**Project Team 6**
**Deliverable 4**
Arjun Chauhan
Geena Chernyak
Serena Choi
Tony Nguyen
Professor Paul Vroomen
TIM58: Systems Analysis and Design
14 March 2024

Deliverable 4: Implementation

1) Two Fully-Dressed Use Case Narratives

| Use Case Section | Comments |
|---|---|
| Story | As a person suspected of carrying malaria, I want to be able to use my portable device to easily diagnose if I actually have malaria, so I'm able to receive the proper treatment. |
| Use Case Title | Use Case 1: Provide a questionnaire to diagnose patients. |
| Story Owner | Sujit Norhona |
| Story Creator | Project Team 6 |
| Revisions and Approval | Version 1, Initial Draft |
| Stakeholders and Interests | WHO & AHS Employees: Arjun Chauhan, Geena Chernyak, Serena Choi, Tony Nguyen. |
| Scope, Context, and Background | The countries of East and Central Africa (Tanzania, Kenya, Zambia, the public of Congo, Central African Republic, and Mozambique) are still plagued by malaria, and it's important to provide aid for all patients who need it. With limited resources, the AHS needs an efficient way to diagnose malaria cases among patients. Having appointments for each individual diagnosis is costly and inefficient for clinics. If there were a way to diagnose patients prior to their clinic appointment, the clinics would then be able to provide care to those who need it most. As a solution, the AHS has decided to launch an app targeted to accurately diagnose malaria. Using an app allows all patients to receive a fast diagnosis of their condition using a machine-learning algorithm without requiring a trip to the clinic. The automated diagnosis allows local doctors and hospitals to provide assistance to those who require it most, rather than helping every single person, which is especially important due to limited resources. The mobile diagnosis, however, doesn't replace the need for a doctor or hospital visit for further treatment. Patients who receive a |

| | |
|---|---|
| | chance to schedule an appointment at their local malaria clinic upon completion of the questionnaire in order to receive proper medical treatment. Transportation information and services will also be included within the mobile to streamline the entire process for the consumer. |
| Dependencies | Assume:<br>- Ability to share patient information and data among hospital and doctor databases<br>- Automated algorithmic diagnosis is actually accurate in its diagnosis<br>- Patient is using a mobile device that the application supports: iOS or Android. |
| Actor Role(s) | Patient fills out a malaria questionnaire for mobile diagnosis. |
| Precondition(s) | The patient must be using an iOS or Android device to utilize the mobile application and is living within the area of the application's service. |
| Success Guarantee | The patient opens the mobile application and fills out the provided questionnaire. Upon completion of the questionnaire, the automated system will give an algorithmic diagnosis of the patient's condition depending on their answers. Then, the patient will be given the choice to book an appointment with a doctor. The patient can agree or refuse the proposal, and patient information will only be sent to hospitals if the patient agrees to the appointment. |
| Minimal Guarantee | In the case of a system failure during the interaction, the system will return to the starting page, and any patient information will not be saved if the questionnaire hasn't been submitted. The errors will also be recorded for future reference and revisions. |
| Trigger(s) | The patient will trigger the start of the process by opening the mobile application, prompting the app to offer the patient the two primary services: the questionnaire and the self-care information page. |
| Main Scenario | 1. The patient begins an interaction with the mobile application.<br>2. The system will initially provide patients with two primary options, a questionnaire or self-care information, depending on the patient's specific needs.<br>3. The patient selects the questionnaire option and completes it.<br>4. The system presents the patient with a predicted algorithmic diagnosis; the diagnosis will be positive in this case.<br>5. The system will provide patients with two paths: appointment or self-care information.<br>6. The patient chooses to book an appointment.<br>7. The patient books an appointment<br>8. The system redirects the patient to the appointment confirmation page<br>9. The system transfers patient information to the hospital.<br>10. The hospital transfers patient information to the doctor.<br>11. The system will provide patients with two paths: need |

