A Blockchain Solution for Healthcare Industry

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SOFTWARE REQUIREMENT SPECIFICATION DOCUMENT

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Appendix A: Glossary

1.Introduction

1.1 Purpose

As a lot of businesses are moving towards the online platform due to the ongoing pandemic, the healthcare industry is one that is most directly affected by it. With transmission rates being high in hospitals, it becomes unsafe for patients to safely travel to their local hospitals for appointments and other procedures. Especially for the purpose of accessing their healthcare data, it can be more convenient and safe for people if there were a method through which they could send and receive their medical data with three guarantees - Confidentiality, Integrity and Availability. When it comes to medical data, it is imperative that strict confidentiality is maintained. In early 2020, over 120 million medical images and scan reports were exposed by computer hackers. This is just one of the many incidents that are happening throughout the state. It becomes clear to us that exposure of private healthcare data is a serious concern. Therefore, a blockchain based system that focuses on storage and retrieval of data securely by patients will be useful. This SRS document provides the description, features and requirements of such a system in a high level manner.

1.2 Document Conventions

Font : Times New Roman
Bullet points : Stakeholders and key mentions
SF : System Functionality
F : Feature

1.3 Intended Audience and Reading Suggestions

This document is self explanatory for any software professional who has a basic understanding of how blockchains work. This document contains the product scope, functions, use cases, design fundamentals, basic documentation, dependencies, Interface descriptions, Functional and Nonfunctional requirements along with some of the highlighting features of the product. The document can be

read in a linear fashion from top to bottom. If the professional who is reading this is searching for a particular element of the model such as UI design or requirements, he/she is free to directly jump over to the required section as every section is self explanatory.

1.4 Product Scope

The primary computational concept that is being used to solve the problem is the creation and maintenance of blockchains. In blockchains, each data is securely stored with a hash encryption in a data block and linked with each other to form chains of data. The primary benefit of this is that duplication or manipulation of blocks of data is not practically feasible as to change one block, the hash addresses and other attributes of all other blocks need to be correctly calculated and changed which requires very high computational power. Therefore, safety of data is ensured. This technique is widely used in FinTech (Financial Technology) for creation and trading of cryptocurrencies on the stock market. We have identified the potential of this technology in maintaining healthcare applications. It can be economically feasible and even profitable for healthcare institutions to make use of this technology rather than sticking on to their traditional legacy systems which are outdated and vulnerable.

1.5 References

1. T. Kumar, V. Ramani, I. Ahmad, A. Braeken, E. Harjula and M. Ylianttila, "Blockchain Utilization in Healthcare: Key Requirements and Challenges," 2018 IEEE 20th International Conference on e-Health Networking, Applications and Services (Healthcom), Ostrava, 2018, pp. 1-7, doi: 10.1109/HealthCom.2018.8531136.

2. Carlson, Kristofer. (2018). The Nakamoto Blockchain. 10.13140/RG.2.2.17991.34723.

2. Overall Description

2.1 Product Perspective

Even though conventional systems that use relational database models have been developed and implemented widely, there are still some drawbacks that come along with it. A blockchain model that stores data in a remote cloud server like IBM Cloud can be more secure and reliable. The product can either be a standalone system that acts as a third party application to the web portals of hospitals or be the main application through which patients directly interact.

2.2 Product Functions

- Provide a platform for patients, doctors and other healthcare professionals to securely search for, and access the required data.
- Store the data in cryptography aided blockchains and mine new blocks for future use.
- Share the data to third parties and clients of the patient such as their employer or insurance providers for determining insurance coverages.
- Make sure that incoming and outgoing data has proper access to external cloud storage platforms.
- Allow pharmacies to receive prescriptions from doctors and provide the required medicines to the patients
- Employ independent miners to create and verify hash codes of blocks and make sure that no malicious person(s) can manipulate or steal data.
- Allow medical researchers and data analysts to access specific data in order to find patterns and structures, thereby stimulating new innovations.
- Integrate personalised wearables such as Fitbit to share the user’s data such as heartbeat rate to the cloud system and trigger automatic warning if any anomaly is detected.

