

Submitted in partial fulfillment of the requirements for the degree

Of

*Bachelor of Science in Computer Science and Engineering*

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Submitted in partial Fulfillment of the REQUIREMENTs FOR the degree of  
B. Sc. in COMPUTER SCIENCE AND ENGINEERING

Department of Computer Science and Engineering (CSE)  
INTERNATIONAL ISLAMIC UNIVERSITY CHITTAGONG (IIUC)  
Chittagong, Bangladesh

**DECLARATION**

We hereby declare that the work in this project is our ow` n except for quotations and summaries which have been duly acknowledged.

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DECLARATION OF SUPERVISOR

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DECLARATION OF PROJECT REPORT AND COPYRIGHT

PROJECT REPORT TITLE:

Decentralized Social Network using Blockchain (Link-din)

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ACKNOWLEDGEMENT

At first, we want to give out heartiest thank to Almighty god for being able to develop our project with his mercy. Now we would like to take the opportunity to express our humble gratitude to our honorable supervisor Mr. Sazid Zaman Khan, Lecturer, Department of Computer Science and Engineering for his planned and construction guidance at different stage of this project work.

It might have been quite impossible to carry out this work without his guidance. We cannot forget our friends in the faculty of Computer Science & Engineering for the academic interactions and ideas.

Lastly, we would like to convey our gratitude all the teacher of the Department of CSE Faculty for their guidance, friendship, discipline and creating an environment of enthusiasm for learning, appreciation for growing along the way. We are grateful to have all of you as a guide.

May Allah bless them and keep them safe.

ABSTRACT

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TABLE OF CONTENTS

|  | Page |
| --- | --- |

**[DECLARATION ii](#_Toc47567422)**

**[SUPERVISOR’S DECLARATION iii](#_Toc47567423)**

**[DECLARATION OF THESIS / PROJECT REPORT AND COPYRIGHT iv](#_Toc47567424)**

**[ACKNOWLEDGEMENT v](#_Toc47567425)**

**[ABSTRACT vi](#_Toc47567426)**

**[TABLE OF CONTENTS vii](#_Toc47567427)**

**[LIST OF FIGURES ix](#_Toc47567429)**

**[LIST OF ABBREVIATIONS xii](#_Toc47567430)**

**[CHAPTER I INTRODUCTION](#_Toc47567431)**

[1.1 Background of the Study 1](#_Toc47567432)

[1.2 Problem Statement 1](#_Toc47567433)

[1.3 Motivation 2](#_Toc47567434)

[1.4 Objective of the Project 2](#_Toc47567435)

**[CHAPTER II LITERATURE](#_Toc47567431) REVIEW**

[2.1 Introduction 4](#_Toc47567432)

[2.2 Existing Work Reveiw 4](#_Toc47567433)

[2.3 Limitations of the Existing Works 5](#_Toc47567434)

[2.4 Problems That Are Focused From Study 5](#_Toc47567435)

[2.5 Summery 5](#_Toc47567436)

**[CHAPTER III REQUIREMENT](#_Toc47567431) SPECIFICATION & ANALYSIS**

[3.1 Why Requirement Specification Is Needed ? 6](#_Toc47567432)

[3.2 Requirement Defination 7](#_Toc47567433)

[3.3 Requirement Validation 8](#_Toc47567434)

[3.4 Sytem Requirements 9](#_Toc47567435)

[3.5 Feasibility Study 10](#_Toc47567436)

[3.6 Gantt Chart 12](#_Toc47567436)

**[CHAPTER IV METHODOLOGY](#_Toc47567431)**

[4.1 Process Model 13](#_Toc47567432)

[4.2 Recent Trends In Process Model 13](#_Toc47567433)

[4.3 Why We Choose Agile Model ? 13](#_Toc47567434)

[4.4 Agile Model Implementations 14](#_Toc47567435)

[4.5 Limitations of Agile Model 17](#_Toc47567436)

**[CHAPTER V SYSTEM](#_Toc47567431) ANALYSIS**

[5.1 System Analysis 18](#_Toc47567433)

[5.2 Data Flow of SDMS App 18](#_Toc47567433)

[5.3 Data View 19](#_Toc47567434)

[5.4 Security 19](#_Toc47567435)

[5.5 Version Support 20](#_Toc47567436)

[5.6 System Design 20](#_Toc47567432)

[5.7 A General Model of Software Design Process 21](#_Toc47567433)

[5.8 Flow Chart Diagram 22](#_Toc47567434)

[5.9 Use Case Diagram 25](#_Toc47567435)

[5.10 Entity Relationship Diagram 28](#_Toc47567436)

[5.11 Data Flow Diagram 35](#_Toc47567433)

**[CHAPTER VI SYSTEM](#_Toc47567431) IMPLEMENTATION & TESTING**

[6.1 System Implementations in Details 39](#_Toc47567432)

[6.2 UI Design Implementation 42](#_Toc47567433)

[6.3 Testing 58](#_Toc47567434)

**[CHAPTER VII CONCLUSION](#_Toc47567431) & FUTURE PLAN**

[7.1 Conclusion 62](#_Toc47567432)

[7.2 Contribution of the Project 62](#_Toc47567433)

[7.3 Future Plan 62](#_Toc47567434)

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* 1. Introduction
     1. Background of the Study

Online social networks have exploded in popularity, allowing users to exchange images, videos, and other content with their peers. Facebook, for example, has more than two billion members.

