Arjun Chauhan

Geena Chernyak
Serena Choi
Tony Nguyen
TIM 58
25 January, 2024

Deliverable 1, African Health Services: An App For Health and Wellness

1. Requirements
   a. User Stories:
      i. As a person who thinks I may have malaria using the app, I want to be able to use my portable device to easily diagnose if I have malaria so that I can receive proper treatment.
         1. The app should be available for download and installation on both iOS and Android platforms.
         2. Users should be prompted to fill out a symptom questionnaire upon launching the app.
         3. Verify that users receive a notification to fill out the questionnaire if they have not done so within a specified timeframe.
         4. If the predicted result is negative:
            a. Confirm that users receive a list of potential symptoms to look out for.
            b. Verify that users are presented with a map displaying nearby clinics based on their location.
         5. If the predicted result is positive:
            a. Ensure users are directed to a map showing the locations of local clinics.
            b. Confirm that users receive contact information for the closest clinic for further assistance.
      ii. As a health-conscious individual using the app, I want to use my portable device to give me information about malaria, so that I can look out for malaria symptoms and learn about self-treatment options.
         1. The app should be available for download and installation on both iOS and Android platforms.
         2. Users should find a summary overview of malaria, including common symptoms.
         3. Provide a list of self-treatment options and preventative steps.
         4. Ensure the app includes a map of local clinics and pharmacies for necessary treatment.
         5. Verify that users can easily navigate between different sections of the app.

iii. As a Local Treatment Coordinator using the app, I want to use my portable device to show me potential positive patients so that I can reach out and facilitate scheduling.
1. Receive daily notifications for positive cases via email.
2. Access a web portal containing all relevant patient information.
3. Utilize an in-portal VOIP utility to contact potential patients.
4. Use an appointment scheduling utility within the app.
5. Confirm that the information displayed on the web portal is up-to-date and synchronized with the mobile app.

iv. 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 visit, so I can create a course of treatment for the patient.
1. Access a list of patient's questionnaire answers during visits.
2. Input visit notes for use by fellow hospital staff.
3. Utilize a treatment planning interface for both nursing staff procedures and medication orders.
4. Provide feedback on the app's predicted diagnosis, indicating the symptoms present during the appointment.
5. Verify that the treatment planning interface provides clear options for both immediate and follow-up treatments.

v. As a Nurse using the app, I want to be able to use my portable device to see the doctor's treatment plan so that I can implement that course of treatment.
1. Access the patient's questionnaire answers.
2. View the doctor's visit notes, including the treatment plan.
3. Access the history of treatment received.
4. Review the breakdown of treatment to be provided during the visit.
5. Confirm that the app allows easy communication and coordination with the doctor and other healthcare professionals.

vi. As a pharmacist using the app, I want to be able to use my portable device to show patient information and self-treatment options, so that I can assist patients in procuring proper medications.
1. Access patient profiles with treatment plans (if seen by a doctor).
2. Present appropriate self-treatment options for patients not seen by a doctor.
3. Display patient questionnaire responses to facilitate medication choice.
4. Allow logging of treatment provided for records.
5. Verify that the app provides real-time updates on medication availability and procurement.

vii.   As a Hospital Transport coordinator using the app, I want to be able to use my portable device to show me which patients require transportation, so that I can help redirect them to a form of transportation.
   1. Receive an overview of patients indicating the need for transport.
   2. Access a breakdown of the number of patients by region for coordination.
   3. Notify patients of transportation options.
   4. Access patient contact information for communication.
   5. Confirm that the app provides a secure and efficient means of communication for coordinating transportation.

viii.   As a Taxi coordinator using the app, I want to be able to use my portable device to show who needs a taxi to the clinic and their pickup address, so that I can provide a ride to the clinic.
   1. Receive an overview of patients not served by hospital transportation.
   2. Allow receiving ride requests through the app.
   3. Provide location information for those requesting a ride.
   4. Allow providing estimates and facilitating payment.
   5. Verify that the app includes a feedback mechanism for users to rate and provide comments on the taxi service.

b. Use Case Diagram (larger copy and image link on Page 8)