2.3 User Classes and Characteristics

- Patients - People who seek medical assistance are the primary customers of this product. Since storage and retrieval of patients' data is the main focus of this system, they are the most significant user class.
- Doctors - Physicians and other medical professionals need to access the data of patients during diagnosis and treatment to view the medical history of the patient in order to perform accurate treatment. They also can update the medical history of the patient and prescribe medicines and other assistance.
- Pharmacies - Sale of medicines can be automated by directly receiving prescriptions from doctors, thereby reducing misuse and overdose of drugs.
- Researchers and analysts - Scientists who use existing data to find patterns, perform experiments to create new medicines, equipment and procedures.
- Insurance Providers - Collect data of their clients (patients) in order to resolve medical insurance claims.
- Personal Wearable Manufacturers - To integrate and store data that the company has collected and warn when patient health is at risk.

2.4 Operating Environment

The application will be hosted on IBM cloud and will be made available on the internet for all the major browsers like Chrome, Safari, Firefox, Edge, etc. On mobile environments, it shall be available as an application that can be downloaded from Play Store/Apple Store. No additional frameworks are needed to use the application.

2.5 Design and Implementation Constraints

- Even though blockchain technology is widespread in the developed world, it is not the case here. Since the legality of bitcoins is questioned and debated by the Government, legal feasibility should be taken into account.
- If the number of users increases drastically, there will be storage issues as creation of new blocks is difficult and takes time.

- If cloud service is not secure and uninterrupted, the whole purpose of this application will be neglected.
- Transfer of data from the servers of the hospital to the application can take a long time. Data Integrity can become an issue when transferring from legacy systems.

2.6 User Documentation

Since the application is online, tutorials and FAQs will be provided in the website itself. The link to the documentation and tutorial is here : https://cloud.ibm.com/docs

2.7 Assumptions and Dependencies

- Independent miners who create, maintain and verify blocks that store the data.
- Third party cloud storage partner that helps to store and maintain the data.
- Portals and database systems of hospitals that are integrated into the application.
- Personal Wearables that access, send and receive data of patients.

3. External Interface Requirements

3.1 User Interfaces

UI plays a major role when it comes to easier navigation, pleasurable feel and customer/client satisfaction. A lot of abstraction concepts are applied inorder to hide the complex workloads behind the scenes and present the user a clean and consistent interface.

A lot of UI components are available but certain selected components are used in order to not flood the user with complex interfaces.

UI components :

Since, our platform primarily focuses on providing an administration framework along with access to specific scientific frameworks, we will be primarily providing drop-down lists, text boxes, labels, input fields, buttons, radio-buttons, check-boxes, toggles, message boxes.

UI design styles :

There have been so many advancements when it comes to providing users with graphic content that relaxes and kicks in the excitement and awe. Animated illustrations, microinteractions, 3D graphics in web and mobile UI, virtual reality and asymmetric layouts are some of the design styles we will employ to provide users access to a broader spectrum of experience.

3.2 Hardware Interfaces

Our product is to be built as both a mobile application and as a server based web application.

Supported device types include hand-held devices like mobile phones, tablets, laptops and desktops that are capable of running any one of the following environments.

- Windows
- Linux/Unix based Distros
- MacOS
- Android
- iOS

A web application is also developed for easier access of data remotely provided a stable internet connection is present. The web application is to be cross-compatible between the major browsers like Google Chrome , Microsoft Edge , Safari and Firefox.

Hardware level and Software level security are given the maximum priority to prevent data breaches and unauthorized entry.

Web Security protocols like TLS are used for encrypting and decrypting sensitive data like medical records to prevent snooping and man-in-the-middle attacks.

3.3 Software Interfaces

The product will be fully developed and deployed on IBM cloud using their latest technologies like IBM Watson, cloud DB2 and Node-Red.

Node-Red is a browser based editor that is used to easily connect different APIs and online services through a flow based approach.

A lot of APIs will be used in order to connect the database, scientific frameworks and other operations of the organizations for easy access and maintenance.

3.4 Communications Interfaces

HTTPS (HTTP with TLS) will be used as the communication protocol for the web application as well as the local mobile application. Stakeholders of the organization will be provided with official email IDs pertaining to the domain of the organization. Login credentials will be stored in the form of a hash to prevent bruteforce dictionary attacks. Salting is also used to safeguard passwords or other credentials in storage by appending a set of characters to the entered credentials and passing it to a hash function thereby decreasing the chances of an attack.

