**System Request Template (Template for Delivery 1)**

Questions:

1. Designation of stakeholders -> differences between generalization of doctors vs specific doctor roles

2. appendix meaning

**3. How flexible can we be with the features once we get into implementation; can we edit/change/remove some features as we go?**

1. **Project Title:**

   MedSync: Streamlining Healthcare

2. **Project Team:**

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3. **Project Description:**

   MedSync is a web application primarily aimed towards private general practitioners who seek to enhance doctor-patient interactions. Through a doctor-patient management system, we provide user-friendly interfaces for both the doctors and the patients. MedSync enables patients to smoothly schedule appointments by providing real-time availability updates. Patients could also receive medical prescriptions, access diagnostic reports, and even opt for remote consultations via the video chat option provided through the system; throughout their consultations, patients will stay informed with notifications. Furthermore, doctors who use our platform could utilize the power of ApiMedic to gain intelligent diagnostic support to aid them in making well-informed decisions quickly. The project encompasses both frontend and backend solutions in collaboration with a database for storing patient and doctor information. The medical management system is set out to ensure that users stay ahead in the rapidly evolving digital healthcare landscape.

## 4. Business Goals:

- Establish a subscription-based revenue model as the primary business strategy for MedSync.
- Facilitate patient-doctor communication and interaction.
- Increase efficiency in appointment management.
- Enhance the accuracy and speed of diagnosis through AI recommendations.
- Provide a seamless and user-friendly experience for both doctors and patients.
- Streamline prescription processes through digital prescriptions.
- Enable remote access to healthcare services.

## 5. Main Features (Engineering Objectives):

The first and foremost feature to implement will be the registration and login for doctors and patients. Doctors will be registered by the database administrator through the admin panel. Patients will have the option of registering on the application and logging in while the doctors will be registered by the database administrator to ensure the authenticity of the patients. This user handling will be done through Passport JS.

For doctors, the platform will provide a centralized dashboard that displays detailed information including appointment schedules, patient information, prescriptions and diagnostic suggestions powered by the APIMedic AI assistant. Similarly the patients will be welcomed with a user friendly interface that streamlines the process of searching for relevant doctors, booking appointments with them, chatting or video calling with them, seeing their medical records and the assigned prescriptions

Our platform will simplify the process of booking appointments by offering instant access to doctors' availability for scheduling, along with a user-friendly calendar interface that allows for easy selection of desired dates and times. Moreover, automated reminders for upcoming appointments will ensure a seamless experience. This will allow doctors to effectively manage their schedules through a centralized view, giving them the ability to make any necessary adjustments.

Digital prescriptions will be drafted by the doctors including all the necessary information about medications, dosages, and instructions. Patients can easily obtain digital prescriptions containing thorough medication information and can even electronically send them to their preferred pharmacies. MedicAPI [2] will incorporate intelligent diagnostic suggestions for the doctors based on patient feedback and outcomes.

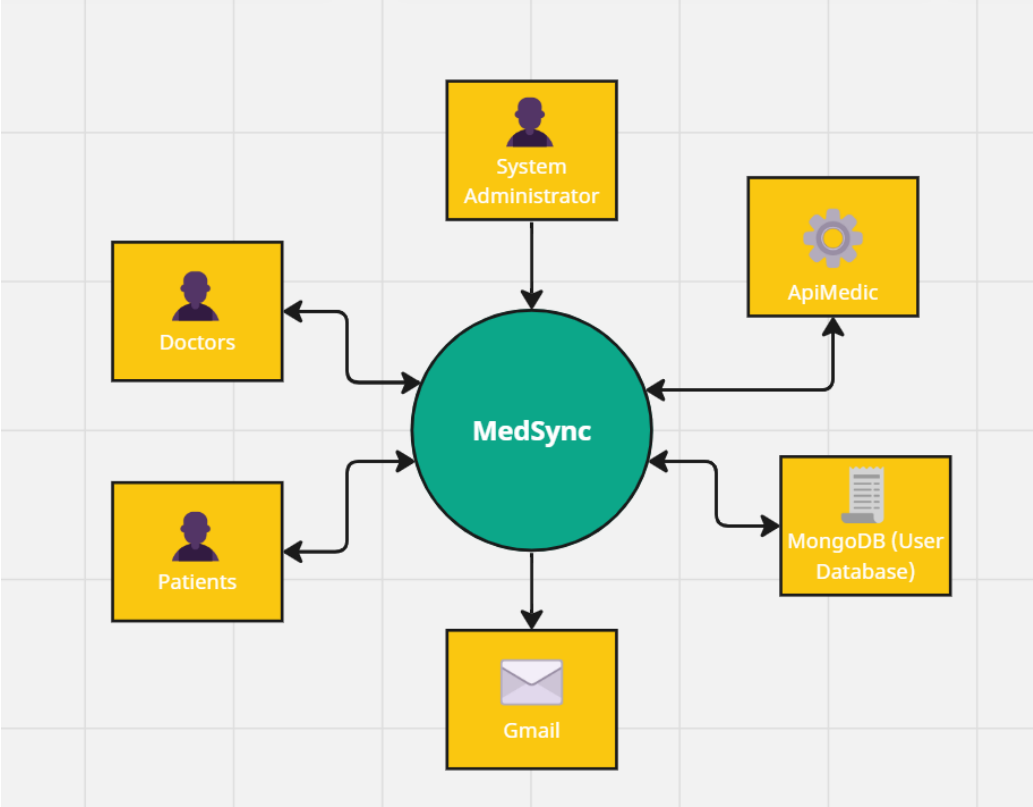
The platform will not only contain a private chat feature with the doctors, but also a secure and encrypted video call option for remote consultations for people who cannot or do not want to attend the appointment in person. These features will facilitate prompt communication between doctors and patients, keeping consultations streamlined. Additionally, the platform will effortlessly integrate with multiple diagnostic imaging formats and standards, facilitating the efficient sharing and management of diagnostic reports.