| | |
|---|---|
| | transportation or don't need transportation.<br>12. The patient needs transportation.<br>13. The system redirects patients to the transportation information and services page.<br>14. Upon completion on the transportation page, the system directs them to the appointment confirmation page.<br>15. The patient is able to check their profile and see any relevant information or assistance they might need. |
| Alternative Scenarios/ Extensions | Alternative Scenario 1: Patient immediately opts for self-care information.<br>3.a. Patient selects self-care information, rather than a questionnaire.<br>3.b. The system redirects patients to the self-care information page.<br><br>Alternative Scenario 2: The patient receives a negative diagnosis.<br>4.a. Patient receives a negative diagnosis.<br>4.b. The system will redirect the patient to a self-care information page.<br><br>Alternative Scenario 3: The patient chooses to not make an appointment.<br>9.a. Patient selects self-care information, rather than an appointment.<br>9.b. The system redirects patients to the self-care information page.<br><br>Alternative Scenario 4: The patient doesn't need transportation services.<br>12.a. The patient doesn't need transportation.<br>12.b The system redirects the patient to the appointment confirmation page.<br>12.c. The patient is able to check their profile and see any relevant information or assistance they might need. |
| Acceptance Criteria | MINIMUM VIABLE SOLUTION MUST HAVES<br>- The mobile application should be usable on both iOS and Android devices.<br>- The patient must have the option to fill out the malaria diagnosis questionnaire.<br>- The patient must also have the option to see self-care information.<br>- The algorithmic diagnosis system must be functional and accurate to prioritize the health and safety of patients.<br>- The system must have safety and security measures in order to protect patient information.<br>- The application must give the patient an option to book an appointment with a local clinic.<br>- The system must securely save and transfer patient information to hospitals and clinics.<br>SHOULD HAVE<br>- The application should provide the patient with transportation information and services.<br>- The mobile application should provide patients with locations of local clinics.<br>- The mobile application should provide patients with contact information for local clinics. |

| | |
|---|---|
| | NICE TO HAVE<br>- The system transfers relevant patient information, such as pickup address, for transportation services. |
| Test Cases | The mobile application is tested for functionality in the most important elements. By test navigating the application, the user must be able to easily use the mobile diagnosis system or access self-care information. The application should offer a glitch-free experience, and in the event of an error, the application is able to reset itself and report the error. |
| Exclusions/Out-of-Scope Items | The patient interaction with the taxi services has been omitted from this narrative. While transportation services are included, the specifics of the taxi interaction, such as scheduling, transfer of information, and payment, will not be included in this case to focus on the patient interaction with the diagnosis system. |
| Assumptions | Information from patient questionnaires must be completely secure, and strong security measures must be implemented throughout the system. The location and contact information of clinics and hospitals will be consistently updated for an accurate experience for users. The transportation information, such as routes and services, will also be regularly updated for users. |

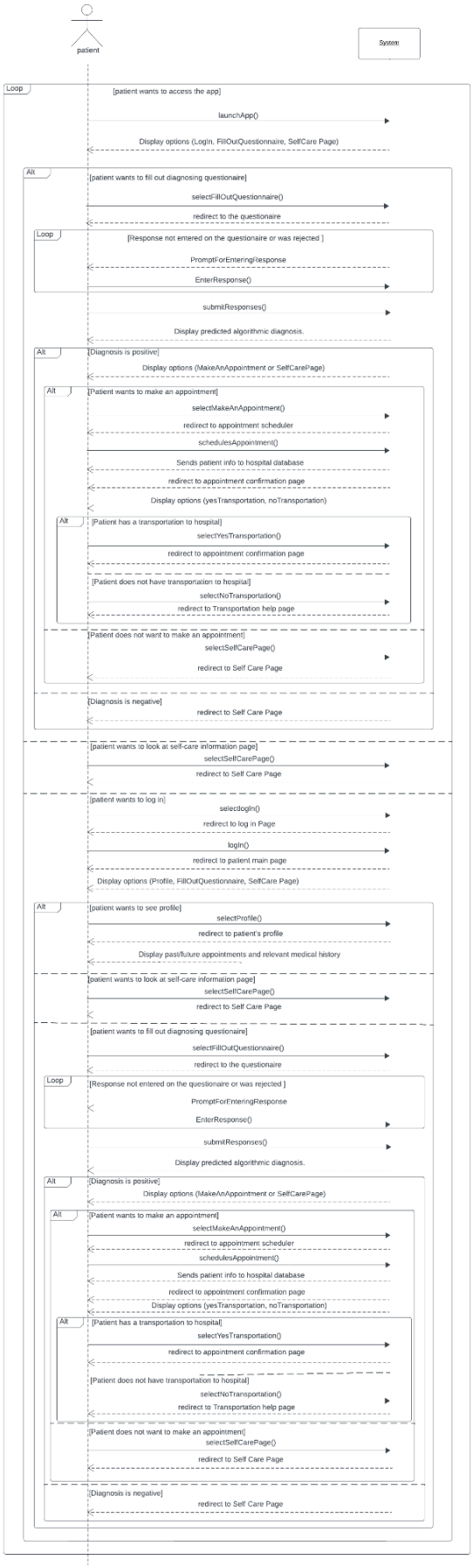
| Use Case Section | Comments |
|---|---|
| Story | As a Doctor using the app, I want to be able to use my portable device to show me the patient's questionnaire answers at the time of the visit so that I can create a course of treatment for the patient. |
| Use Case Title | Use Case 2: Obtain patient information and create a treatment plan. |
| Story Owner | Sujit Norhona |
| Story Creator | Project Team 6 |
| Revisions and Approval | Version 1, Initial Draft |
| Stakeholders and Interests | WHO & AHS Employees: Arjun Chauhan, Geena Chernyak, Serena Choi, Tony Nguyen. |
| Scope, Context, and Background | Diagnosing patients with malaria and leading them to nearby clinics for treatment: Many individuals struggle to understand the complexities that come along with being ill with malaria. They often do not understand the urgency that is required to be diagnosed and treated. With that in mind, this app is intended to aid ill patients all while increasing accessibility to useful resources. Additionally, doctors face challenges in accessing and utilizing patient information. This app is intended to provide a |