4. System Features

- **Company shareholders:**

The investors in the enterprise providing the digital solution will be a stakeholder here.

SF- All units of the software product function properly, Maintain financial records. Since shareholders invest in the company for profits, first and foremost

they would want to see a fully functional software product system which is one of the core functionalities.

F - Apart from that, an in-built ERP system for third party providers for further integration with their respective API's. A tool to maintain financial records for shareholders analysis.

- **Cloud service providers:**

The providers of digital cloud infrastructure, to secure data storage.

SF - Provide secure access to the digital cloud.

F - Platform to access and use the blockchain's distributed ledger

- **Medical researchers:**

The academicians and researchers who actively study and experiment with diseases, their causes and effects.

SF - Access to bio-records in a time critical and secure manner.

F - A system that briefs more about where(from which patient) data came from, rather than an anonymously aggregated dataset, by reading one particular block.

- **Physicians:**

The doctors who diagnose and prescribe medicines.

SF - By adding the details of the patient/ the treatment availed, accessing the patients' medical history. Cloud databases can be leveraged for this purpose.

F - A simple, easy to use and robust interface to access the records.

- **Patients:**

It can perhaps be the largest segment of stakeholders. The patients avail the healthcare solutions when they are sick.

SF - Timely and proper access to a healthcare professional, tailored to their disease/ body condition. Data of patients including their history of ailments, diagnoses, prescriptions need to be stored and accessed securely.

F - Full and unambiguous control over how their data is collected, used and shared.

- **Insurance providers:**

Companies that reimburse the hospital bills under health insurance schemes, on a subscription based-model.

SF - Access to the medical record and details of service availed, for seamless reimbursement.

F- To be able to provide insurance to their clients through the system. They can stamp the block of the patient, for future prevention against tampering and thus preventing insurance fraud/theft.

- **Emergency service providers:**

The first responders. Most likely to be ambulance drivers, nurses who administer first aid, and the like.

SF - They can benefit by having time-critical access to data, so that they do not accidentally perform any action that can endanger the patient to an unrecoverable stage.

F - The patient's data should be accessible in a safe and secure manner.

- **Supply Chain Management:**

The various components needed for this system are procured by the marketing, logistics and sales departments. Keeping track of the inventory is a vital part when it comes to healthcare as the demand varies a lot, and performing predictive analysis of the need is difficult. In a time of pandemic, like the one we are experiencing now, demand will always be at a high. So it is highly important to keep the supply upto it and make sure products are reached safely and securely without getting tampered. So, keeping track of the inventory and supply chain

along with its third-party partners and distributors is very important and it also needs to be done securely.

SF- A secure way of accessing the supply chain products on the move as well as in the inventory, so managers can have a real-time statistical view of the supply and demand of the respective products and automate enterprise aspects for the dealers and the retail partners to assess the inventory accordingly. This can prove useful for future sourcing of materials, to reduce the supply deficit gap.

F - Access to a retrieval system to check with the inventory details.

- **Pharmaceutical manufacturers:**

Companies that manufacture medicines and healthcare equipment.

SF - Access to secured medical records and raw material.

F - Marketing and sales view, where the medical representatives can gain valuable insights into client behavior and consumer attitudes.

- **Data Analysts:**

Researchers who analyse medical data to discover patterns that may help in the early detection and prevention of diseases/epidemics.

SF - Secured access to the medical records of all the patients. Access to cloud computing resources for performing analytics and predictability of different diseases and providing a cure.

F - Provide access and support to a wide variety of open-source libraries and tools, such as MATLAB.

- **Government:**

State funded healthcare projects and schemes, such as the Ayushman Bharat Yojana. It can also provide afterlife health services as a system functionality and feature. Government, being a central authority, practices absolute control over data and its use. So in such cases, data practices and security needs to be made stringent as a lot of data breach and misuse takes place. Taking medical records into

consideration, it proves to be a much greater threat if the government doesn't regularise the data practices and privacy.

SF - Blockchain technologies that are implemented for secured access and retrieval are made to follow the stringent local/regional government standards and policies.

