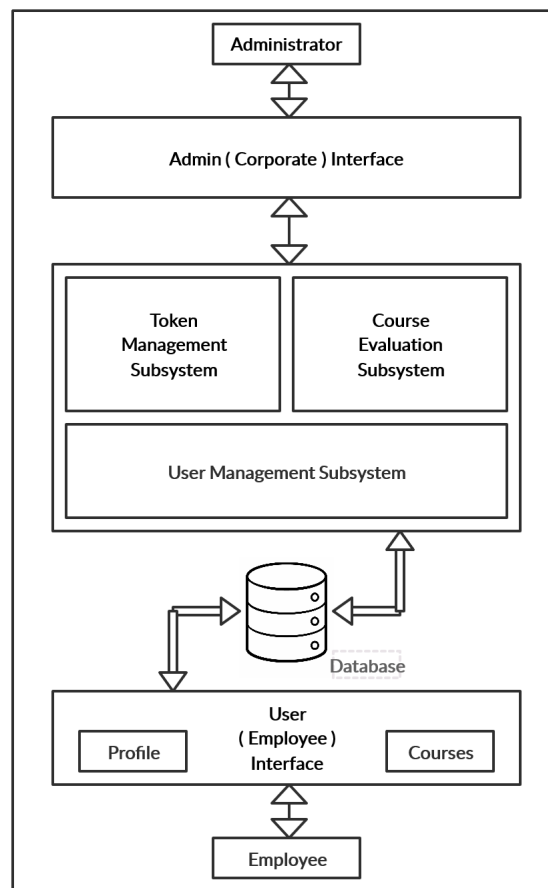


Figure 4.1: System Architecture

4.2 UML Diagrams

4.2.1 Data Flow Diagram

- Data Flow Diagram gives a more closer view into the system.
- It depicts how exactly the input is processed i.e, what processes are carried out while producing the output.
- Different phenomenons are listed in the figure below.

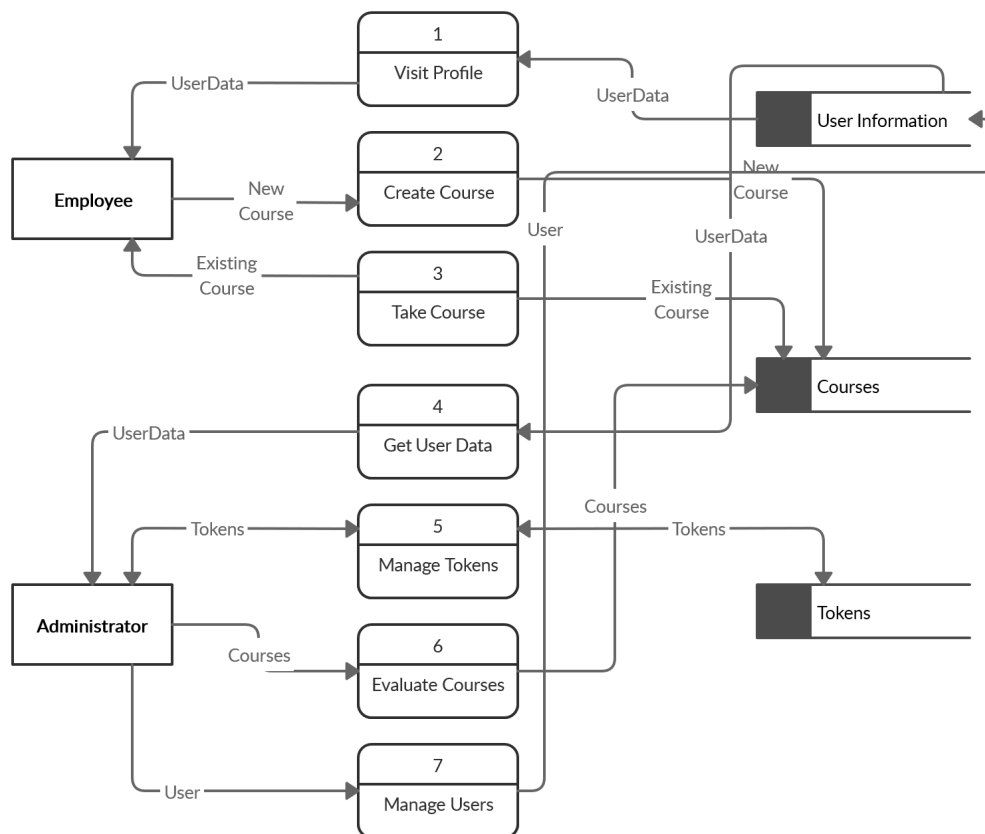


Figure 4.2: Data Flow Diagram

4.2.2 Use Case Diagram

The following figure shows a general use case for the system.