| | |
|---|---|
| | comprehensive solution for doctors, allowing them the flexibility of accessing and maintaining patient data in a portable format all in real time. Furthermore, this app intends to increase accessibility for individuals all around the world and receive care for those at risk of malaria. |
| Dependencies | Assume:<br>- Ability to access patient data and share treatment plans with hospital staff.<br>- Ability to share prescribed prescriptions with pharmacies. |
| Actor Role(s) | Doctor diagnosing and creating treatment plans for ill patients. |
| Precondition(s) | After the patient reaches out and makes an appointment, the doctor must have a valid account, log in, and securely access the patient's saved information. This would allow the doctor to safely make any necessary changes in the patient's chart at the time of visit. |
| Success Guarantee | The Doctor must have the functions of logging into the application, accessing relevant patient information, and creating a viable treatment plan in order to ensure the success of the application. |
| Trigger(s) | A doctor has a scheduled visit with a patient and is able to see relevant patient information. Then, the doctor effectively initiates treatment planning with the patient. |
| Main Scenario | 1. A doctor's visit is scheduled by the patient.<br>2. The doctor logs into the application in preparation for the visit.<br>3. The app verifies the doctor's credentials.<br>4. The doctor finds the patient in the system and reviews the patient's information.<br>5. The doctor initiates treatment along with the patient ensuring their comfort and commitment to the treatment plan.<br>6. Completion of visit. |
| Test Cases | 1. Data Security and Privacy:<br>- Ensure that the application requires proper authentication before allowing access to patient data.<br>- Verify that patient data is stored in a secure and encrypted database and is only accessible to authorized personnel.<br>2. Performance:<br>- Regular tests need to be run to ensure the app's performance and responsiveness during vital stages like treatment planning and data retrieval. |
| Exclusions/Out-of-Scope Items | In-depth data analytics would be currently excluded because the current focus is to obtain a patient's questionnaire answers and facilitate treatment plans. We can also assume that device-specific customizations are currently excluded because the main focus is to ensure that the program works efficiently and effectively for all IOS and Android software. |