F - Provide secured access to the government and implement blockchain technologies to securely link accounts like SSN with medical records for faster retrieval of data and medical service provision.

- **Medical Organisations:**

Global players, like the World Health Organisation, or national bodies like Indian Medical Association.

SF - They should be given a common interface / access system through which they can interact and synchronise with all the governments or respective local bodies.

F - A monitoring tool to observe a spike in new diseases/syndromes, thus enabling a quarantine for only that place.

- **Miners:**

Independent blockchain miners who help create new blocks and make sure that there are no illegitimate chains.

SF - Access to cloud GPUs and CPUs, as blockchain mining is extremely heavy in terms of resource consumption.

F - Integrated blockchain mining software, such as ethOS or Hashr8 along with secure crypto wallets.

- **Employers:**

Employers have their “third-party” intervention reduced as their protocols for providing insurance changes. Being an important asset to the company, they play a crucial role in maintaining and hiring new employees.

SF - Access to the medical records of their employees and cross verification using blockchain’s unique hash stamps.

F - Integration/tie-ups with insurance agencies for a more comprehensive health insurance coverage.

- **Personalised Wearable Manufacturers:**

Wearable bio-sensors such as blood pressure/ heartbeat monitors. They are commonly integrated into a watch. Smartwatches and digital exercise bands provide such services.

SF - Updating the displayed data in real time to the cloud and performing regular analytics.

F - Reminding users to take good care of health, such as hourly reminders to drink water, and perform other essential activities. Keeping track of the diet that is being followed and adjusting it accordingly to every user. Providing clean and understandable output of medical readings like SpO2, bpm, sugar content and much more.

5. Other Nonfunctional Requirements

5.1 Performance Requirements

The hospital plays many roles that come under the broad umbrella of healthcare, ranging from critical life-support to regular health-checkups to fitness and

well-being. In the pandemic, we are feeling the lack of scalable and secure infrastructure like never before. Our system encompasses the entire range of health and medicine, and can be implemented at appropriate levels. The patients who rely on telemedicine require 24/7 uptime from the server, to ensure a seamless and secure experience. Physicians who consult remotely, should be equipped with the latest hardware and the training to use them. Telemetry can be performed from the patients to get feedback and improve the performance of the system. Optimising code for space and time can certainly speed up and ameliorate the performance of the system. Since timing is of much importance in such a system, the latency should ideally be in less than a few milliseconds, as it can literally mean the difference between life and death. Architecture - level design should be done after considering security, low latency and privacy.

5.2 Safety Requirements

Owing to the huge number of privacy and security incidents happening in the medical field in the recent past, we need to incorporate best practices with regards to safety of the software. The users should get to interact with a familiar UI so that they do not feel alienated. They should always be put in control, and should be able to backtrack their steps or cancel an operation midway. They should be assured of their security at all times, by being minimalistic and bloatware-free.

5.3 Security Requirements

Cloud providers should integrate blockchain with their core, to ensure a secure and reliable experience for the medicare professionals, who interact with it on a daily basis. The patients who trust hospitals, and give their personal medical information should be given the highest priority, and their data should be encrypted at each end, with standard blockchain protocols. Hospitals should be equipped with devices, which comprise hardware-level security and performance. Cloud servers should follow global standards for security, and eliminate any chance of middleman / code injection attacks. Since blockchain is distributed, it cannot be easily tampered.

5.4 Software Quality Attributes

The medical community is vast by itself, and the addition of cloud and blockchain to it gives rise to some novel quality attributes that should be specified. For instance, the vast majority of users will not be tech savvy, and the system should be adaptable to their needs. This time critical project also requires 24/7 availability, as we do not know when/where an accident may occur. The users who will eventually be part of the system, will come from diverse fields ranging from supply chain managers to drug developers. They should use the system smoothly, hence interoperability becomes an important part. Many people's lives may depend on this crucial system, and ensuring a robust experience will augment the customer's view of the project. The system should be deployed after thorough and rigorous testing, to ensure a secure and seamless experience. Thus, we can conclude that privacy and ease of use are the paramount factors to be considered when designing the system.

