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# A Secure and Protect Personal Health & Insurance Record by Using Blockchain Technology

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***Abstract:*** In this paper Patient can access his/her records anytime anywhere through the portal. Patient can grant/revoke access to doctors. Doctor can access the records of the patients who he is treating anytime. Doctor needs to request other patients if he wants to access their records. Patients can grant access to doctors by sharing special key/OTP with doctors. The records are encrypted and stored in the form of Hash values in the ledger. The frequency of healthcare insurance scams is increasing year after year, according to this study from the insurance side, causing great anxiety in society. Fabricating information, concealing third-party liabilities, falsifying an electronic bill, and so on are all examples of healthcare insurance fraud. The current healthcare insurance system necessitates a significant amount of people and resources, putting a strain on the system. In this project, we propose a blockchain-based healthcare insurance anti-fraud system in response to the many types of healthcare insurance fraud. The blockchain system includes more than hundreds-command centers, public security traffic control departments, judicial organs, healthcare insurance agencies, and other entities.

***Index Terms*** **- Healthcare, Blockchain Technology, Insurance**

## I. INTRODUCTION

Blockchain is a system for decentralized transaction and data management. It is a relatively advanced technology with a wide application that is healthcare, insurance and supply chain management etc. the aim of this Project is to analyses the work carried out in healthcare and insurance using blockchain technology for security and privacy of patient's health records. Medical and healthcare services are one of the most visible and important services that must be delivered on time and in a secure and safe manner.

Patients are typically unaware of which entities are storing and using their medical data without their knowledge in today's healthcare systems, which are largely built on centralized servers where multiple entities within the network require permission to access the medical information.

The rate of healthcare insurance fraud, as well as the number of people implicated in the scams, has increased year after year in the Covid19 situation, raising widespread alarm in society. Faking information, concealing third-party liability, and falsifying electronic bills are examples of common scams.

When faking information, the criminal exploits the fact that healthcare insurance systems in different cities are not linked, allowing receipts or bills to be used as evidence for insurance claims. However, because the healthcare insurance systems are not linked, it is extremely difficult to check the veracity of receipts and bills. The expense of hospitalization for injuries caused by a third-party liability accident is not reimbursed in the concealing third-party liability accident fraud.

The investigation and collection of evidence in such cases has long been a challenge for healthcare insurance companies. Due to variables such as first-aid failure, it is impossible to ensure sufficient people and material resources under the current healthcare insurance supervision system. Electronic bills or receipts could be altered or used for multiple insurance claims in the instance of faked electronic bills.

Validating bills and receipts necessitates a significant amount of manpower and material resources, and the current healthcare insurance oversight system is tough to maintain. We propose a blockchain-based approach to detect healthcare insurance fraud to address these issues.

When compared to traditional information technology, Blockchain technology has the properties of decentralization, tamper resistance, and traceability. To achieve decentralization, tamper protection, and traceability in healthcare insurance fraud, blockchain technology can be used to form a medical insurance anti-fraud alliance with 120 command centres, public security traffic control departments, judicial organs, and healthcare insurance agencies.

## II. Literature Review:

Wei Liu and Qinyong Yu investigated blockchain as a tool to combat healthcare insurance fraud. They covered many types of studies in their study, and the majority of the work in this study was done utilizing blockchain, which increased the security and privacy of healthcare insurance data while also overcoming difficulties. They've reached an agreement on how blockchain could be a better fit for handling health-care records on the cloud while ensuring data security and privacy.

Rouhani et al. devised a method for dealing with the restrictions of permissioned and permissionless blockchains. For patient-controlled healthcare data management, they employed an instance of the Hyperledger platform [6].
Wu and Tsai conducted a literature study on healthcare management systems and presented two network security techniques. They also advocated for the use of a distributed system for healthcare data management and the establishment of healthcare data rules [7].

Med Chain is a technique proposed by Shen et al. for sharing medical data utilizing blockchain and peer-to-peer networks. They created this system to collect patient data from IoT sensors and other mobile apps as well as healthcare data generated by medical examinations [8].