At the same time, consumer’s privacy in online social networks(OSN) has been discovered to be easily compromised . Although members of Online Social Networks (OSN) can alter privacy settings to limit who has access and who does not, We don't have any effective technical solutions to provide access or prevent them from disclosing user data to third parties in this case. The New York Times reported in March 2018 that a business fraudulently got information from more than 50 million Facebook users. The primary cause of these incidents is that present OSN’s with centralized structures can completely comprehend all user data..

The solution is a decentralized online social network based on BlockChain (OSN).

1.2 Problem Statement

When we post content to an OSN, we worry that our account will be hacked or blocked, and we'll lose all control over it. The most pressing concern on our minds is how to keep our data safe. Instead of giving the main copy of data to OSN, what if we had a system where we stored data and just gave OSN system an authorized hash value?.

1.3 Motivation

// write a motivation on your free time .

1.4 Objective of THe project

1. The purpose of this Social Network is to safeguard an OSN user's personal data from being accessed and being lost in the OSN platform.

The following are the desired goals:

* 1. In order to Protect user Account.
  2. To keep personal data access as secure as possible.
  3. To store all resources in a separate cloud storage, the OSN will communicate with that cloud storage to retrieve the desired data based on the user's rights and public key.
  4. Literature Review
  5. Introduction

A clear knowledge about the objectives & motivation related to the work conducted by us were provieded in the previous chapter .In the current chapter we will procced by analyzing the previous works related to our work.we can arrange writing survey into four fundamentals targets for better understanding . They are:

* Analyzing the existing works with their basic features from relevent sources and articles.
* Finding the proper limitations which should overcome.
* Combine and summarize the information found from the topic.
* Represent the problems of study which should be focused in the system.
  1. Existing Work review

Work Review By IPFS :

Traffic Police Assistant System[1] is a blockchain based system used india . It offers several features of protecting the Traffic data and other handy data. But It fails to reduce the cost of implementing and designing smart contract . which is an important part of an blockchain based system.

Medical image sharing system [2] blockchain based image sharing system . It has features like zero trust principles, role based authentication etc. It also offers data encryption features. Since each transaction requires peer-to-peer verification , it becomes time consuming especially in a public blockchain with many nodes .

Work Review By Authentication :

IdM system [3] is based on Single Sign-On services . SP validates the identity and credentials with an Idp , preventing the user needs to enter it’s identifier and password to access the services. But it has some authentication layer left risky.

2.3 Limitation of the existing works

1. Most of the applications are highly expensive .

2. They have limitations in combining authentication and blockchain in same system.

3. Some of the existing Application are not with full socail Network system. For that they only provide solution to either IPFS blockchain or authentication security.

2.4 problems That are focused From study

1. This system needs a cloud system where any user’s post can be stored in database system . From where a OSN provider securely pull the request of the data for OSN system.

2. In the Application real-time data showing and posting to cloud with same time posting it to ipfs blockchain is must need . which will make the OSN more userfriendly.

3. A well-secured authentication and data security is needed fo better data safegaurding .

2.3 Summary

From this review we got a clear understanding about the features and drawbacks of the previous applications and we have founded few major points:

* The basic security layer’s is a Must have thing.
* The main limitaitons of previous blockchain based system that must have to overcome.
* After the brief study , we finally figure out our OSN system’s features.

CHapter III  
  
Requirement Specification & analysis

// After

3.1 Why Requirement Specification is needed?

Requirement Specifications needed because: -

1. It precisely describes about the functionality of the software.
2. It describes how the software will interact with hardware and other software.
3. It describes about the performance level.
4. It describes about the non-functional factors.

3.2 Requirement Definition

The needs of user are generally called requirement. The requirements prioritize details and accurate need with description. After analyzing that we can set up system user requirements [7].

3.2.1 User list of the system

* OSN User
* Administrator

3.3 Requirement Validation

//

3.3.1 Requirement Validation in software process

//

3.4 System Requirements

//

chapter IV  
  
Methodology

A software development methodology is similar to a cooking recipe. A software development methodology, like a recipe, tells Us how to build a software. The ultimate goal of software methodology is to create high-quality, maintainable software in a reasonable time frame and at a reasonable cost. A successful software development methodology describes how all of our tools, techniques, and practices work together to create a winning Project.