5.5 Business Rules

The main operating principles behind blockchain and healthcare integration include bringing together specialists from vast and diverse fields, with each of them contributing varied things. The cloud service provider forms the backbone of the whole system, as they provide remote infrastructure for the whole system. Blockchain specialists secure the whole system, and they should provide hardware-level integration at each and every step. The medical professionals who fetch/ update data from or to the cloud, need to be given training on best practices. Lastly, the patient needs to be put in control of how their data is handled and processed at each step.

6. Other Requirements

The operation of such a large scale system requires the cooperation of international and national organisations - such as W.H.O or I.M.A - to set protocols and standards for the smooth orchestration of the project. The legal and ethical aspects, including the code of conduct of the software should be determined beforehand, as medicine is a gray area, with many people having different views and opinions. Such constraints may shape the rules of the system. The privacy policy should be

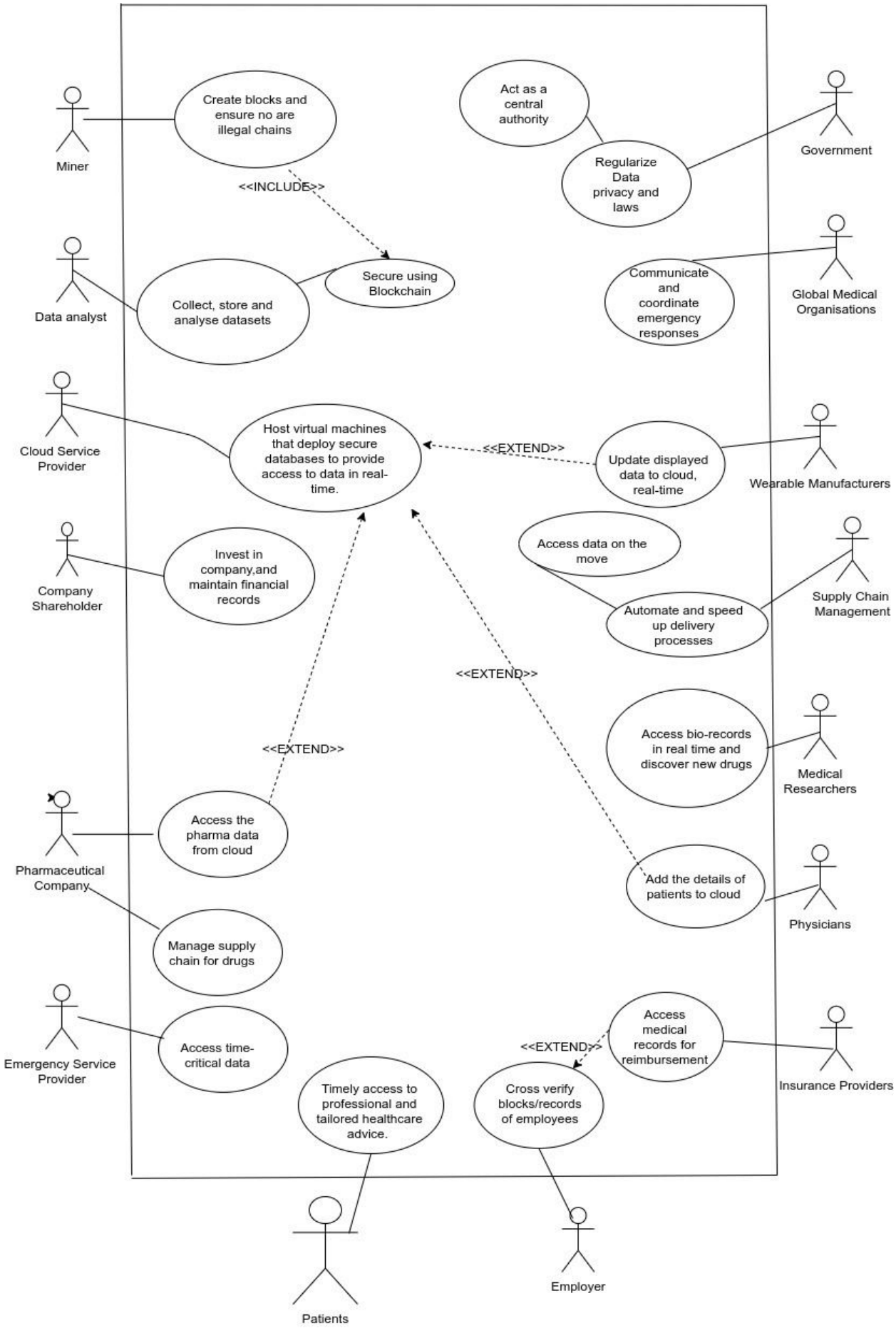
expressed to the end user in a clear and explicit manner, without any loopholes, legal or otherwise.

