JSS MAHAVIDYAPEETHA
JSS SCIENCE AND TECHNOLOGY UNIVERSITY
SRI JAYACHAMARAJENDRA COLLEGE OF ENGINEERING

- Constituent College of JSS Science and Technology University
- Approved by AICTE
- Governed by the Grant-in-Aid Rules of Government of Karnataka
- Identified as lead institution for World Bank Assistance under TEQIP Scheme

DIAMOND JUBILEE YEAR :: 1963 - 2023

"Student Link: A Smart Campus platform for Students"

Report on Phase-I: Stage-II Project Work for 7th Semester

Bachelor of Engineering
In
Computer Science & Engineering

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January 2023

TABLE OF CONTENTS

1. AIM OF THE PROJECT

In order to design a smart campus, colleges and universities should define a common understanding and vision. We define a smart campus as a paradigm shift to leverage innovative next-generation technologies to create a “digitally connected” campus that:

• Drives positive outcomes by fostering dynamic engagement.
• Enables development and delivery of new business models and revenue streams.
• Fosters a digital culture to create and collect data, derive insights from that data, and utilize the insights.
• Provides faculty with information that allows them to foster positive interactions with students, other faculty members, ecosystem partners, and the community.
• Leverages new interactive learning models by using digitally augmented reality and virtual reality technologies.
• Improves operational efficiency and effectiveness of current education business models continually through state-of-the-art technologies and operating models.
• Leverages innovations (small and large) from other smart environments and industries.
• Evolves to create and maintain a digital campus of the future—the next-generation campus that continually modernizes iteratively over time.

2. OBJECTIVES

1. Develop a platform for record creation and collection, analysis, application and availability.
2. To create a login interface for students and institutes.
3. Enable delivery of records such as grade sheets by the institution.
4. Timestamp all the transactions carried out by the stakeholders

3. PROBLEM STATEMENT

For individuals, accurate and full educational records are a valuable asset. Educational documents have been digitized in recent years. There are still, however, two major problems that have not been overcome. One is to achieve reliable and privacy-preserving storage of educational records, while another is how to understand the sharing of educational records and ensure the protection of the process of sharing.

4. LITERATURE REVIEW

Creating a Student's Profile using Blockchain Technology :

https://www.researchgate.net/publication/33441854

1The research paper deals with data extraction and its security. Data collection is a very crucial process in the higher education sector because of its volume and veracity. The data must be scrutinized and secured with high levels of security mechanisms. Blockchain is one of the most influential technologies that has transformed the way data is perceived. It has many of its applications in education mainly in storing a student's profile to be precise.

Online College Portal:

https://inpressco.com/wp-content/uploads/2015/04/Paper69976-980.pdf

Online College Portal system aims to improve the efficiency of college information management, and the main function is managing and maintaining information and notifications. The administrator and students are two major functional requirements in the system. The Administrator will be given more access (enable/disable/ update) as compared to users. This paper assists in automating the existing manual system. This is paperless work. It can be monitored and controlled remotely. It reduces the manpower required and provides accurate information. Malpractice can be reduced and the portal can be made more authentic.

5. IMPLEMENTATION

Many applications in smart campus require the overlapping and interactions over multiple domains, which promotes the technology fusion towards the common smart development goal. The concept and scope of the domain used in the developed module is introduced below.

1. BLOCKCHAIN

The blockchain technology is used in our proposal to ensure the protection and reliability of data storage, while the blockchain's smart contracts are used to manage the storage and sharing method. The off-chain database stores the original educational records in encrypted form more specifically, while the records' hash information is stored on the blockchain. To ensure the protection of data storage, the off-chain records are regularly anchored with the hash data on the blockchain. Cryptography approaches are used to manage the encryption of documents and digital signature of messages. The system incorporates a WebApp based interface for the concerned parties involved in the transaction to communicate in an effective manner thereby providing a base for decentralized approach.