4.1 Process Model

Software process have to include main functionilities of the software and the constrains (Specification) .Software needs to be designed and programmed . A software must meet the specifications and to cope up in the software competion we need to evaluate our software .

4.2 Different Software Process ModelS

1. Waterfall Model.
2. V-model
3. Iterative and Incremental Model
4. Spiral Model
5. Iterative Development Model
6. Agile Model
7. Big Bang Model
8. DevOps Model

4.3 Why we choose Spiral model (SDM) ?

The spiral model combines iterative project development from evolutionary implementation of a prototype model with the systematic and controlled features of the sequential waterfall model. The spiral model is better suited for large-scale projects that require consistent improvement and refinement with each iteration around the spiral.The output of one iteration's specific activities is a small proof-of-concept (POC) prototype, which is part of the larger software and is used to gather user feedback. The same activities are repeated in subsequent spirals, with refinement of the POC prototype, to produce a working model of the software called build with a version ID/number. Each version ohf the build is distributed to users in order to gather feedback for future enhancements in the next version until the final system is developed.

The difficulty in calculating the Gas price, the cost of running a smart contract on a public blockchain such as the Ethereum platform, is particularly high for large-scale projects with complex smart contract coding.

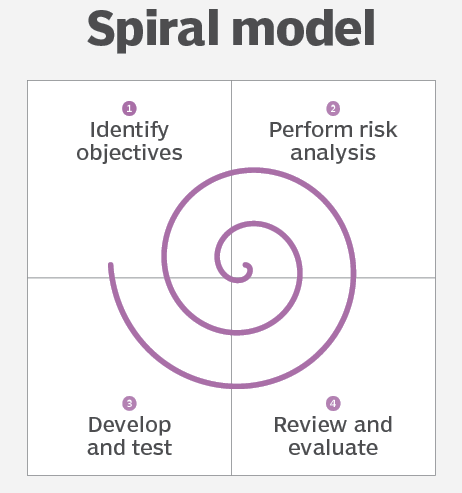


Figure4.2 Agile Model [9]

4.4 Agile model implementataions

As we used agile approach in our project. We completed the phases properly one after another to avoid confict in development. The phases are described below in detail:

****4.4.1 Requirements****

It is the primary period of the development where every one of the prerequisites accumulated and documented. For our project we have examined previous related systems and the users. After that we have finalized our system features.

4.4.2 Design

As we are finished the testing and requirement analysis of our project .Now it’s time for desiginig the frontend part . In that stage we use React js , the javascript framework , to develop a dynamic frontend part. To make our project eye cathing we used Material UI , Bootstrap, React js Styled Components to style different parts of page components .

4.4.3 Implementation

As we achiving the product requirements and design , It’s time for starting our implementaiton or development stage in web development terminology we can say we are now going to Backend system development.

In this phase we strictly follow the spiral model . It helps us to be on track of project requirement and takes us to next steps. We hard coded a function and then test it and optimize it and then we this funciton for our final figured function .

We impleement user backend using solidity and web3.js and admin backend using Laravel with phpMyAdmin .

****4.4.4 Testing****

As testing is very important for Sdlc model . We first test our wallet connection by Ethereum Tester and Ganache .In blockchain as everything is node , we node test to keep everything smooth. For Admin Backend we Test our Api .

We observe every error and failed response in our project . Then we debug it and also pay attention to corner stage for which the error are causinig.

We also checked our project using White Box testing and Truffle Migration testing in white box approach .We will presenting system testing in chapter 6 ‘System Implementation and Testing”.

4.4.5 Deployment

As we are now in the Deployment stage , we previously debug and log to console bar to detect any hiding error. And Then Now our project is ready for Deployment.Once it is Deployed to production ,Now It is ready for everyone to use in website .

4.4.6 Review & Maintenance

We regularly keep an eye on Maintenance so that we can provide our visitors with the best possible user experience.keeping Updated with valuable information, fixing broken links, removing duplicate pages to boost our website traffic.



Figure4.2 Spiral Model for Software Development [10]

4.5 Limitations of Spiral model

There are some limitations of using Spiral model in porject [11] -

1. Difficulty in time management. As the number of phases is unknown at the start of the project, so time estimation is very difficult.
2. A large number of intermediate stages necessitate an abundance of documentation.
3. Spiral development is best suited for large projects and necessitates risk assessment expertise.

chapter V  
  
System ANalys7is

A system is a special design that is physical and functional need. System analysis is conducted for the purpose of studying a system or its parts in order to identify its objectives [13].

