HealthCare Manager

This application will help users/patients to connect with their doctors and getting immediate and remote assistance for their health. This may also act as a health tracker.

The application aims to solve the problem of doctors' availability at this time of crisis. As most of the countries are going through lockdown at the moment, and doctors are working on finding a cure for COVID-19, it became very difficult for patients to get a checkup even if they have common flu.
This application will help solve this problem, by providing a platform for patients and doctors to interact and share details and prescriptions so that the patient can get assistance anytime.
This application will not only be useful at such critical times but can also act as a health monitoring device for patients who require regular monitoring and checkup.

We overall faced 3 major challenges:
1) Storing web3 and contract instances in local storage because of their cyclic redundancies. Found a workaround by removing cyclic objects.
2) Deploying smart contracts on the Matic Network. Solved after discussing the same with the Matic Team.
3) CORS error with IPFS storage. Found a solution on google.

Steps performed by the patient:

- The patient register himself as a patient on the Registration tab
- After registration, he can upload his health care data in the form of excel files, pdf, docx, or images. This data can be recorded any smart device that the patient may have, or can be compiled by the patient or any relative.
- Once the patient uploads the data, he will get a unique hash that points to his data on the IPFS blockchain. The data is encrypted using AES encryption so that it is not understandable by anyone.
- The patient can then share this unique hash with his doctor (who is also registered on this platform).
- The doctor can then view this data and send the prescription accordingly.
- The doctors are incentivized using the token mechanism (HealthToken) which we have introduced.

Steps performed by the doctor:

- The doctor register himself as a doctor with his fee (fee to be paid by the patients to get diagnosed and get a prescription).
- After registration, he can view the files which his patients have sent him and then he can diagnose and send the prescriptions accordingly.
- After the doctor sends the prescription, he will receive his fee in HealthToken.

Incentive mechanism:

- We introduced native ERC20 tokens, named HealthToken.
- On first registration, users (both patient and doctor) may receive 1000 free tokens (owner can send it to each user only once) so that they can use the platform (this may act as ICO)
- When the user sends his data to the doctor, the doctor's fee is automatically deducted from his account and is stored securely in the Smart Contract.
- The stored fee is only released and sent to the doctor only when he sends the prescription to the patient.

Technologies used:

- IPFS:
    - IPFS is a data storing platform and is used to store the patient's data.
    - Storing patient's data would be very costly and not very efficient which made us choose IPFS for data storage.
    - The IPFS hashes are generated according to the content of the files so it is practically impossible for any random user to find the unique hash.
    - By any chance, if any hacker finds out the file hash and tries to steal the data from IPFS, then he will have to decrypt the AES encrypted file which is another practically impossible task.
    - The patient can share his file hashes with the doctor. To view those files, the doctor will have to download files using our platform only so as to decrypt it. Hence allowing only legit users to access the sensitive data.
- Truffle:
    - Solidity dApp development framework.
- Metamask:
    - Browser extension that acts as a bridge to connect ethereum network with browser.
- Matic:
    - It is a Layer 2 scaling solution that achieves scale by utilizing sidechains for off-chain computation.
    - It is used to remove the gas price for every transaction and to make the transactions faster and efficient.
    - Because of Matic Network, the application doesn't have any extract cost at the moment (0 gas for every transaction).

Testing Details:

Live Demo: https://tender-mclean-a3d648.netlify.com/
Matic TestNet link: https://testnetv3.matic.network

HealthToken Contract Address: 0x54d28562271De782B261807a01d1D2fb97417912
HealthCare Contract Address: 0x3750bE154260872270EbA56eEf89E78E6E21C1D9

Owner (The account that deployed the contract):
Address: 0x2B522cABE9950D1153c26C1b399B293CaA99FcF9
Private Key:
1aba488300a9d7297a315d127837be4219107c62c61966ecdf7a75431d75cc61

Doctor:
Address: 0x613e91209393D3adF227ddeFfd5A4FC3426733D4
Private Key:
d5797f17a2be6ea0ac5086651a68b8913fab126bacabbd7fe08f0a1c8bf339e6

Patient:
Address: 0x5Bf426E32d5D2691f4c06e0dE12FeC7B482acBc8
Private Key:
fbdb73a66289349b731b86b18780f44496ba55d6d994e09b3682e0ffc46bbf6b