Figure 4.3: Use Case Diagram

4.3 Entity Relationship Diagram

- The following figure gives a brief idea about the Entity Relationships.
- It gives the logical view of the database that has been used in the system.
- The rectangles represent entities and the diamonds represent the relationships between them.

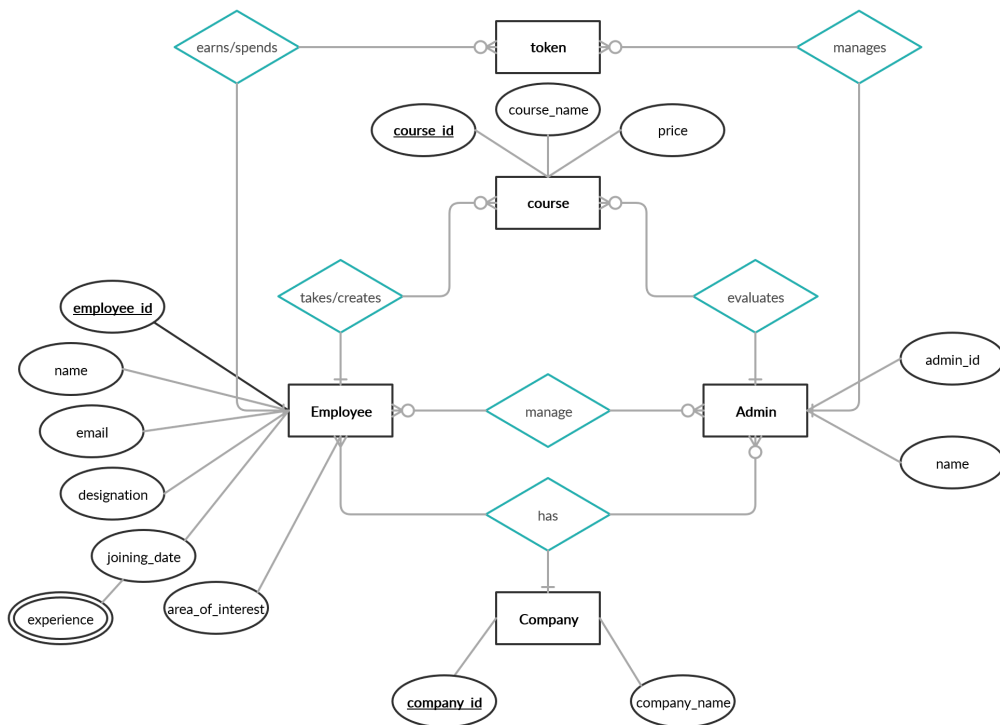


Figure 4.4: Entity Relationship Diagram

CHAPTER 5

PROJECT PLAN

5.1 Purpose of the Document :

This document seeks to provide a Project Plan for the project 'Company Employee Wallet Program using Blockchain' to be developed as a part of Final Year Engineering Project at Pune Institute Of Computer Technology with purpose of obtaining a degree in Computer Science at the Pune University. The purpose of this document is to identify the scope of the project, estimate the work involved, and create a project schedule.

5.2 Project Estimates :

5.2.1 Historical Data Used for Estimates :

Since no practical work was similar to our project done, data is unavailable for current estimation.

5.2.2 Estimation Techniques Applied and Results :

5.2.2.1 Cost Estimates

- Transactions were carried out using ethereum(A public platform).
- Required software was available for free.
- Required hardware was available with us.

5.2.2.2 Time Estimates

- Time estimation of project is around 8-9 months

5.3 Project Resources :

5.3.1 Human Resources:

1. Pragya Gupta
2. Nirav Shah
3. Sohel Shaikh
4. Annie koul

5.3.2 Hardware Resources Required :

1. 4 GB RAM.
2. Core i3 processor.
3. Wireless Network Information Card.
4. Ethernet port.

5.3.3 Software Resources Required :

1. Front-End : Angular.
2. Back-End : Node JS, NPM, Express JS.
3. Database : MySQL.
4. Blockchain : Ethereum.

5.4 Project Schedule :

5.4.1 Project Task Set :

The different task sets that are critical in the projects are as follows :-

Table 5.1: Program Task Set.