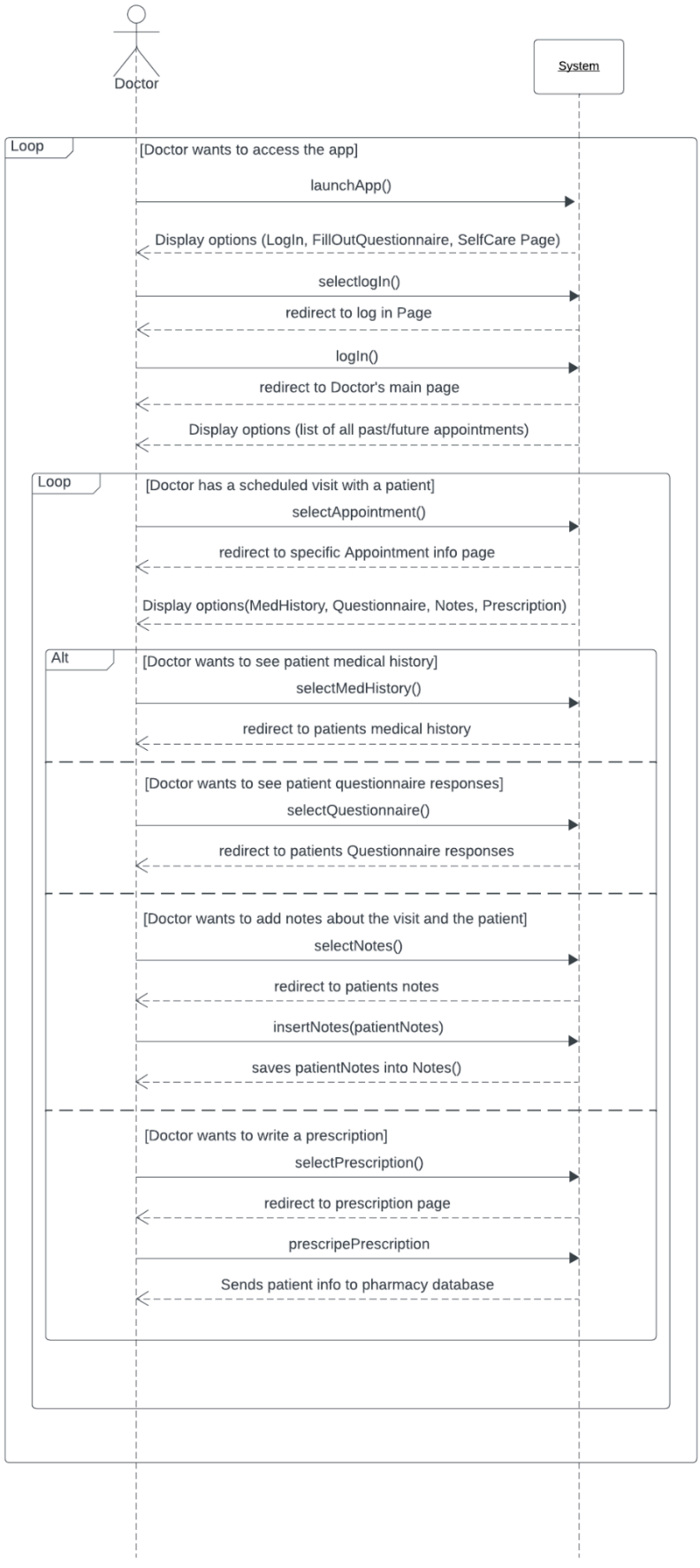
| | |
|---|---|
| Assumptions | Some assumptions include that the system undergoes regular maintenance and is in compliance with any legal standards. We assume that security and safety measures are set in place with adaptive protocols to ensure patient protection. We assume that doctors are trained and familiar with the interface and can quickly access the materials needed. Finally, we assume that patients give consent to doctors to utilize their questionnaire answers. |