5.1 System Analysis

System analysis is the technique of studying a system or its components in order to identify its objectives. It improves the system and ensures that all the components of the system work efficiently to accomplish their purpose.

5.2 Data flow of Dapp-Linkedin App

Data flow is which is the way of sending data to server and receive them to android application. The process is figured out below:

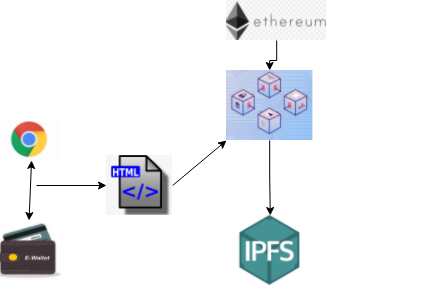


Figure 5.1: System Data Flow of Decentralized Social Network

Dispatcher

Callbacks

Actions

Web APi Utils

Web Api

Store

Actions Creators

React Views

Change Events + Store Queries

User Interactions

Figure 5.2: System Data Flow of Decentralized Social Network

5.3 Data view

In Our Dapps we show post of user using grid view. In a post there is two part one is text and other is image .As we request for user data , then the post of every user will be appeared in Grid view. In our Dapps we followed a excenent view of post so that grid view will be responsibe.

5.4 Security

In our Dapps we try to maintain best security practices. When ever a user try to post he/she must have to pay some gas fee and he must have to be connected with his metamask Etherum wallet. So if any user will not connect his metamask account he will not get the facility to post and even unable to see the post of others. We store the User Post data to IPFS(InterPlanetary File System) to secure the user Shared data .And IPFS will not give the main copy of the data rather it will give it a url hash value which is generated by IPFS system. To secure the user data to be shared by OSN system admin we used JSON Web Token (JWT) . Whenever a OSN admin pull all user data he/she must have to show a badge given the jwt authenticaiton system . If he shared the data and jwt token to others ,the surprising part of jwt token is that in every different login a different token will be given to admin .So there is no benifit of sharing every data to others, other’s will not get the data.

5.5 Version support

H As we building this website with the help of framework , we try to keep up to date of our every frameworks version up to date. Laravel 8, and solidity 0.5.0 version and web3.js version are supported by most of the web browser.

5.6 System Design

**Objective:** To change of the system detail into and operational system plan.

**Input:**  project goals, users requirements and specifications.

**Process:** Making alternatives to make economic benefits and building a qualityful system for major uses.

**Output:** system design, schedule, software and hardware requirements.

Fig 5.1: Elements of system [13]

5.7 A general Model of software design process

5.8   Flow chart Diagram

5.8.1 Flow Chart Diagram for Posts List

**Start**

**Deal Successfull , reading trading Information , Get hash**

**Log in to the Ipfs network via file hash and enter file hash**

Read Contract , the user participations in the transaction ?

**Transaction failure**

**Go to the Dapps**

**End**

Figure 5.3: Teacher Panel Activity diagram of the system.

5.8.2 Flow Chart Diagram for User Posting panel

**Start**

**Requestor signs across request transaction**

Is requestor’s key is connected with blockchain

**NNO**

**Drop transaction**

yes

Is requestor’s samrt contract is ok?

**Post Unsuccessfull**

**Post in ipfs**

**End**

Figure 5.4: Student Panel Activity diagram of the system.

5.8.3 Flow Chart Diagram for Admin Panel

**Start**

**User post list**

**Bearer token in APi?**

**Passport token**

**Passport**

**User list**

**post**

**End**

Figure 5.5: Admin Activity diagram of the system.

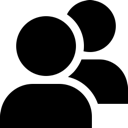
5.9   Use Case Diagram

5.9.1 Use Case Diagram for Post Insert Panel

User Verification with pirvate key & Sign-in

Meta Mask Connected

Access to Ethureum coins

****

Participate in Transaction

Pay the Gas Price

**User**

**f**

Share Post with Image

Image insert in IPFS

Post in OSN system

Figure 5.6: Use Case diagram for Teacher Panel

5.9.3 Use Case Diagram for OSN Admin

Admin Login

OSN system access

Ganache user list

Meta Mask Connected

User Post

****

Token in pocket

Manage user’s Post

**Admin**

Manage official notices.

Manage department forum.

Manage faculty information.