Sr. No	Task Id	Name of Task
1	T1	Decision of boundaries and scope of project
2	T2	Problem statement feasibility assessment
3	T3	Literature survey
4	T4	Installation of required software
5	T5	Inputs and outputs factorization
6	T6	Learnt the tools required for the project
7	T7	High level design
8	T8	Documentation

5.4.2 Task Network :

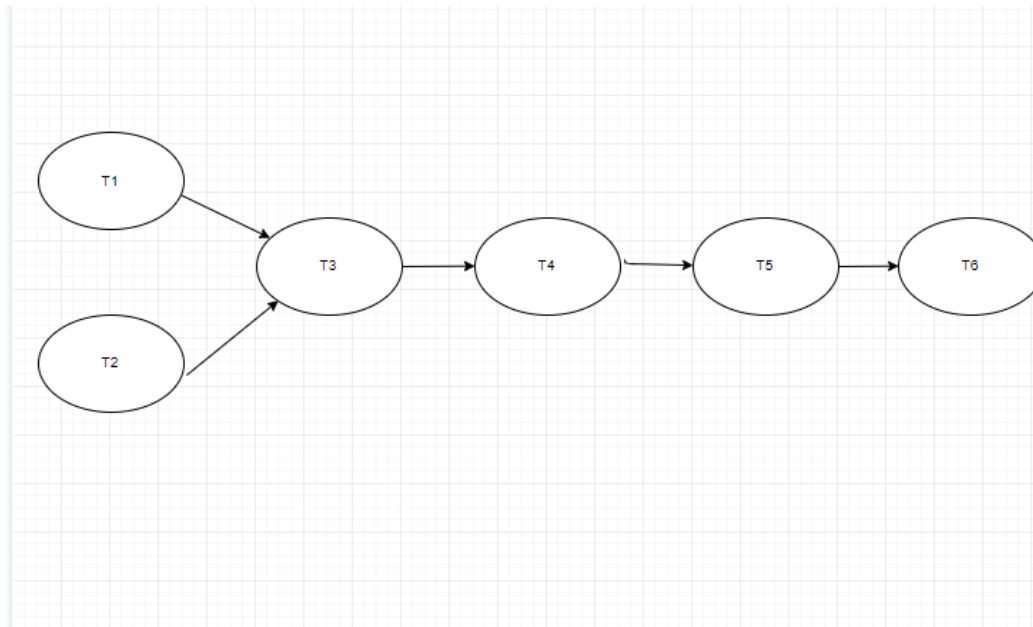


Figure 5.1: Task Diagram.

5.4.3 Timeline Chart :



Figure 5.2: Gantt Chart

5.5 Staff Organization :

Table 5.2: Staff Organisation

Roles	Responsibilities	Participant(s)
Project Sponsor	1.Final decision maker 2.Provide project oversight and guidance 3.Review and approve some project elements	Mr.Amit Yedurkar
Project Guide	1. Manages project in accordance to the project plan 2. Provide overall project direction 3. Direct/lead team members towards project objectives 4. Handle problem resolution	Mr.Bipin Shidore Mr. Vishal Divekar Prof.P.R. Patil
Project Participants	1. Communicate project goals, status and progress throughout the project to personnel in their area 2. Review and approve project deliverables 3. Coordinates participation of work groups, individuals and stakeholders 4. Assure quality of products that will meet the project goals and objectives 5. Identify risks and issues help in resolutions	1. Front-End : Sohel Shaikh and Annie Koul 2. Back-End : Pragya Gupta and Nirav Shah 3. Connectivity Management : Pragya Gupta

5.6 Management Reporting and Communication :

Timetable was put up and sufficient time was provided for:

- Domain decision.
- Final problem statement design with the help of mentor.
- Group details and problem statement submission.
- Abstract of project submission.
- Synopsis and Mathematical Model submission.

- Literature survey.
- Review 1 with the guide and experts.
- Implementation of partial project.
- Review 2 with guide and experts.
- Project lab assignments including UML diagrams submission.
- Regular status observed in project workbook .
- Submission of preliminary project report.
- Review 3 with the guide and experts.
- Project Implementation.
- Review 4 with the guide and experts. ‘
- Final Project Report Submission.

5.7 Tracking and Control Mechanisms :

5.7.1 Quality Assurance and Control :

Software quality is defined as :

The degree at which a system, component, or process meets specified requirements. The functionality and features of a software product that bear an ability to satisfy stated or implied needs. Software quality assurance is an activity that is applied throughout the software process. It involves steps like :

1. A set of activities are created to ensure that every software product exhibits high quality.
2. Quality assurance performance on activities for every software products.
3. Develop strategies by using matrix for improving quality of software processes.
4. Everyone involved in the software engineering process, is responsible for the quality of the product.

Documentation :

As a part of ensuring software project, following documents should be prepared :

- Software Requirement Specification
- Software Design Specification

- Risk Mitigation, Monitoring and Management Plan

Document Standard :

All documents are written in Overleaf/Latex Format, in Font Times New Roman, and size 12. The headings are bold with font size ranging from 12 to 14 and are fully justified.

Coding Standards :

The code will be written in Node JS and Angular. Angular shall be used to create the user interface.

Review Guidelines :

The team shall update the documents on a regular basis and send the updated documents to internal as well as external guide for critical reviews assessment. Suggested improvements and changes will be incorporated promptly.