**Links to larger versions of all charts are at the end of this document**

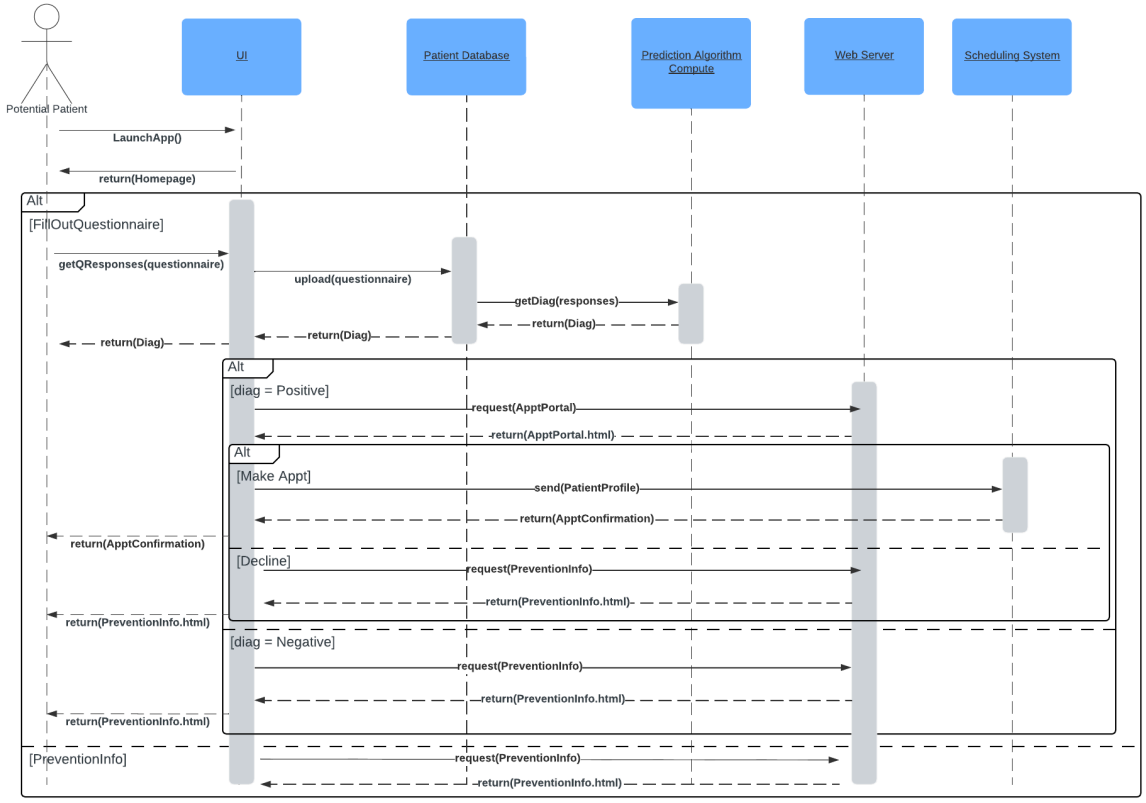
# 2a) System Sequence Diagram: Patient



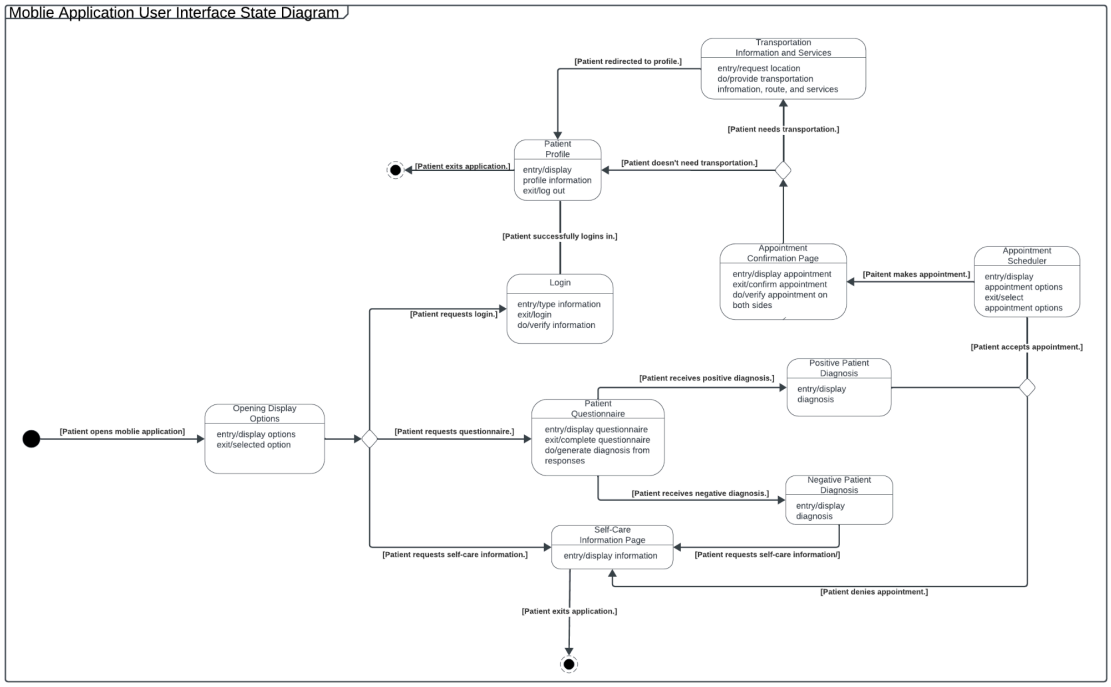
2b) System Sequence Diagram: Doctor



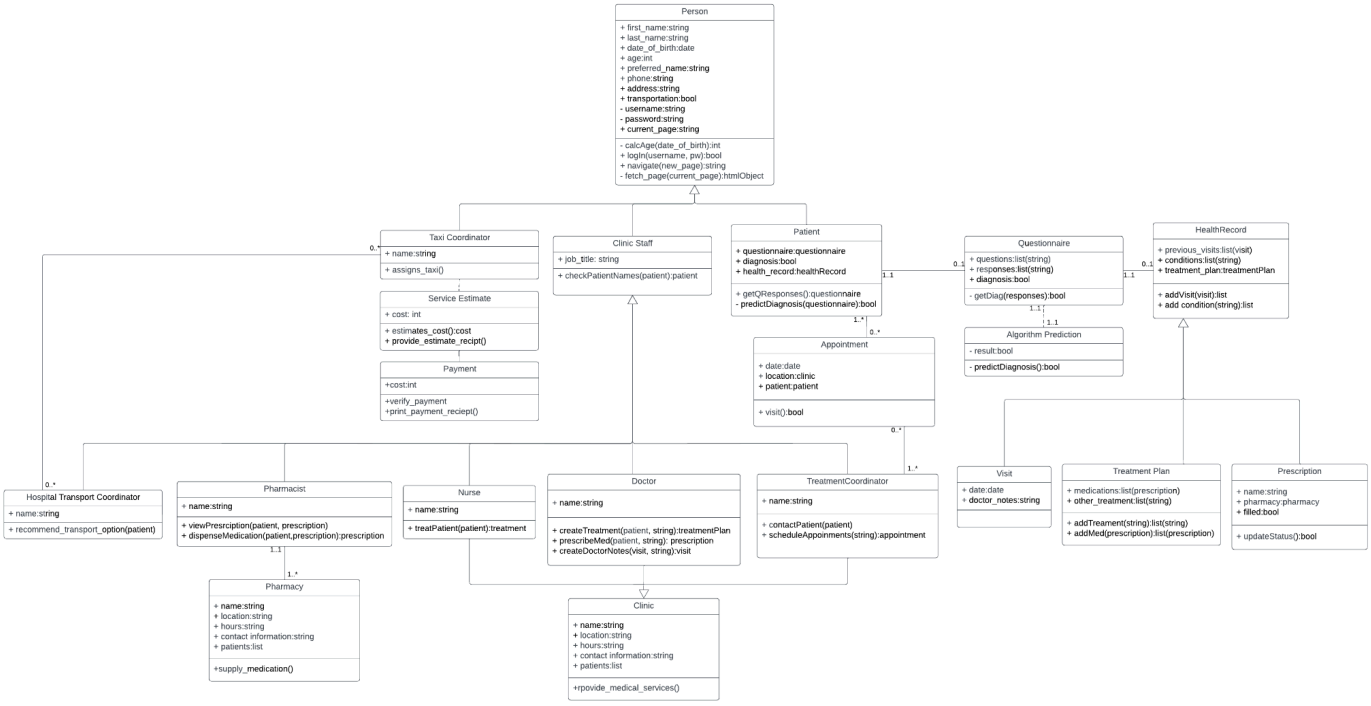
## 3) Design Sequence Diagram



## 4a) State Diagram




## 4b) Updated Class Diagram



**Links to Charts**

1. N/A
2. 
    a. https://lucid.app/publicSegments/view/bf47b3b0-03cd-408b-afaf-f226570c6e45/image.png
    b. Image.png
3. https://lucid.app/publicSegments/view/78f65b7c-1d8a-444a-b7af-e66f23eeb2bf/image.png
4. 
    a. https://lucid.app/publicSegments/view/ead0c813-af4e-405d-b44d-1279d1ed4b1b/image.png
    b. https://lucid.app/publicSegments/view/8ba4f085-12f8-4692-a64f-a91c2f222742/image.png