Technology used

1. Ethereum - Ganache CLI
2. Web3
3. Solidity
4. IPFS
5. Truffle

Ganache is used for setting up a personal Ethereum Blockchain for testing your Solidity contracts.Ganache is used in our project in order to deploy the smart contracts of the student profile.We created two smart contracts SimpleStorage.sol and Education Contract.sol and deployed it to the local Blockchain provided by Ganache.

Truffle is a one-stop solution for building DApps: Compiling Contracts, Deploying Contracts, Injecting it into a web app, Creating front-end for DApps and Testing. It is a Development Environment, Testing Framework and Asset pipeline for Ethereum Blockchains.

IPFS is a distributed system for storing and accessing files, websites, applications, and data. Blockchain is a decentralized data management platform that provides immutability, therefore it is a good choice to support file traceability metadata on a distributed file system like IPFS.

2. FRONT END

The user interface used to interact with the user is developed the using the following

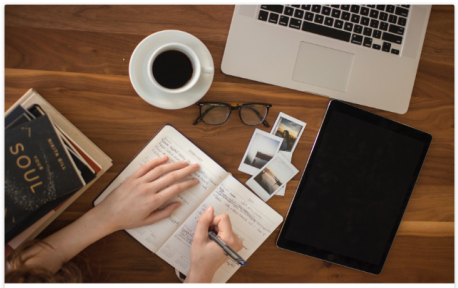
1. ReactJS - Web language
2. Bootstrap - Framework

The login interface for student and institute and the record dashboard page are developed using the same.

```
pragma solidity >=0.4.22 <0.7.0;
pragma experimental ABIEncoderV2;

contract SimpleStorage {
    struct RecordDetails {
        string record_id;
        string timestamp;
        string record_code;
        string description;
    }

    RecordDetails[] public record;
    mapping(address => RecordDetails[]) public institute;

    function addrecordReport(string memory _record_id,address institute_id, string memory _timestamp, string memory _record_code, string memory _description) public returns(uint)
    {
        institute[institute_id].push(RecordDetails(_record_id,_timestamp,_record_code,_description));
        return 1;
    }
    function getAllrecordDetails(address _institute_id) public view returns (RecordDetails[] memory)
    {
        RecordDetails[] memory id = new RecordDetails[](institute[_institute_id].length);
        for (uint i = 0; i < institute[_institute_id].length; i++) {
            RecordDetails storage temprecord = institute[_institute_id][i];
            id[i] = temprecord;
        }
        return id;
    }
}
```

```
pragma solidity ^0.5.0;
pragma experimental ABIEncoderV2;

contract EducationContract {
    struct RecordDetails {
        string record_id;
        string record_name;
        string description;
        string timestamp;
        string ipfsHash;
    }

    RecordDetails[] public record;
    mapping(address => RecordDetails[]) public students;

    function addReport(string memory _record_id,address _student, string memory _record_name, string memory _description, string memory _timestamp, string memory _ipfsHash) public returns(uint)
    {

        students[_student].push(RecordDetails(_record_id,_record_name,_description,_timestamp,_ipfsHash));
        return 1;
    }

    function getAllrecordDetails(address _id) public view returns (RecordDetails[] memory)
    {
        RecordDetails[] memory id = new RecordDetails[](students[_id].length);
        for (uint i = 0; i < students[_id].length; i++) {
            RecordDetails storage temprecord = students[_id][i];
            id[i] = temprecord;
        }
        return id;
    }

}
```

6. SNAPSHOTS OF RESULTS



Sign In

Login ID

Password

Student Institute

SIGN IN!

Records Home Request Record Log out

List of records

Institute ID	Record Name	Description	Created Timestamp

No records!