Metrics :

Following metrics will be used to ensure software quality :

- Everyday team discussion to ensure progress.
- Meeting with the internal guide to analyse the progress.
- Meeting with external guide weekly to discuss the progress till date, suggest changes for improvement and decide the future course of action.
- Logging of daily work by every team member.
- Use of bit bucket to manage work done by every team member.

Quality Control through Testing :

Test Cases shall be designed using Postman to test each module for API calls thoroughly. Each test consists of requirements for performing the test, the exact procedure to be carried out, the correct results of the test and the errors, which the test might expose.

5.7.2 Change Management and Control :

Any change in design or plan is immediately reported to the external guide and design is modified after discussion with him. Further course of action is decided based on this design.

CHAPTER 6

PROJECT IMPLEMENTATION

6.1 Algorithms

Proof Of Work :

“The Proof of Work” is the consensus algorithm which verifies the transaction for adding a new block into the legitimate chain of the Bitcoin Blockchain. The method is also known as Mining’ and therefore the network nodes which are involved in mining are known as miners. The most prominent application of POW is Bitcoin followed by bitcoin based cyptocurrencies like litecoin.

6.1.1 Working Of Algorithm(POW)

The whole method of verifying the transactions involved of the new Blocks to be added and arranging the transactions in consecutive manner does not require much energy .Even adding the newly verified block in the legitimate chain also is not that hard task.

The part that makes a difference is the 'hard mathematical computation part' which the miners perform to link the new block to the rear one in the valid blockchain. The mathematical part can be any logical query, be it a hash or complicated mathematical puzzle like integer factorization which requires a lot of computational power to solve. The complexity of the puzzle depends on the number of users, current power and network load and is increased to prevent the vulnerabilities like dos attacks and spam.

When the miner computes and confirms the completion of the transaction, the node then broadcast it to the whole network at the same time and receives a reward mostly bitcoins provided by the POW protocol.

6.1.2 Major Flaws

The three main limitations of POW are huge expenditures, uselessness of the computations and 51 percent attack.

- Mining requires high computational power hardware to run such complicated mathematical puzzles which turn out to be a costly operation.
- Miners do a lot of work for computation and consume a lot of power but it is useless because it can not be used anywhere else
- 51 percent attack or the majority attack is a case when 6 out of 10 nodes are malicious in the network.

CHAPTER 7

OTHER SPECIFICATIONS

7.1 Advantages

1. **Reduced Cost :**

Development of the digital wallets reduce the need of intermediators in between the billing process. For instance, the customers in stores can carry out the billing procedure just with one scan, thus eliminating the need of a cashier.

2. **Increased efficiency and speed :**

The use of traditional, paper process trading is quite time consuming and prone to human errors, often involving an inter-mediator. By automating the process by Blockchain, transactions can be completed in no time with great efficiency.

3. **Modern Trend :**

Traditional cash-only businesses and markets, now accept cards. This release a wholly new aspect to payment methods in large markets, introducing many business opportunities and greater potential revenue.

4. **Transparency:**

Due to distributed ledger property of Blockchain, transactions are becoming more transparent. All the network participants share the same copies irrespective of the individuals one. The shared copy, if updated needs the consensus of all the participants.

5. **Enhanced Security:**

Blockchain is anyway more secured than the traditional, heavy paper trading, though what really makes a difference is the unique working of it. The records must be agreed before recording. The approved transaction then is encrypted and linked the previous transaction (the previous hash). The record is stored on a network of computers, thus distributed rather than on one server.

7.2 Limitations

1. **Scalability:**

Bitcoin is the most successful implementation of Block chain, yet on the planet only 1 in thousands uses it. More number of users is not just practical, maybe due to its transactions process speed which is inversely proportional to the number of users. On contemporary Visa which processes thousands of transactions per seconds for thousands of its customers, though its quite expensive. Comparing Blockchain with the classical banking systems, they are far more scalable.

2. **Blockchain can be horrible inefficient :**

The high grade bitcoin users stores the entire transaction history, which can be as large as 100GB, this amount of storage is not available in smartphones or laptops. The data needs to be downloaded, if not then destroys the foundation of peer-to-peer Blockchain and resembles like any other client server model. Even the commercial blockchains like Ethereum are no different. The Ethereum has accumulated 200GB+ history data in Blockchain in its 30 months of use.

3. **High Energy Consumption :**

Bitcoin is the first and most successful implementations of Blockchain. The Bitcoin core needs around 200GB+ in every node and other requirements can be 5GB upload everyday and 500MB download everyday, however in our country, we are currently struggling with network conditions like 4g having limited availability in the country and to implement the Bharatmala Broadband project, thus having a very limited scope in India

7.3 Applications

1. **Financial Services :**

The use of traditional, paper process trading is quite time consuming and prone to human errors, often involving an intermediary. On the opposite hand, Blockchain is transparent, affordable and the financial services are its introducing smart contracts and smart bonds, that makes the method easy.