Sign-out

Figure 5.8: Use Case diagram for Admin Panel

5.10 Entity Relationship Diagram

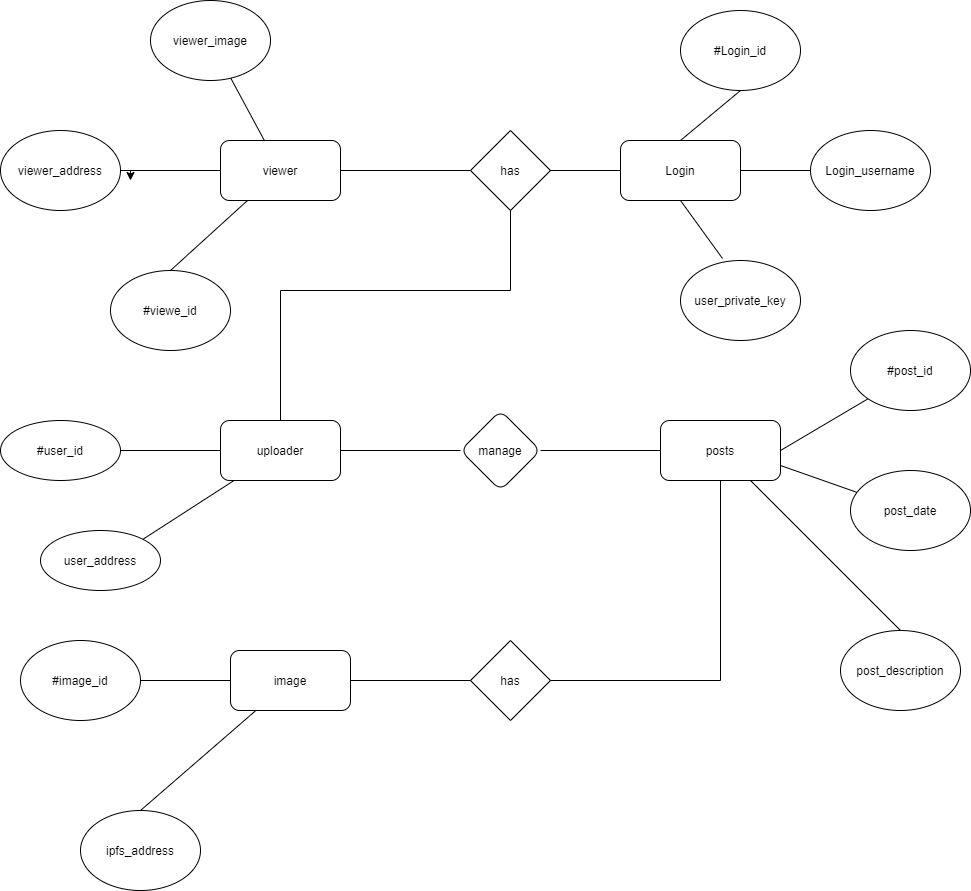


Figure 5.9: Entity Relationship Diagram

5.10.1 Logical Schema

* admin ( id, name , email, password , Bearer Token )
* User (id, name , email, email\_verified\_at , password , remember\_token , created\_at , updated\_at)
* Post(id, user\_id , title , image , created\_at , updated\_at )

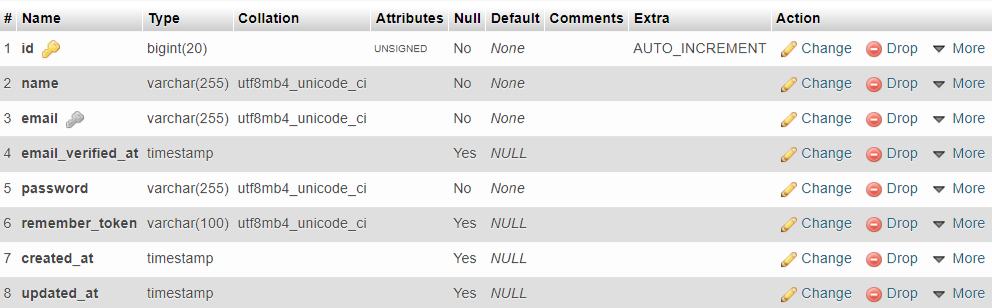


Fig 5.11 : Table (Admin)

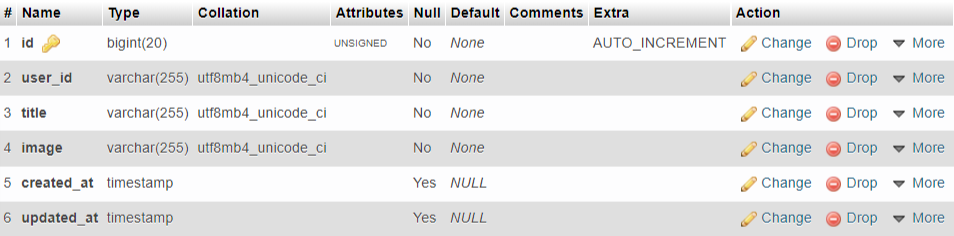


Fig 5.12 : Table ( Posts)



Fig 5.13 : Table (Admin access\_tokens )