Ganache

ACCOUNTS BLOCKS TRANSACTIONS CONTRACTS EVENTS LOGS

SEARCH FOR BLOCK NUMBERS OR TX HASHES

CURRENT BLOCK	GAS PRICE	GAS LIMIT	HARDFORK	NETWORK ID	RPC SERVER	MINING STATUS	WORKSPACE	
7	20000000000	6721975	MUIRGLACIER	5777	HTTP://127.0.0.1:7545	AUTOMINING	ROUGH-SWING	SWITCH

TX HASH
0×9a6d58f8defbe067bee9d03cd0a48f39130569ea874f5de39bbecdf5d3e81d70 CONTRACT CALL

FROM ADDRESS	TO CONTRACT ADDRESS	GAS USED	VALUE
0×100d967Bc54e9EB9f644FFdb9AC2e967Aa1b6252	0×2bE959C99f0635070CAC58267a94a230020782D2	196608	0

TX HASH
0×c499bbbf6b76caf5cefd694339f9edf16247532c068e6f8f9ff3cc96dae21fa9 CONTRACT CALL

FROM ADDRESS	TO CONTRACT ADDRESS	GAS USED	VALUE
0×4726eC2cD91aF098627f04B7abbf5f50131233A4	0×50A86e558d7D075F82Bd678c6Fe404CC4597BFA6	98719	0

TX HASH
0×e9da0d0d297a9078bcaa820928a75fa137b35d4ede1a40cf634b91220f7c1bd5 CONTRACT CALL

FROM ADDRESS	TO CONTRACT ADDRESS	GAS USED	VALUE
0×4726eC2cD91aF098627f04B7abbf5f50131233A4	0×50A86e558d7D075F82Bd678c6Fe404CC4597BFA6	113719	0

TX HASH
0×8244bf5a67a467b7e82da0014d43afa8e009e2d9dd702e13c6aa147e3c21fe90 CONTRACT CALL

FROM ADDRESS	TO CONTRACT ADDRESS	GAS USED	VALUE
0×4726eC2cD91aF098627f04B7abbf5f50131233A4	0×54C76025FBe7EEa529919e59BB428B92c26d677F	42535	0

TX HASH
0×f67373e59d955b3bcda7f2385bcaf582e0321425cc4e63d25a83bbb2dde7f014 CONTRACT CREATION

FROM ADDRESS	CREATED CONTRACT ADDRESS	GAS USED	VALUE

7. FUTURE WORK PLANNED FOR PHASE II

Phase 6: Integrating the frontend for the digital student profile system to smart contracts deployed on blockchain.

Phase 7: Creating the Interface for the Hostel management .

Phase 8: Creating Club Zone interface.

Phase 9: Creating bots for various clubs by collecting information from clubs.

Phase 10: Integrating campus navigation module and placement portal of the college.

Phase 11: Final deployment.

8. SOCIAL RELEVANCE OF PROJECT

For individuals, accurate and full educational records are a valuable asset. Educational documents have been digitized in recent years. There are still, however, two major problems that have not been overcome. One is to achieve reliable and privacy-preserving storage of educational records, while another is how to understand the sharing of educational records and ensure the protection of the process of sharing. In this paper , we propose a scheme for educational records based on blockchain storage and sharing, which incorporates blockchain, storage database and cryptography techniques to create a reliable and protected setting.

9. CONCLUSION

The higher education landscape is at the crossroads of an amazing digital shift. Higher education is faced with complex disruption from a changing student body who are digital natives expecting a more intuitive experience that fosters positive outcomes. This is where a digital campus, also referred to as a smart campus, plays a role in transforming the lives it touches. The phrase "smart campus" refers to academic institutions that seamlessly integrate next-generation technologies into their infrastructure. It allows for the creation of a "digitally connected" institution that can improve the on-campus experience, boost operational effectiveness, and deliver education that anyone can access right away.

10. REFERENCES

1. Online College Portal:
(https://inpressco.com/wp-content/uploads/2015/04/Paper69976-980.pdf)

2. Creating student's profile using blockchain technology
(https://www.researchgate.net/publication/334418541)