2. **Asset Management :**

Traditional, heavy paper trading is prone to errors and often needs many intermediaries whereas the Blockchain diminish the need of any mediators. In Asset Management, each participant in it, be it a broker or manager or custodian keep their individual records which in turn can cause lot of inefficiencies. Due to distributed ledger property of Blockchain, transactions are becoming more transparent. All the network participants share the same copies irrespective of the individual's one.

3. **Smart Appliances :**

Any object or device performing on its own work through training given to it is termed as Smart. Connected with internet through various wireless protocols and mechanisms, it can give you more detailed information and results. Encrypting these devices on the blockchain protects the client's ownership and enables transferability.

CHAPTER 8

**CONCLUSION AND FUTURE
WORK**

8.1 Conclusion

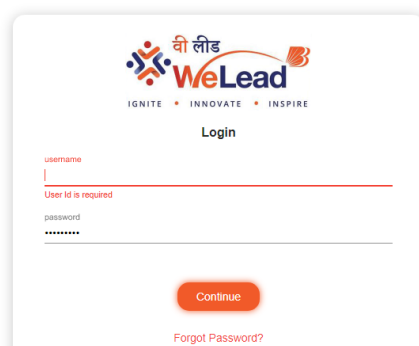
1. Transparency, Immutability, Reliability were favoured as the three benefits of leveraging Blockchain Technology.
2. Minimum time for a Blockchain project completion is 3.2 months.
3. Both automated and manual interfaces are provided for the employee to interact with the company.
4. Database employees, company and admin were designed as an whole.
5. Token Creation using Ethereum smart contracts and allocation of them to wallets for transactions initiation.
6. Innovative Approach demonstrated by prioritizing open API's and network structure dependency.

8.2 Future Scope

1. The Company wallet could be a new and upcoming technology that's a step towards revolutionizing the way individuals to spend money on their mobile devices.
2. The convenience related to it's undeniable; digital wallets allow the user to perform transactions with one click or press of a button and it's secure.
3. Sensitive information linked to the applications are stored on encrypted servers hosted by the company that administers the digital wallet application.
4. This can be the "next big thing" to be introduced to the market and Canadians are already beginning to switch to using digital wallets.

8.3 Outputs

Underleaf attached are the screenshots of the task modules that were carried out within our project :



The login page features the WeLead logo at the top, which includes the text 'वी लीड' and 'WeLead' with the tagline 'IGNITE • INNOVATE • INSPIRE'. Below the logo is a 'Login' heading. There are two input fields: 'username' with a red error message 'User Id is required' and 'password' with masked characters. A red 'Continue' button is positioned below the fields, and a 'Forgot Password?' link is at the bottom.