Khezr et al. explored how blockchain technology could be used to tackle different challenges in the healthcare management system. They discussed current research on healthcare using distributed ledger technology, as well as several potential medical use cases in which blockchain technology might play a key part in streamlining the process. They've also proposed an Internet of Things (IoT) delivery system based on networking protocols [9].

| Sr No. | Title / Author | Working | Conclusion |
|---|---|---|---|
| 1. | Healthcare Management System using Blockchain, Khezr et al. | They discussed current research on healthcare using distributed ledger technology, as well as several potential medical use cases in which blockchain technology might play a key part in streamlining the process. | They talked about how blockchain technology could help solve problems in the healthcare management system. They've also presented a networking protocol-based IoMT delivery system. |
| 2. | Healthcare Data Security and Privacy using Blockchain, Litchfield et al. | It increased the security and privacy of healthcare data and solved problems by utilizing blockchain technology. | In addition to conducting a poll on healthcare difficulties, they explored issues related to healthcare data security and privacy and advised using blockchain to address these issues. |
| 3. | Approach to address limitations of permission and permissionless Blockchain, Rouhani et al. | They deployed a Hyperledger platform instance to manage patient-controlled healthcare data. | They devised a strategy to overcome the restrictions of permissioned and permission less blockchain. |
| 4. | Healthcare management systems with networking blockchain algorithms, Wu and Tsai | They advocated for the use of a distributed system for healthcare data management and the establishment of healthcare data rules. | They conducted a literature study on healthcare management systems and suggested two network security techniques. |
| 5. | A Blockchain-Based System for Anti-Fraud of Healthcare Insurance, Wei Liu & Qinyong Yu | They covered many types of studies in their analysis, and the majority of the work in this study used blockchain to improve the security and privacy of healthcare insurance data and resolve concerns. | They looked into blockchain as a solution to efficiently manage healthcare and insurance data. |

## III. PROPOSED SYSTEM ARCHITECTURE

The frequency of healthcare insurance scams is increasing year after year, according to this study from the insurance side, causing great anxiety in society. Fabricating information, concealing third-party liabilities, falsifying an electronic bill, and so on are all examples of healthcare insurance fraud. The current healthcare insurance system necessitates a significant amount of people and resources, putting a strain on the system.

In this work, we suggest a blockchain-based healthcare insurance anti-fraud system, based on the many types of healthcare insurance fraud. The blockchain system includes command centres, public security traffic control departments, judicial organs, healthcare insurance agencies, and other institutions. And, in the medical process, information from medical expenses, prescriptions, inspection reports, and treatment records is used to create a healthcare insurance blockchain. The system offers medical process inspection, excessive medical behavior analysis, third-party liability inspection, and medical invoice data review services, all of which are based on the blockchain.