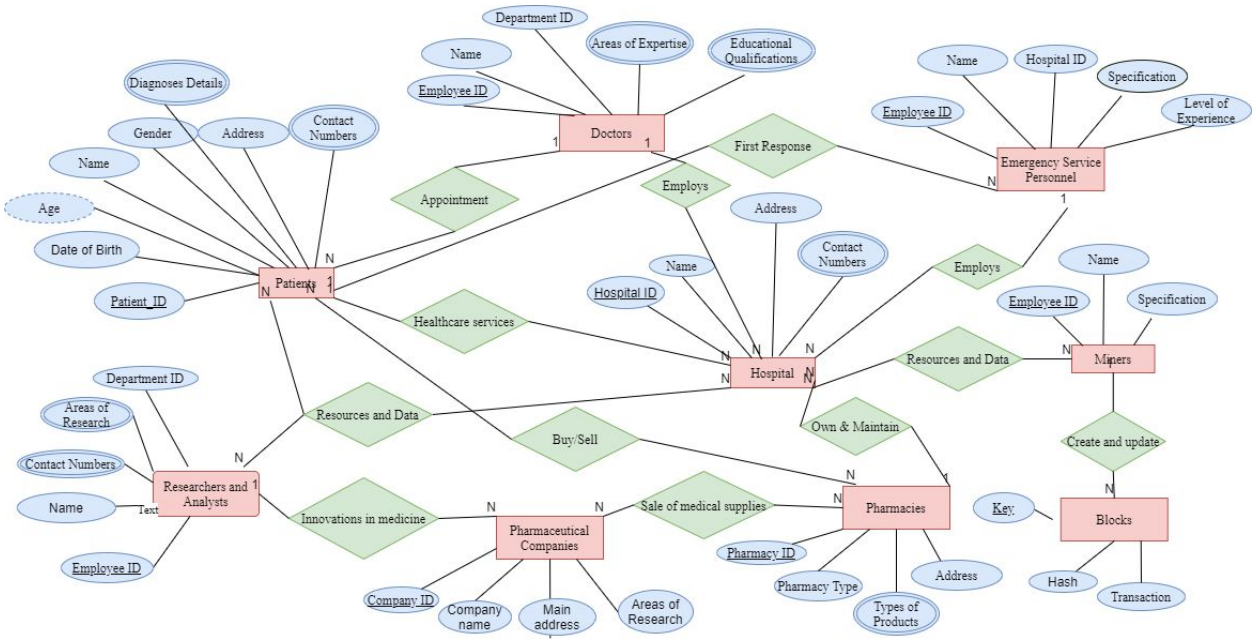
Appendix A: Glossary

- Blockchain : A growing list of records or blocks, secured by cryptography. Blockchain is tamper resistant by design.
- Cloud computing : It is the on-demand availability of storage and other computational resources over the internet, without direct management by the user. Most cloud service providers use a pay-as-you-go model, with free trials.
- UI : User Interface is the front-end portion shown to users, which they use to interact with features of the system. A simple UI is often a powerful UI.
- IBM Cloud : IBM cloud computing is a set of on demand cloud computing services for business offered by the information technology company IBM.
- Node-Red : Node-RED is a flow-based development tool for visual programming developed originally by IBM for wiring together hardware devices, APIs and online services as part of the Internet of Things. Node-RED provides a web browser-based flow editor, which can be used to create JavaScript functions.
- Cloud DB2 : IBM Db2 on IBM Cloud is an SQL database that is provisioned in the cloud. It rapidly installs a ready-to-go developer edition of Db2 with tools inside a Docker container.