Figure 8.1: Login Page

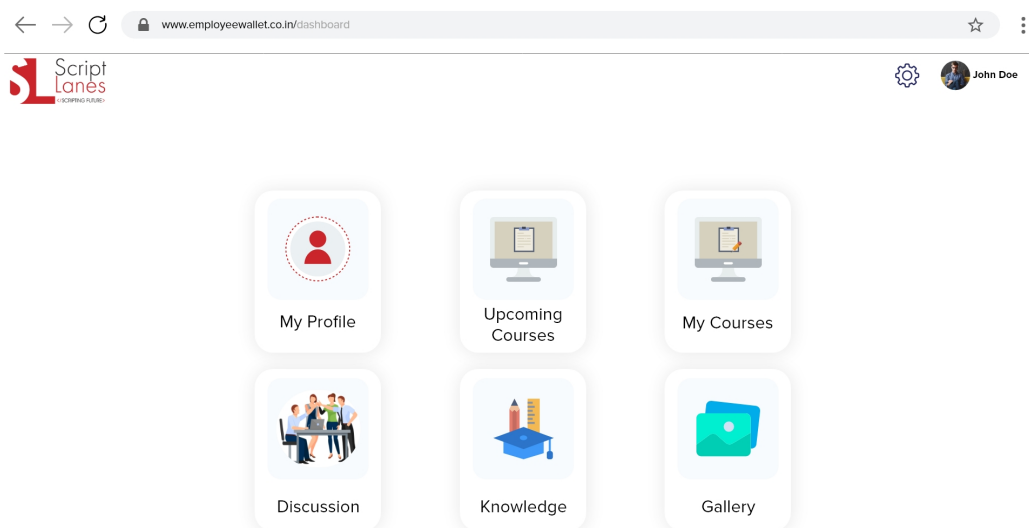


Figure 8.2: Home Page

COMPANY EMPLOYEE WALLET PROGRAM

Script Lanes
Scripting Future

Home
My Profile
Upcoming Courses
My Courses
Discussion
Knowledge
Gallery

My Profile

Change Profile picture

My Points: 1000

Name
John Doe

Email
johndoe07@gmail.com

Mobile
9687563256

Company Name
Script Lanes

Employee Id
10401

Designation
Software Developer

Date of Joining
25 Feb 2016

Total Experience
4 yrs 5 months

Area of Interest
HTML, CSS, JavaScript, AngularJS

Skills
C, C++, Java

About me
My name is John Doe

Save

Figure 8.3: My Profile

Script Lanes
Scripting Future

Home
My Profile
Upcoming Courses
My Courses
Discussion
Knowledge
Gallery

List of Courses

Java Programming Masterclass for software Developers
Start date: 1 February 2020
End date: 30 April 2020
Number of people applied to course: 1
My total credits: 100

Java In-Depth: Become a Complete Java Engineer
Start date: 1 February 2020
End date: 31 March 2020
Number of people applied to course: 2
My total credits: 200

The Complete Java Certification Course
Start date: 1 February 2020
End date: 31 May 2020
Number of people applied to course: 3
My total credits: 300

Create New Course

Figure 8.4: My Courses

COMPANY EMPLOYEE WALLET PROGRAM

The screenshot shows the 'Create new course' form in the Script Lanes application. The left sidebar contains the following navigation items: Home, My Profile, Upcoming Courses, My Courses (highlighted), Discussion, Knowledge, and Gallery. The top right corner shows a settings gear icon and a user profile for John Doe. The form itself has the following fields and controls:

- Short description: A text input field.
- Detail Description: A text input field.
- Start date: A date picker icon.
- End date: A date picker icon.
- Credit for course: A dropdown menu.
- What you'll learn: A text input field with a plus icon for adding more items.
- Upload image here: A button with a download icon and the text 'Choose a file or drag it here.'

Figure 8.5: Creating a new course

The screenshot shows the 'List of Courses' page in the Script Lanes application. The left sidebar contains the following navigation items: Home, My Profile, Upcoming Courses (highlighted), My Courses, Discussion, Knowledge, and Gallery. The top right corner shows a settings gear icon and a user profile for John Doe. The page displays a list of three courses:

Course Image	Course Title	Start date	End date	Course offer by	Apply for course	Credits
	Java Programming Masterclass for software Developers	1 February 2020	30 April 2020	Sonal Agawane	Apply for course	50 Credits
	Java In-Depth: Become a Complete Java Engineer	1 February 2020	31 March 2020	Amit Gluge	Apply for course	50 Credits
	The Complete Java Certification Course	1 February 2020	31 May 2020	Varun Shindikar	Apply for course	50 Credits