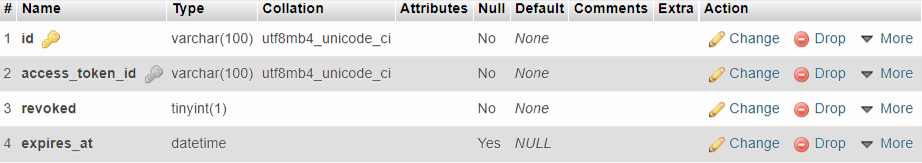


Fig 5.15 : Table ( Admin Token refresh )

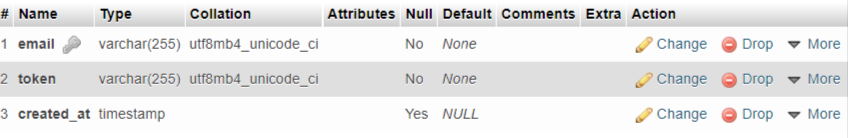
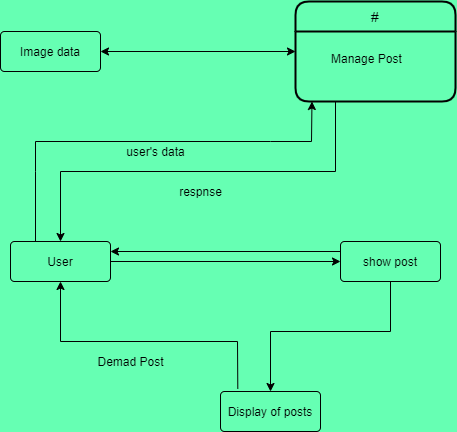


Fig 5.14 : Table ( Admin Password reset )

5.11 Data flow diagram

5.11.1 Level 0 DFD



.11.2 Level 1 DFD for Admin

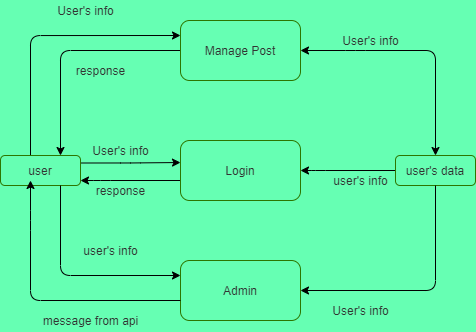


Figure 5.29: Level 1 Data Flow Diagram for Admin of the Application.

5.11.3 Level 1 DFD for Teacher

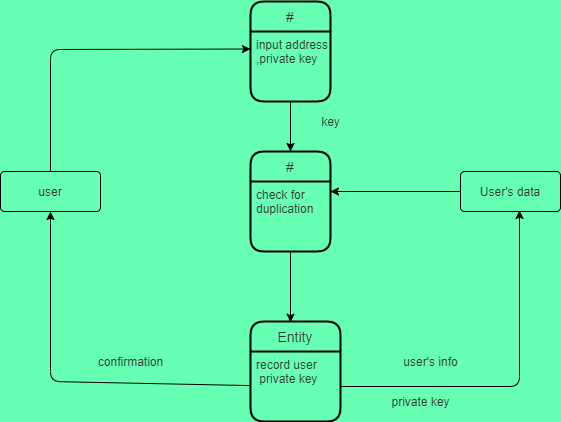
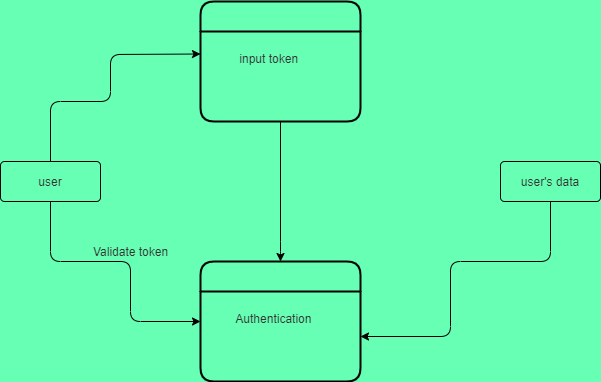


Figure 5.30: Level 1 Data Flow Diagram for Teacher Application.



chapter VI  
  
System Implementation & Testing

Android applications are spreading widely and are rapidly used as an operating system for Smartphone, tablet and other devices. Android development is now focusing on giving support to people in every other steps of life. By using our user friendly android application the students and the teachers will get an easier way to be connected with own department.

6.1 SYStem implementetaion in details

In OSN system there are 2 panels.