Appendix B : Diagrams

UML DESIGN - USE CASE DIAGRAM AND ENTITY RELATIONSHIP DIAGRAM FOR THE PROPOSED SYSTEM


Miner
Create blocks and ensure no are illegal chains
<<INCLUDE>>
Secure using Blockchain
Data analyst
Collect, store and analyse datasets
Act as a central authority
Regularize Data privacy and laws
Government
Communicate and coordinate emergency responses
Global Medical Organisations
Cloud Service Provider
Host virtual machines that deploy secure databases to provide access to data in real-time.
<<EXTEND>>
Update displayed data to cloud, real-time
Wearable Manufacturers
Company Shareholder
Invest in company,and maintain financial records
Access data on the move
Automate and speed up delivery processes
Supply Chain Management
<<EXTEND>>
<<EXTEND>>
Access bio-records in real time and discover new drugs
Medical Researchers
Pharmaceutical Company
Access the pharma data from cloud
Add the details of patients to cloud
Physicians
Manage supply chain for drugs
Emergency Service Provider
Access time-critical data
Access medical records for reimbursement
<<EXTEND>>
Insurance Providers
Timely access to professional and tailored healthcare advice.
Cross verify blocks/records of employees
Patients
Employer



Sample Code :

The following snippets of code include the application's major classes and objects with some of their function declarations.

```
#include<iostream>
// Required header files, namespace and libraries for specific functions
class patient{
        long int id;
        string name;
        string dob;
        char sex;
        long int ph_num;
        string addr;
//method declarations
        void addpatient();
        void book_app();
        void view_data();
        void modify_data();
}
```

```
class doctor{
        int doc_id;
        string area_of_expertise;
        string qualification;
        string dept;

        void view_patient();
        void update_patient_record();
        void view_medical_history();
}
class Hospital{
        string hos_location;
        int med_id;  //used as primary key by national/global agencies
        string specialists;
        int no_of_features;

        void view_patient();
        void fix_appointment();
        void view_doctor();
        void add_doctor();
        void add_patient();
}
```

Maintenance :

Maintenance deals with the functional checks, servicing, repairing or replacing of necessary devices, equipment, machinery, building infrastructure, and supporting utilities in industrial, business, governmental, and residential installations. Over time, this has become a cost-effective practice to keep equipment operational; these activities occur either before or after a failure. The common types of maintenance include the following.

Categories of Maintenance :

1. **Preventive**

Engineers can optimize maintenance and reduce reliability risks to business operations through machine learning, operational data analytics and predictive asset health monitoring. Preventive maintenance software helps produce stable operations, ensure compliance with warranties and resolve issues impacting production — before they happen.

Types of preventive maintenance

There are 4 major types of preventive maintenance with each built around the concept of planned maintenance, although all are organized and scheduled differently, to suit different business needs and purposes.

- **Usage-based preventive maintenance**

Usage-based preventive maintenance is triggered by the actual utilization of an asset. This type of maintenance takes into account the average daily usage or exposure to environmental conditions of an asset and uses it to forecast a due date for a future inspection or maintenance task.

- **Calendar/time-based preventive maintenance**

Calendar/time-based preventive maintenance occurs at a scheduled time, based on a calendar interval. The maintenance action is triggered when the due date approaches.

- **Predictive maintenance**

Predictive maintenance is designed to schedule corrective maintenance actions before a failure occurs. The team needs to first determine the condition of the equipment in order to estimate when maintenance should be performed. Then maintenance tasks are scheduled to prevent unexpected equipment failures.

- **Prescriptive maintenance**

Prescriptive maintenance doesn't just show that failure is going to happen and when, but also why it's happening. This type of maintenance helps analyze and determine different options and potential outcomes, in order to mitigate any risk to the operation.

2. **Design for maintainability**

The construction of such a critical software relies on the maintenance and the regular updates from the support team. So, maintainability is incorporated from the design level of the project. Simplicity of the code can be ensured in regular code and/or design reviews so that the design is verified for future maintainability.

3. **Operational**

Operational maintenance is the care and minor maintenance of equipment using procedures that do not require detailed technical knowledge of the equipment's or system's function and design. Regular audit and technical services of the core functionality of the infrastructure is advised to be done in order to have a seamless workflow. This proves to be very effective when it comes to the expense spent on unnecessary repairs due to which services are shut down, and such downtime expenses can be drastically reduced.