i.
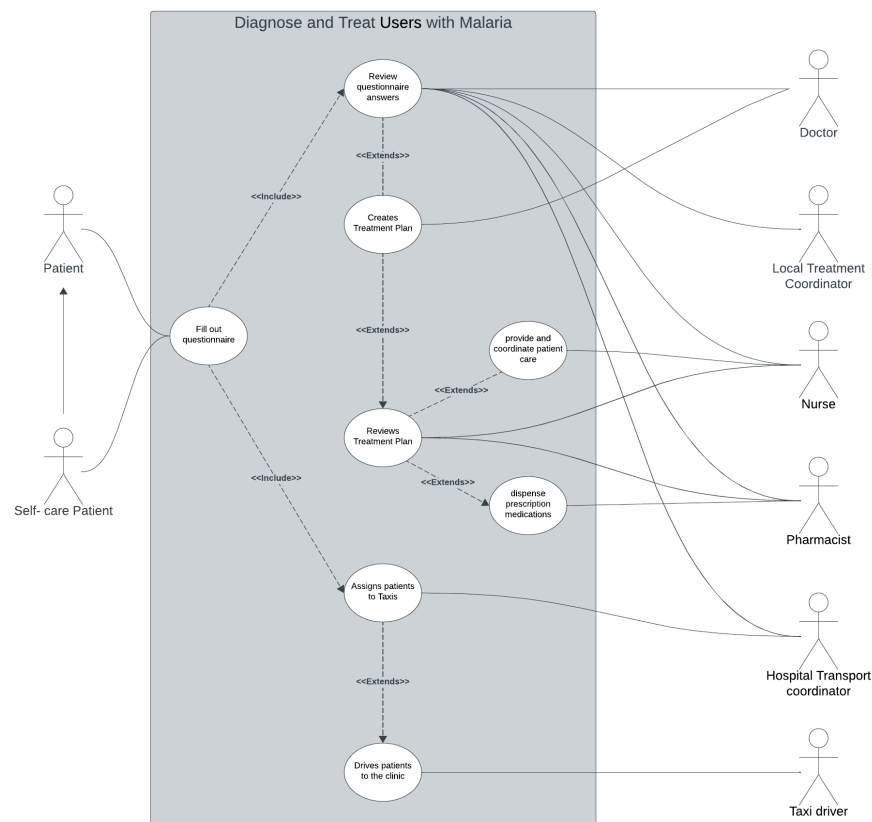
    c. Assumptions Made
- i. All parties involved have reliable internet and cellular access enabling them to download and use the app seamlessly.
- ii. Per the background, we assume that potential patients have access to a mobile device.
- iii. App users have a basic understanding of and ability to identify their symptoms.
- iv. The app can accurately identify the nearest clinic and does not lead users to the wrong location.
- v. The app assumes that users can navigate and interact with the interface without any language barriers.

2. Behavioral Models

   a. Highest Priority Business Processes
- i. Patient filling out the questionnaire:
  1. After downloading the app and being directed to a home page, users are redirected to a questionnaire and are prompted to fill it out with their symptoms and basic personal information. Once the questionnaire is completed, a predicted diagnosis is given. If the predicted diagnosis is positive, they are directed to a separate page where they are given directions to the closest clinic with contact, scheduling, and location information. Suppose a user is predicted negative for malaria. In that case, they are given a page with symptoms to be aware of and a map of local clinics with their contact information, including address and hours of operation.
- ii. Treatment coordinator's review and reaching out:
  1. Treatment coordinators receive an email summary of all potential positives with respective patient information. Appointments can be scheduled through the app. The treatment coordinator has access to a VOIP utility through the app, facilitating phone calls between potential patients and the coordinator.

    b. Activity Diagram (larger copy and image link on Page 9)
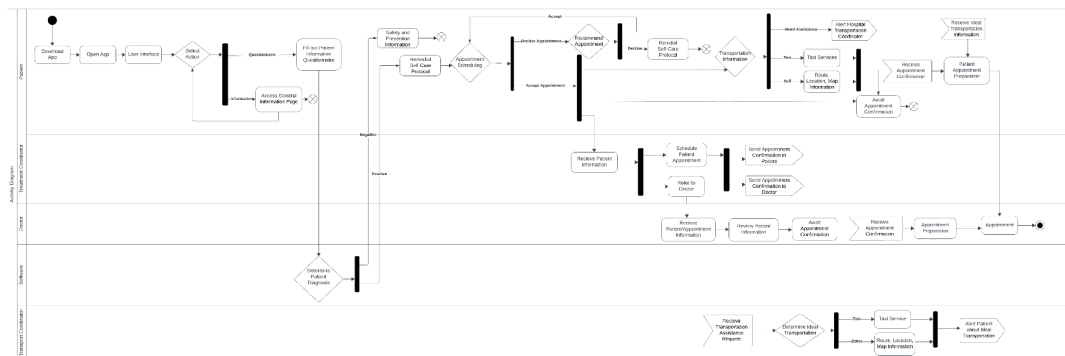
3. Domain Model
   a. Classes
      i. Person
         1. Various roles in the system are specialized versions of a general Person which represents an individual using the application. It is a superclass for more specific roles like Patient, Treatment Coordinator, Doctor, Nurse, and others.
      ii. Patient
         1. A patient represents a user who thinks they may have malaria and is in association with HealthRecord, TreatmentPlan, and Appointment. Contains demographic information, contact information, questionnaire responses, predicted diagnosis, health records, and treatment plans.
      iii. Treatment Coordinator
         1. A treatment coordinator is associated with a Clinic and has access to the list of patients associated with that clinic. They can call patients and schedule appointments.
      iv. Doctor
         1. A doctor is associated with a Clinic, visit, and treatment plan. The doctor has the ability to enter visit notes and create a treatment plan, including the ability to prescribe medication to be sent to a pharmacy.
      v. Nurse
         1. A nurse is associated with a Clinic, visit, and treatment plan, having access to patients on their schedule and their full profile, including treatment history and future treatment plans. The nurse has the ability to fulfill and log items in the treatment plan, as well as to enter visit notes.
      vi. Hospital Transport Coordinator
         1. The transport coordinator is associated with a Clinic, having access to a list of patients who have indicated they need assistance arranging transport. The transport coordinator can schedule patients onto rideshare, refer them to a taxi company, and contact patients directly.
      vii. Pharmacist
         1. A pharmacist is associated with a pharmacy and prescription. They have access to the list of patients the pharmacy serves, as well as medication orders prescribed to those patients, which they can mark as filled and refill as needed.
      viii. Prescription
         1. Prescriptions are issued by a doctor and are associated with a patient, medication, and pharmacy. They have a filled or unfilled flag that can be changed by the pharmacist.