* User Panel
* OSN Owner Panel

6.1.1 User Panel

To use the User panel user must need to first open the blockchain server provided by Ganache .Without opening the Ganache the user database provided by blockchain terminal will not be accessed . When Ganache will be open it will create a connection between Ganache and Meta mask in browser .Then user signin in metamask by putting Private key mentioned in Account information in Ganache . When a user import his Account to meta mask by putting by private key , then account imported done . Now user has access to user panel . In our PWA user can able to do:

* **Share Post**
* All Posts – Every user can post in OSN system and they have to pay some gas fee to continue the post to be inserted in the system . whenever a user post in system his data will be uploaded in IPFS system .
* My Posts – The previous given post will be shown here. Can delete or modify any post.
* **Tip Amount**  – Can as in normal OSN system user’s post are promoted by likes and comment .In our blockchain system we provide user to promote other’s post by giving coin to other , we can call it Tip amount .
  + 1. OSN Owner Panel

This panel provides the unique facility to the Admin to control all the aspects of the whole system .This panel provide a user-secured data flow within the system. Viewing and managing all old data .it consists of the sub panel activity :

* **Post Control**
* All Post --

Admin can get all posts control with passing some security pathway to confirm that admin are not a malusious user to stole the data.

Admin can get all data of user and post data in this panel . He can delete the data too. .

6.2 UI Design Implementation

Here we will describe the UI Implementation into two main parts. These are:

1. User Panel
2. OSN Admin Panel

6.2.1 User Panel

Student panel is one of the major part of the SDMS application. Because we implement this system by giving the supreme priority to the students and teachers.

// add the scren shot of project

6.3 TESTING

Software testing is a process where in the software is evaluated to find the difference between the given input and expected output.Software testing is done to check if the software is working as expected or it is deviating from the original expectation defined.Accordingly to the SWEBOK: “Software testing consists of the dynamic verification that a program provides expected behaviors on a finite set of test cases, suitably selected from the usually infinite execution domain. “[10] .

6.3.1 Objectives of Testing

There have some different goals and objectives in software testing. The main objectives are as follows [16] -

1. To find failures and defects. .
2. Increase the likelihood that the test application will meet all of the requirements described
3. Increase the likelihood that the application intended for testing will work correctly under all circumstances
4. Helps to ensure that product is safe and secure for end-user/customer.

6.3.2Testing Details

The testing methodologies are provided below:

a)Unit testing  with white testing

b)Black box testing

**1.12.1Unit Testing:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Test Case | Attributes and Values | Expected Result | Result |
| 1 | posts?id=`id`-10 | GET method malicious request came through HTTP | should detect the malicious request and block the request then log the attacker details | Pass |
| 2 | User=Mark Zukar?=  Pass = markz?= | A POST method malicious request came through HTTP | should detect the malicious request and block the request then log the attacker details | Pass |
| 3 | /posts-all | A Blacklisted Spammer IP came through HTTP to client request | should detect the malicious request and block the request then log the attacker details | Pass |

* We have debugged all inputs which are mandatory as user inputs. We have tested another important field, file input. If file upload manager accepts all file type without specific one, then it can cause security issue to our database and server. We got error exception in debugger while checked with invalid or unknown file types.