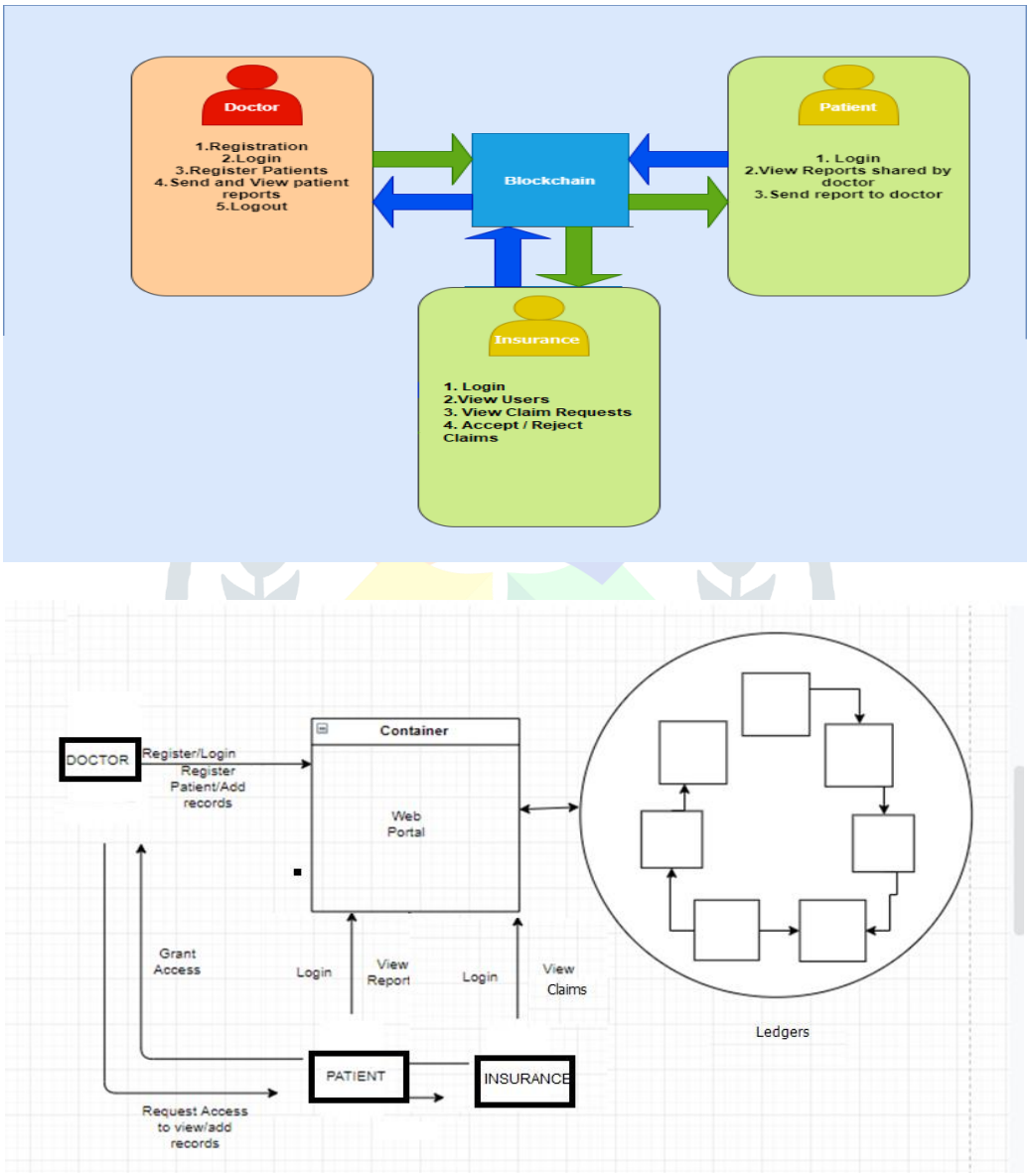


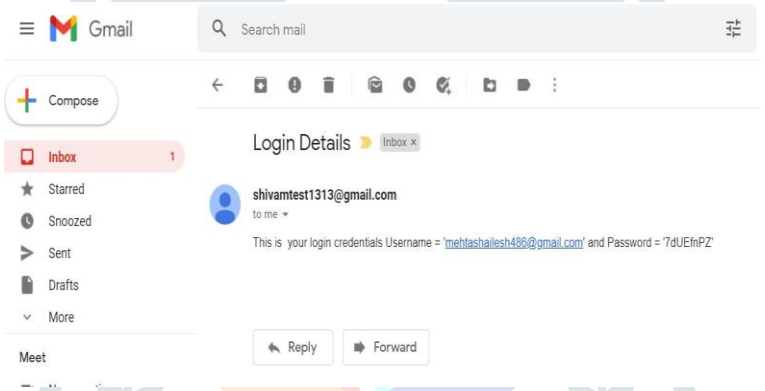

Fig 1: Proposed System Block Diagram

## IV. IMPLEMENTATION AND RESULT

The implementation of this paper uses the following steps:

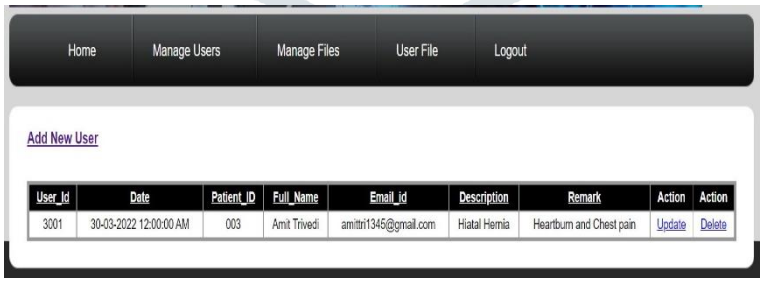
a. In the Login Panel where Doctor can login to his profile. First, he/she needs to create their Profile on the portal by clicking on New Registration he/she can create their profile. Firstly, Doctor needs to Register himself on the portal in order to access this portal. Here Doctor Needs to add some sort of details such as Full Name, Degree, Contact Number, Email ID, Address and Specialization etc.


**b. Login Credentials on Email of The Doctor/ Creating Patient Profile:** After that the Login Details such Username and Password will be sent over the Registered Email of the Doctor. After receiving the credentials on email. He can Login to the portal with help of Username and Password.




Only Doctor has a right to create the patient profile. These rights are only provided to doctor because in order to avoid fake profile creation and only genuine or needed patient should be available at the portal. by Clicking on Manage User Section there is Add Patient Option to create new patient profile. By Adding Patient's Full Name, Patient ID, Contact Number, Email ID, Address and Description of the Disease followed by Remarks. The Login Details such Username and Password will be sent over the Registered Email of the Patient.

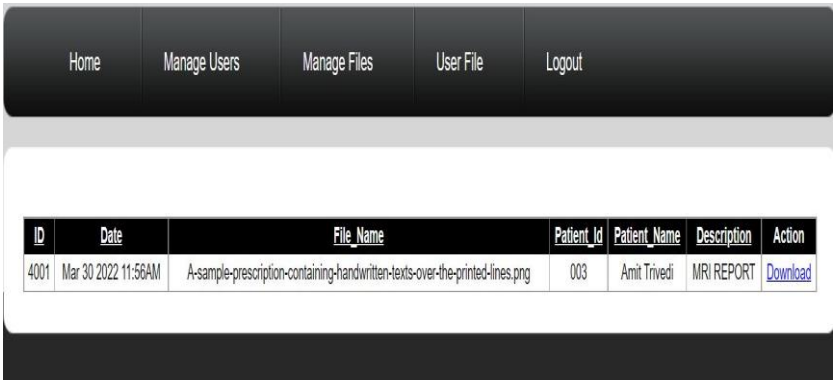
**C. Manage User Section:** In Manage User Section the Doctor can add Patient, Update the Existing Information of the patient. and delete the Patient details after treatment etc. Here Deleting the Patient details means after treatment the particular patient info shared with the doctor has been deleted but the Patient Profile with Complete information and Medical History will be Stored/available in the portal always.




**Manage file Section:** In this Section Doctor can manage the details of the patients. Here Doctor can manage the files of different patient who are under his treatments only. Details such as Patient id, Patient name, File Name followed by Description are mentioned in this section.

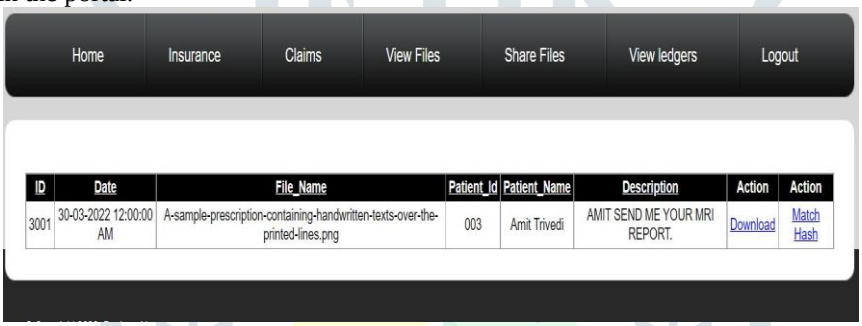
In Manage section, Doctor can select the Patient Id and the Patient name will be displayed automatically. After selecting the prescription file and by giving some remarks to the patient Doctor can upload the prescription file to certain Patient.