Figure 8.6: Upcoming courses

COMPANY EMPLOYEE WALLET PROGRAM

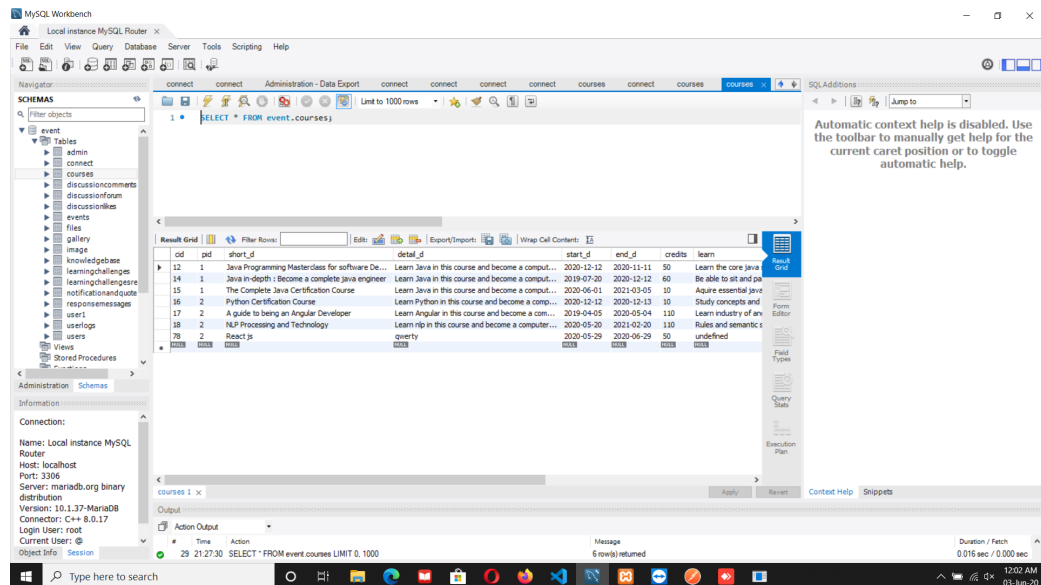


Figure 8.7: MySQL Database

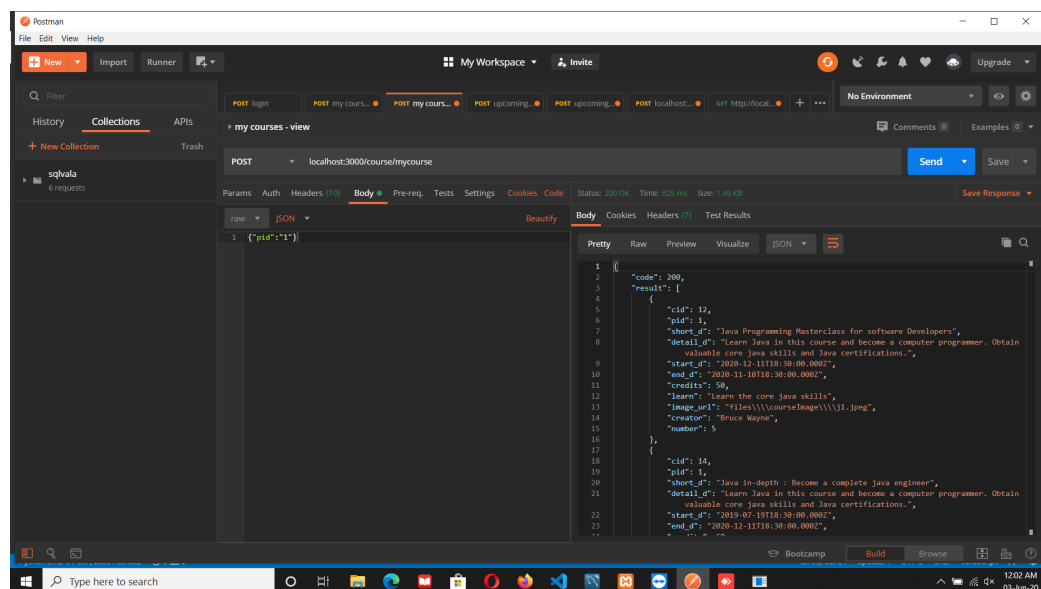


Figure 8.8: Postman API Calls

COMPANY EMPLOYEE WALLET PROGRAM

```
PS C:\Users\Darshan Gaikwad\Desktop> node main.js
SLCoin mining in progress....
{
  "chain": [
    {
      "index": "01/01/2017",
      "previousHash": "",
      "timestamp": "Genesis block",
      "data": "0",
      "hash": "8f56ca2d0b00fd9e262d75dca7f779eab3c6c800c2e477da3bb80302648d49d4",
      "nonce": 0
    },
    {
      "index": 1,
      "previousHash": "8f56ca2d0b00fd9e262d75dca7f779eab3c6c800c2e477da3bb80302648d49d4",
      "timestamp": "20/07/2017",
      "data": {
        "sender": "Me",
        "recipient": "You",
        "amount": 1
      },
      "hash": "0000672227cd2392d74124abc293363cc7b411edd84fb6ce1d434bf7cb2311ea",
      "nonce": 41030
    },
    {
      "index": 2,
      "previousHash": "0000672227cd2392d74124abc293363cc7b411edd84fb6ce1d434bf7cb2311ea",
      "timestamp": "22/07/2017",
      "data": {
        "sender": "You",
        "recipient": "Me",
        "amount": 2
      },
      "hash": "00002732bd56ca759fe40c219c1396785d55ed1f44cd61ce52e46f71596d847d",
      "nonce": 23324
    }
  ],
  "difficulty": 4
}
```

Figure 8.9: Blockchain

CHAPTER 9

APPENDIX

9.1 Appendix A

Problem statement feasibility assessment using, satisfiability analysis and NP-Hard, NP-Complete or P-type using modern algebra and relevant mathematical models.

The feasibility of the project is defined by the subsequent :

1. Blockchain is an NP-Hard type problem because there's clearly a polynomial time algorithm to verify correct solutions.
2. Miners first need to assemble a candidate block by choosing which transactions to incorporate from the set of all pending transactions followed by hashing.
3. Blockchain-based candidate verification, an easy use case employed in our project. Real-time worker payments might be another one and fewer spam as we manage our own career profile.
4. Blockchain, related applications and procedures must be trustworthy and secure.
5. The validated transactions are factored to its store of import by receiving wallet.
6. Blockchain Proof of Consensus is commercially sustainable.

How to sort the transactions ? Answer: Transactions are simply sorted employing a heuristic "priority" formula and so greedily added.