## 6. Scope:

The project's scope involves providing a platform through which doctors and patients can communicate and exchange information. This includes all the requests made by both parties, including appointment scheduling, text chats, video calls, prescriptions, and report sharing. The system also relies on the third-party API ApiMedic to facilitate the diagnosis process to doctors; notifications sent to users will also be carried out externally through Gmail. Also, the management of the users, both patients and doctors, will be carried out through MongoDB's database services.

At the present time, this project does not deal with direct pharmacy integration; prescriptions made by a doctor will be available to the patient but not sent directly to a pharmacy. This project is also primarily concerned with private medical services not involving hospitals; it is designed to cater to the services of private physicians (e.g. family doctors), rather than the broader scope of a hospital-wide system. The system also does not deal with insurance processing; bills will be managed independently by the patients.

Simply put, MedSync is primarily–and only–concerned with **connecting private doctors with their patients**. Below is the context diagram for our system:




7. **Stakeholders:**

- System Administrators
- Private Doctors
- Patients
- Pharmacists
- Ministry of Health
- Labs
- Insurance providers

8. **Constraints:**

MedSync is a project that will begin from scratch. Technical and time constraints are the prominent issues that might arise with the project. The use of different front-end and back-end solutions will be a considerable feat for some members of the team who have not been exposed to them. The use of different packages is another stepping stone for the proper development of the application which also relies on the understanding of elaborate solutions. Considering that the deadline for the project is the end of the Spring 2024 semester, time constraint, unlike the technical factors, cannot be resolved through reading documentation and analyzing pre-existing code. An EHR application takes careful and

elaborate considerations during its implementation. The time constraint is thus also an obstacle for the extreme attention to detail such applications require in order to be successfully implemented.

As with any team project, collaboration and group work might be a significant constraint. Due to each individual team member having a different schedule and other responsibilities the issues surrounding proper teamwork might arise and hinder the timely delivery of certain features of the system.

The use of MedicAPI that would aid the diagnostic process might also present an external dependency since the API is already in use rather than being created by the team. This might lead to compatibility issues between different versions of the same software or systems. The constraint of using the pre-existing API rather than creating one from scratch stems from the time constraints within the project as well as technical challenges that might be present due to the backgrounds of the team, none of whom are pursuing medicine.

The last constraint is the testing constraint. Considering that actual doctors and patients would need to use the app in order to test its functions in real-world scenarios, it would be practically impossible to organize an effort that would make the testing easier. Not only does this make it difficult to properly understand the needs of patients but also to improve the app within the limited timeframe of the project.

## 9. Risks:

The main risk within this project is the security risk posed by the integration of the registration and login features. These features are generally made available by the utilization of a database system, which can be prone to attacks such as SQL injection attacks. These attacks use malicious code in the form of SQL statements to access vulnerable information. In order to make the registration data secure, passwords are usually hashed and salted before storing in the database. We intend to use a good hashing function that is going to make sure our data remains secure. For example, bcrypt password hashing function which does not only salt the passwords before by default, helping prevent rainbow table attacks [1], but also utilizes slow hashing [1], which makes it harder to crack using brute force attacks.

Ensuring the confidentiality of data is an important factor that poses ethical risk concerns. Considering that our application stems from a real-world problem of non-electronic data management systems that are still standard in most countries, the project is meant to observe different techniques for maintaining the confidentiality of the data. The main technique will be abstaining from using any actual names or both doctors and patients and

identification numbers. The project will utilize different principles for generating all types of users and data they might require in order for the application to work properly. Furthermore, the project intends to keep adequate standards when it comes to the data provided to the users themselves. Considering different data policy regulations such as the TPO (Treatment, Payment and Operations) portion of HIPAA (Health Insurance Portability and Accountability Act) in the United States of America, the app will regulate both the patients' and doctors' access to adequate information. Having in mind the time constraints, there is no possibility of eliminating all concerns, such as the amounts of data healthcare providers are sharing with Third Party Payers and Insurance Companies. So, although the team intends to take care of the highest risk factors relating to the confidentiality of data, it does not think it feasible to address them all for now. However, the scalability of the project is a great factor and the adequate documentation of the progress could be of great benefit for the future development of the project.

Integration and Compatibility issues are bound to occur with an emerging healthcare system. The integration with existing systems and other services such as diagnostic imaging services could present compatibility challenges leading to interoperability issues. Considering the scale of the project is limited by its time and technical capabilities, this concern can be mitigated by designating the application as a standalone system. The implementation of standardized data exchange formats like HL7 would only be of primary concern if the application's main intent was the development of a national healthcare system that would require a large scale transfer of data. Testing the application with real world scenarios and careful collaboration with Third Parties would help ensure compatibility in this case.

Technical issues are bound to arise with an emerging system. The integration of different features discussed above, such as video chat or diagnostic recommendation APIs would pose significant risks for the project's development. To mitigate this risk, the project will employ a testing process for its different features. The technical issues which arise from increased loads and data volume can be reduced by planning the scalability of the application from its beginnings. To ensure that other technical issues such as software crashes do not impede the progress of the project, the team intends to make adequate backups for each step of the development. It is vital that a project has deliberate disaster recovery plans aimed at increasing the reliability and availability of MedSync that can be hindered heavily by the technical risks.

## 10. References:

[1] Hornby, T. (2021). *Salted password hashing - doing it right*. CrackStation. https://crackstation.net/hashing-security.htm

[2] https://apimedic.com/updated_terms?r=%2Fnews

## 11. Appendix:

Include any additional documents or reference materials that support the