4. **Corrective**

Corrective maintenance can be defined as the fixing of a user reported bug or a glitch in the system, within the time period allotted for service or maintenance. For our system, due to anticipated heavy workloads, we shall be scheduling regular corrective maintenance for the system. Proper backups will be in place, to appropriately handle the loads. This cannot be avoided, as the system needs to be maintained properly for smooth functioning. This corrective maintenance leads to advantages such as possible bug fixes and support for newer technologies as well.

5. **Adaptive**

The adaptive maintenance comes under the realm of the operating environment of the system. There is no guarantee that the system will be placed in the same environment which was used in development. Hence, adaptability to multiple operating environments should be ensured so that the system can work with minimal downtime.

6. **Perfective**

Perfective maintenance can be regarded as the modifications to the product post-delivery in order to improve maintainability or functionality. It is mainly done to add certain new features. For our project, it is done for adding support for a larger number of users, adding new entrants in the industry, and so on.

Knowledge Base repository for the IBM Cloud

A knowledge base is a self-serve and an online library of information about a product, service, department, or topic that is easily understandable by the common man to interpret and satisfy one's needs.

The past decade has seen an accelerated improvement in knowledge bases and now they mostly exist in the form of a list of documentation in a website. This has made it easily accessible anywhere and anytime. The following sections deal with the support and services provided to the user and the employee of the respective organization.

Search bar

→ Rather than skimming and scanning through tons of documented content, users have the power to search for a specific tutorial to resolve the issue thereby saving time and energy.

Product specifications

→ Providing patients with secure access and retrieval of data through blockchain technologies.

→ Providing medical researchers with cloud based technologies to develop cutting-edge solutions to tackle the issues pertaining to our society.

FAQ's

Frequently Asked Questions deals with the issues faced by the majority of the users and the questions that might arise in the minds of every user. The following lists down a few basic examples,

→ Q1 : How secure is my data in the cloud?

A1 : All the data stored in the cloud are encrypted at rest with IBM-managed encryption. IBM-managed keys are generated and securely stored in a block storage vault that is backed by Consul and maintained by IBM Cloud operations.

For more security, you can protect your data using your own customer root keys (CRKs). You import your root keys to, or create them in, a supported key management service (KMS). Your root keys are safely managed by the supported KMS, either Key Protect (FIPS 140-2 Level 3 compliance) or Hyper Protect Crypto Services, which offer the highest level of security (FIPS 140-2 Level 4 compliance). Your key material is protected in transit and at rest.

→ Q2 : What should I do if my root key is compromised?

A2 : Independently back up your data. Then, delete the compromised root key and power down the instance with volumes encrypted with that key.

→ Q3 : I'm getting a 403 response. What do I do?

A3 : You are using a valid API Key, but it is not the correct key for the service instance that you are trying to access programmatically.

→ Q4 : Where do you store the custom logs and for how long do you keep it?

A4 : Since the platform is developed as a whole on IBM cloud, IBM stores the logs of the customer in their Kubernetes cluster. IBM does not have access to the logs

and it is up to the customer to manage all of their log data including retention management.

→ Q5 : What does IBM do for me?
A5 : IBM handles installation, software upgrades, creating and managing domains, and hardware maintenance. The service includes 24 x 7 health monitoring.

Communication
→ Apart from knowledge base resources, customers are also free to contact our organization through mail or telephone. For bookings/appointments, customers can drop in a message in the chat box. If support/assistance is needed, customers can have a chat with our indigenously built chat-bot assistant using the IBM Watson tools.

Our chat-bot assistant can clarify your basic queries and guide you in a systematic way. For more advanced issues, feel free to contact us.

Recent articles
→ To provide the user with updated content of the platform features, improvements in the functionality and recently solved/posted issues.

Popular articles
→ Articles or solutions that received the highest upvotes or responses will be shown on top as the most popular article to the least popular article.

Community

→ Like minded people can get together to collaborate and work on medical advancements, encouraging the freedom of flow of information between medical researchers to customers/patients.

The above listed sections deal with the basic services that are provided to the customer. Installation Guide, Get started, User Guide, Tutorials, Troubleshooting guide, Accessories, Other Documentation and much more are further included and made available to the users organically over time.