**User File Section:** In User files the doctor can view the file or the reports shared by the patients followed by Patient ID and Patient Name.



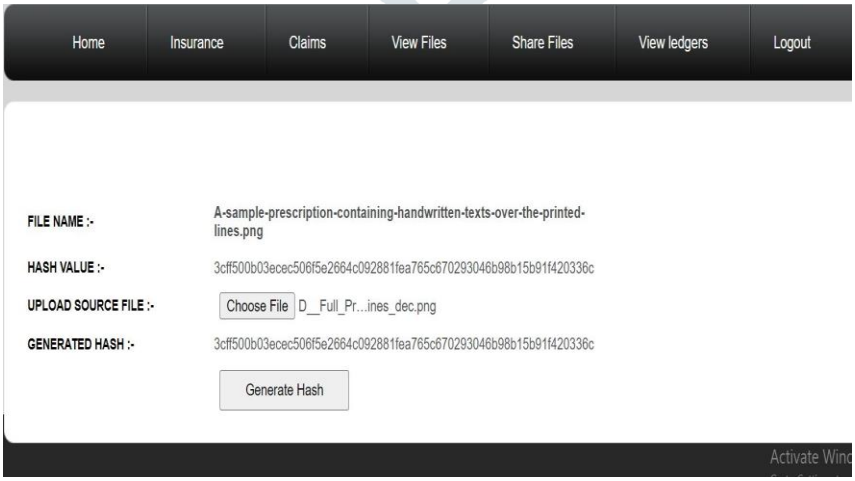

After patient uploaded the reports to the doctor then the doctor will receive an OTP to download the reports shared by the patients. Only after Entering the correct OTP the Doctor can download the reports of the patients. Else it will deny to download the file.

**Patient Module:**
This is Login Panel where Patient can login to his profile. After getting the credentials on the email of the Patient They Can Access their profile within the portal.

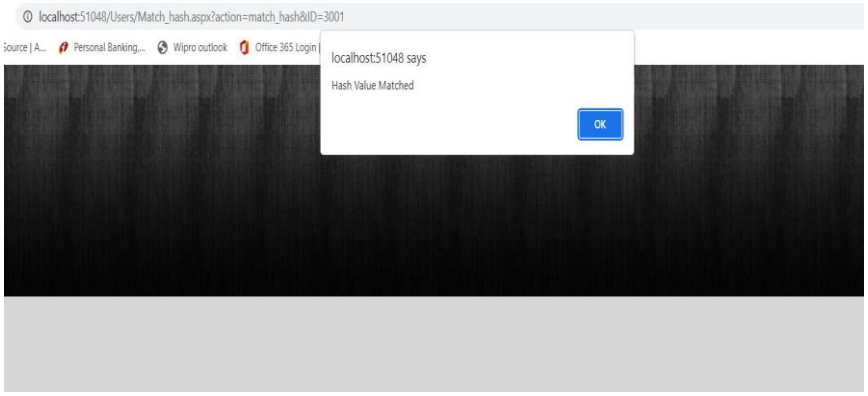



In View files the Patient can view the file or the Prescription shared by the Doctor. By clicking the Download Button Patient can download the prescription file. and also, Patient can check or cross verify the Integrity of the file by Clicking on Match Hash Button. After Doctor uploaded the Prescription to the patient then the patient will receive an OTP to download the Prescription shared by the Doctor. Only after Entering the correct OTP the Patient can download the Prescription from the Doctor. else it will deny to download the file.