Mathematics used :

1. Hashing Algorithm.
2. Ensures that a transaction is secure.

Hashing Process :

- (a) The first record (or block of records) is generated and its hash value is calculated. And then the next record the hash value calculation, includes the hash of the previous record.
- (b) So to alter a record, all other records must be altered for the Blockchain to be valid.
- (c) The Blockchain is decentralized, so it resides on all of the network's nodes.
- (d) So to alter the Blockchain, someone must have 51 percent of the network hash power to do so.

9.2 Appendix B

1. An overview of Blockchain Technology : Architecture consensus and future trends, Z.Zheng, S.Xie, H.Dai, X.Chen, H.Wang (2017 IEEE-6th International Congress on Big Data).
This paper identifies the overview of Blockchain architecture identified and comparison of some typical consensus algorithms used in different Blockchains.
2. Peer-to-Peer Electronic cash system, S. Nakamoto, October 2008.
This paper elaborates on Peer-to-peer network using Proof-of-work approach : System proposal for electronic transactions without relying on trust and CPU power voting.
3. Blockchain-based payment collection supervision system using pervasive Bitcoin digital wallet, Po-Wei Chen, Bo-Sian Jiang, Chia-Hui Wang, 2017 IEEE 13th International Conference on Wireless and Mobile Computing, Networking and Communications (WiMob).
This paper talks about proposing and deploy a Bitcoin collection supervision system called BPCSS based on Blockchain technology with cloud databases for customers and merchandise stores.
4. E-DOC Wallet Using Blockchain, Nimisha Praveen, Suvetha Suresh, 2018 3rd International Conference on Communication and Electronics Systems (ICCES).
This paper entails how the E-DOC wallet is secured using the user's fingerprint which is dissolved into text using steganography. Helps in security and maintenance of the documents without involvement of middle man.
5. Adapting to Mobile Wallets: The Consumer Experience, Susan M. Pandy, Ph.D. and Marianne Crowe Federal Reserve Bank of Boston June 16, 2017 (Revised).
This paper proposes how variations exist in underlying technology platforms, the enrollment and authentication processes, and where the solutions could be used – by channel and location out of which stood out was customer-facing and Opportunities, descriptions and security measures along with explanations were defined.

9.3 Appendix C

Plagiarism Report of project report.

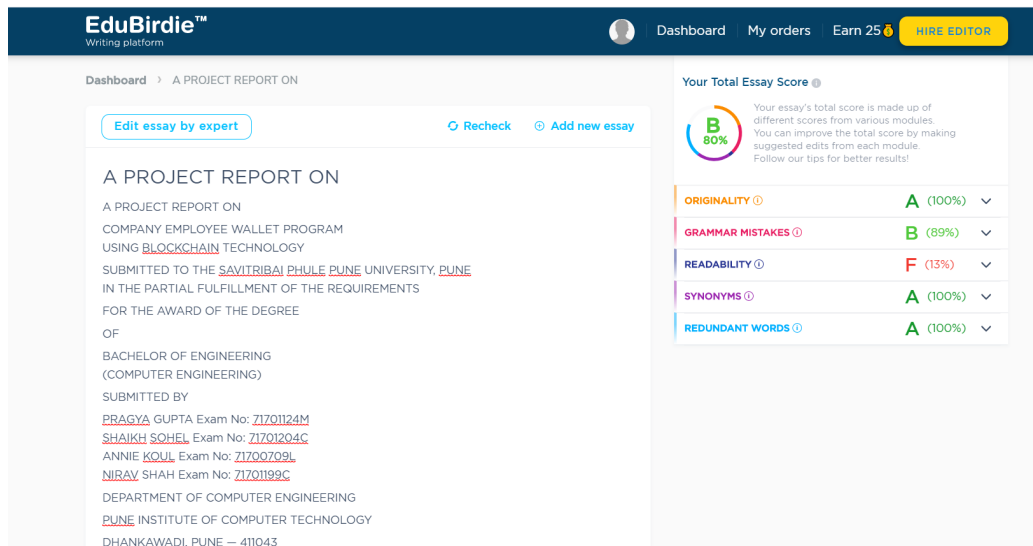


Figure 9.1: Plagiarism Report.

CHAPTER 10

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- [5] Adapting to Mobile Wallets: The Consumer Experience, Susan M. Pandey, Ph.D. and Marianne Crowe Federal Reserve Bank of Boston June 16, 2017 (Revised).
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- [8] Roopali Batra, Neha Kalra, “Are Digital Wallets The New Currency?”, Apeejay Journal of Management and Technology, Vol 11, No 1, January 2016
- [9] M. Sharples and J. Domingue, “The Blockchain and kudos: A distributed system for educational record, reputation and reward,” in Proceedings of 11th European Conference on Technology Enhanced Learning (EC-TEL2015), Lyon, France, 2015, pp. 490–496