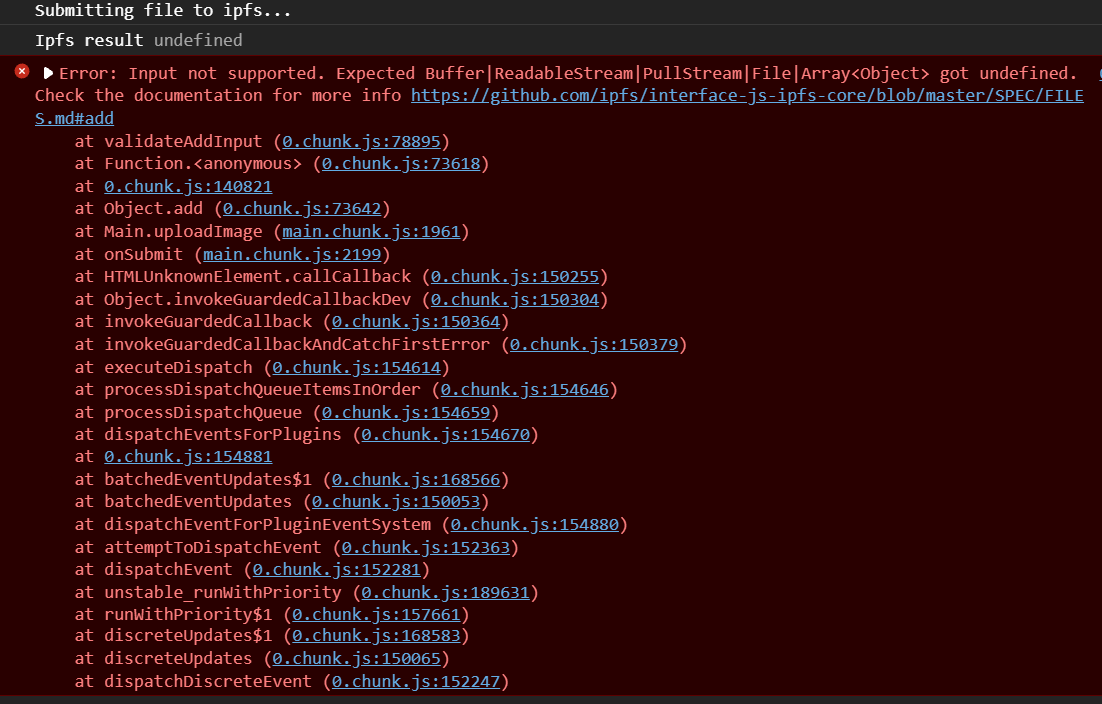




Fig 6.34: File type checking output

* App server connection request execution are tested with debugger network scheduler. We have completed this check without getting any error. At testing time it has started and finished execution with mentioned schedule request. No delay or error execution seen while testing.

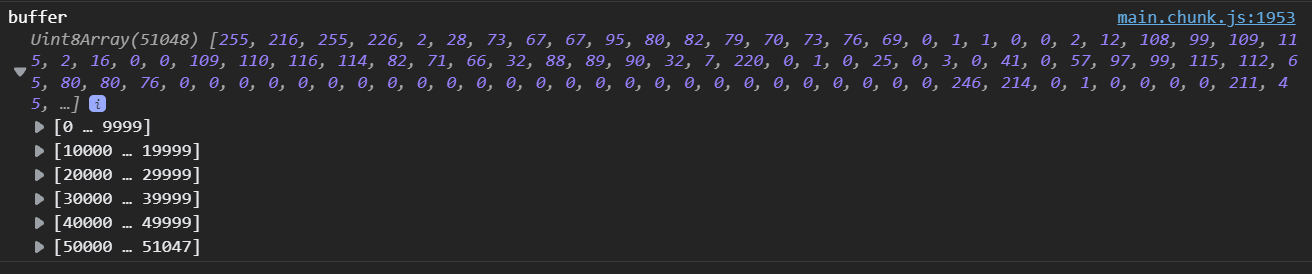
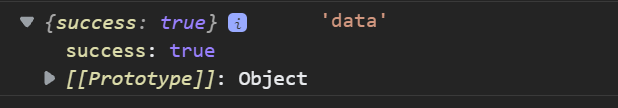
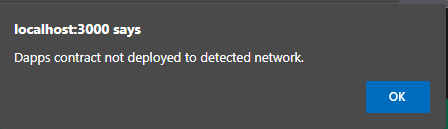


Fig 6.35: connection request execution testing output



* App connectivity tested manually. In this test we have checked application connection manually. As we have used connection detector we see this application can detect no internet connectivity or connectivity with very lower bandwidth. It automatically stops running the application with validation to avoid operation failure.



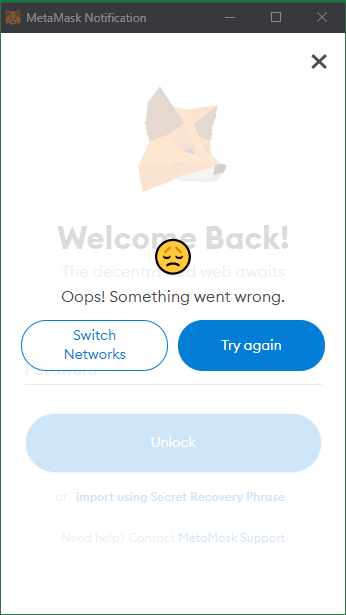


Fig 6.36: Output of manual connection check of application

Testing Black Box

In this form of assessment, constitutional system design is not counted. Requirements and functionality are the basis for tests.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Test Case | Attributes and Values | Expected Result | Result |
| 1 | posts?id=10 | A GET method request came through HTTP | should approve the request | Pass |
| 2 | User = admin  Pass = admin | A POST method request came through HTTP | should approve the request | Pass |
| 3 | /posts | A GET method request came through HTTP | should approve the request | Pass |
| 4 | Header: user.token | should approve the request | should approve this request | Pass |

Summary

In this chapter, the procedure and structure of the project have been explored. Besides method, technique, or approach of the designing and implementing the project has been discussed briefly

chapter VII  
  
Conclusion & future plan

7.1 Conclusion

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7.2 Contribution of the project

//

7.3 Future Plan

**//**

**REFERENCES**

[1] Blackboard Inc., Washington, D.C., U.S. *Private Chat in Blackboard Collaborate with the Ultra Experience* (June 1, 2018). [Online Video]. Available: [https://www.youtube.com/watch? v=xvOuyj\_vROw](https://www.youtube.com/watch?%20v=xvOuyj_vROw)

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**The End**