**Integrity Check of Files:**
By Clicking on the Match Hash Button, the Patient can also check the integrity of Downloaded File provided by the doctor. After selecting the downloaded file just click on generate hash button then it will check the Integrity of the file.

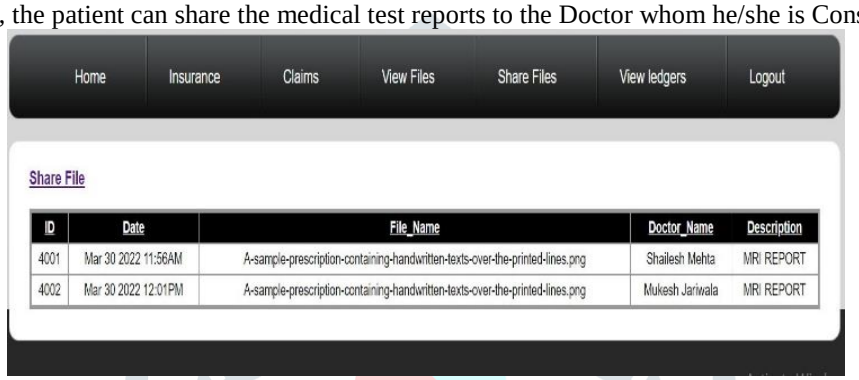


**To Hash Value Matched:**
If the File is Authentic and If the Hash Value is matched then this pop up will be shown.

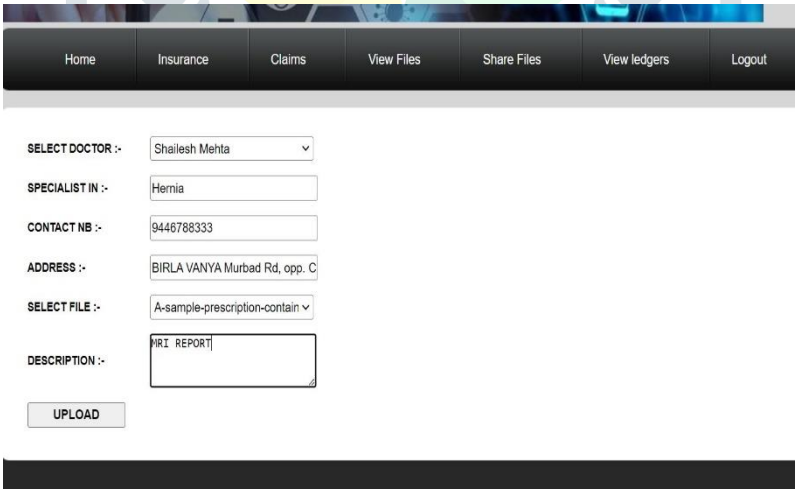



If the File is Not Authentic and If the Hash Value is not matched then this pop up will come.

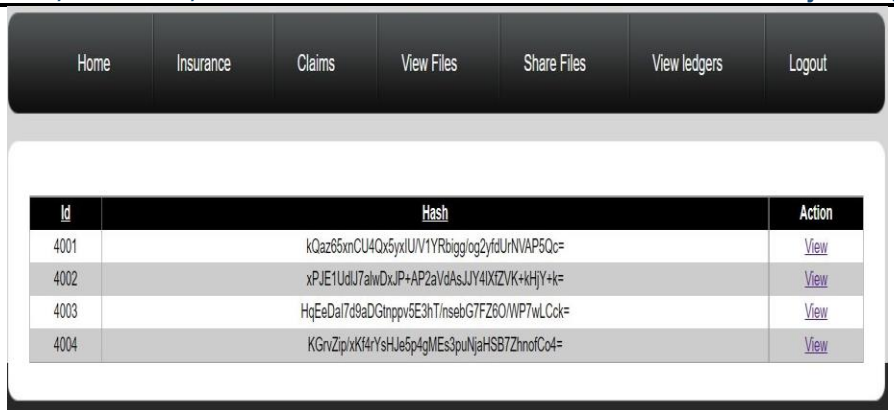
**To Share Files Section:**
In the Share Files section, the patient can share the medical test reports to the Doctor whom he/she is Consulting.




**To Share Report:**
The patient will select the doctor name then automatically all the remaining details of the doctor will be Generated such as Specialist In, Contact No, Address etc . After selecting the required reports the patient can upload the reports to the doctor Hassel free.

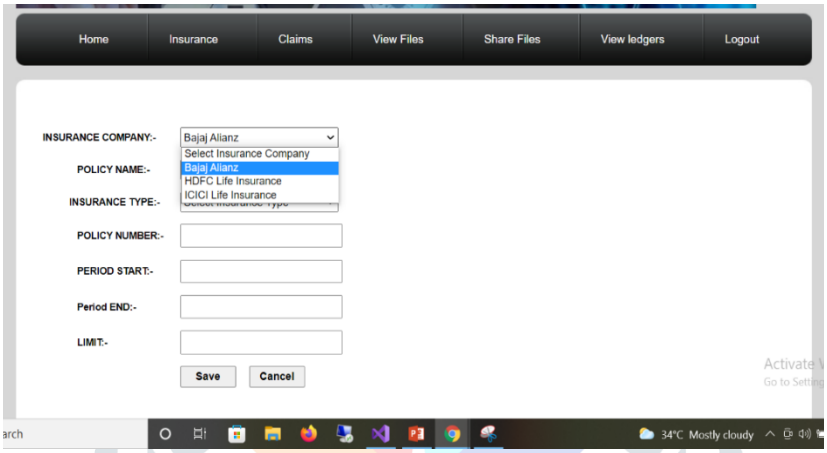



**To View Ledger Section:**
In this Section, whatever activity has been performed by the patient in the portal has been converted into hash format.
So, the transactions are accepted as input and passed through a hashing algorithm that produces a fixed-size output. After Clicking on the Action Button Patient can see the Action performed on the portal by him.




**To Insurance Section:**

In this Section Patient can add details of the Insurance Purchased by him in earlier/past. Patient will select the Insurance company according to his personal preferences. We have got 3 Insurance Company Named as Bajaj Allianz , HDFC Life Insurance and ICICI Life Insurance.




Here Patient can select the Policy Name. After Filing the required details such as policy Number, Period Start Period end and Defining the Limit/Coverage of the Policy which Patient purchased in the past.

In the claim Section he can just claim the policy by adding his full name, contact no, Email ID, address, Description etc. After selecting the policy number company Name and Policy Name will be generated automatically. And patient need to specify the Claim Amount and Upload the Document e.g Bill /Invoice of the Treatment as well as medical reports. After that insurance company can login from his end and check the no of request available of user or patients.

**To View Claims Section:**

In the View Claim section, Insurance Company Officer can view the requested claims.
Followed by the policy number and Period of Start, Period of End of the policy and status of the claims. They can download the Documents provided by the Customer/Patient.
After performing the cross checks based upon their standards and Norms and to ensure the authenticity of the claim raised.
If the claim is approved, which means the documents are perfect and the claim is as per the policy coverage and within the sum insured limits then health insurance company approves the claim. At last the Insurance Company Officer can Approve or Reject the Claims.

## VI. CONCLUSION

Our smart contract-based healthcare management system has demonstrated how decentralization principles may be utilized in the medical ecosystem for large-scale data management and the automation of difficult medical operations using block chain technology. We present a novel method to medical record management that uses smart contracts to provide auditability, interoperability, and accessibility. This system, which is designed to record flexibility and granularity, allows for the sharing of patient data as well as incentives for medical researchers to support the system. We've presented block chain technology's possible applications in the management of health and insurance data. Based on the needs from a medical standpoint, we created a system for data administration and sharing. Our initiative has demonstrated how decentralisation principles may be utilised in the medical/insurance ecosystem for large-scale data management and to speed complex medical procedures using blockchain technology. Patients can also keep track of their records more easily because they just have to maintain one profile.

## ACKNOWLEDGMENT

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