ix. Taxi Coordinator
   1. A taxi coordinator receives a list of referrals from the hospital transport coordinator and has access to those people's respective pickup locations. The taxi coordinator can issue a service estimate, as well as receive payment and directly contact individuals on the referral list.

x. Questionnaire
   1. The questionnaire has a series of questions and answer choices, as well as logging demographic and contact information. These responses are associated with a patient.

xi. Health Record
   1. A health record is initialized with demographic information, contact information, questionnaire responses, and the predicted diagnosis, all being associated with a patient and visit. Accessed by reference to that patient, the health record receives visit notes, treatment plans, and prescribed medications.

xii. Treatment Plan
   1. The treatment plan is entered by a doctor and associated with a patient via their health record, doctors, and nurses. It contains a list of treatment actions, which can be updated by the doctor or nurses.

xiii. Prediction Algorithm
   1. The prediction algorithm receives new questionnaires and calculates a diagnosis. This diagnosis is associated with a patient.

xiv. Appointment
   1. An appointment has a patient, date, and location. It is created by the treatment coordinator and can be accessed by the treatment coordinator, doctors, nurses, and the patient associated with the respective appointment.

xv. Visit
   1. A visit is the container for the visit notes written by the doctor for each appointment. It is therefore associated with a patient, a doctor, and an appointment.

xvi. Clinic
   1. A clinic has a name, location, hours, contact information, and a list of patients. It is associated with the Patient, treatment coordinator, Doctor, and Nurse because a medical facility is associated with Patients and various staff roles.

xvii. Pharmacy
   1. A pharmacy has a name, location, hours, and contact information, as well as a list of patients that have been associated with it along with the prescription.
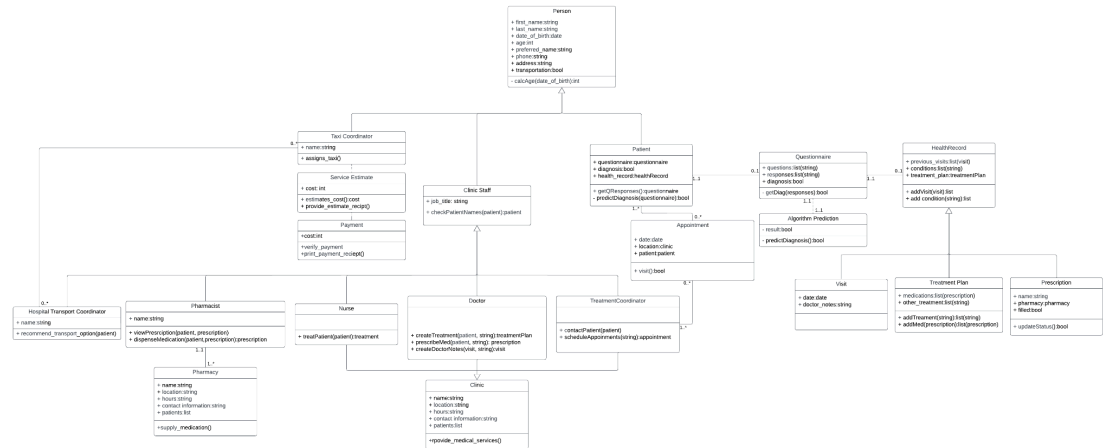
xviii. Service estimate
1. A service estimate has an amount, the entity that has provided the estimate, and the recipient of said estimate. It is associated with the Taxi Coordinator

xix. Payment
1. A payment has an amount, payee, and payment recipient. It is associated with the service estimate.

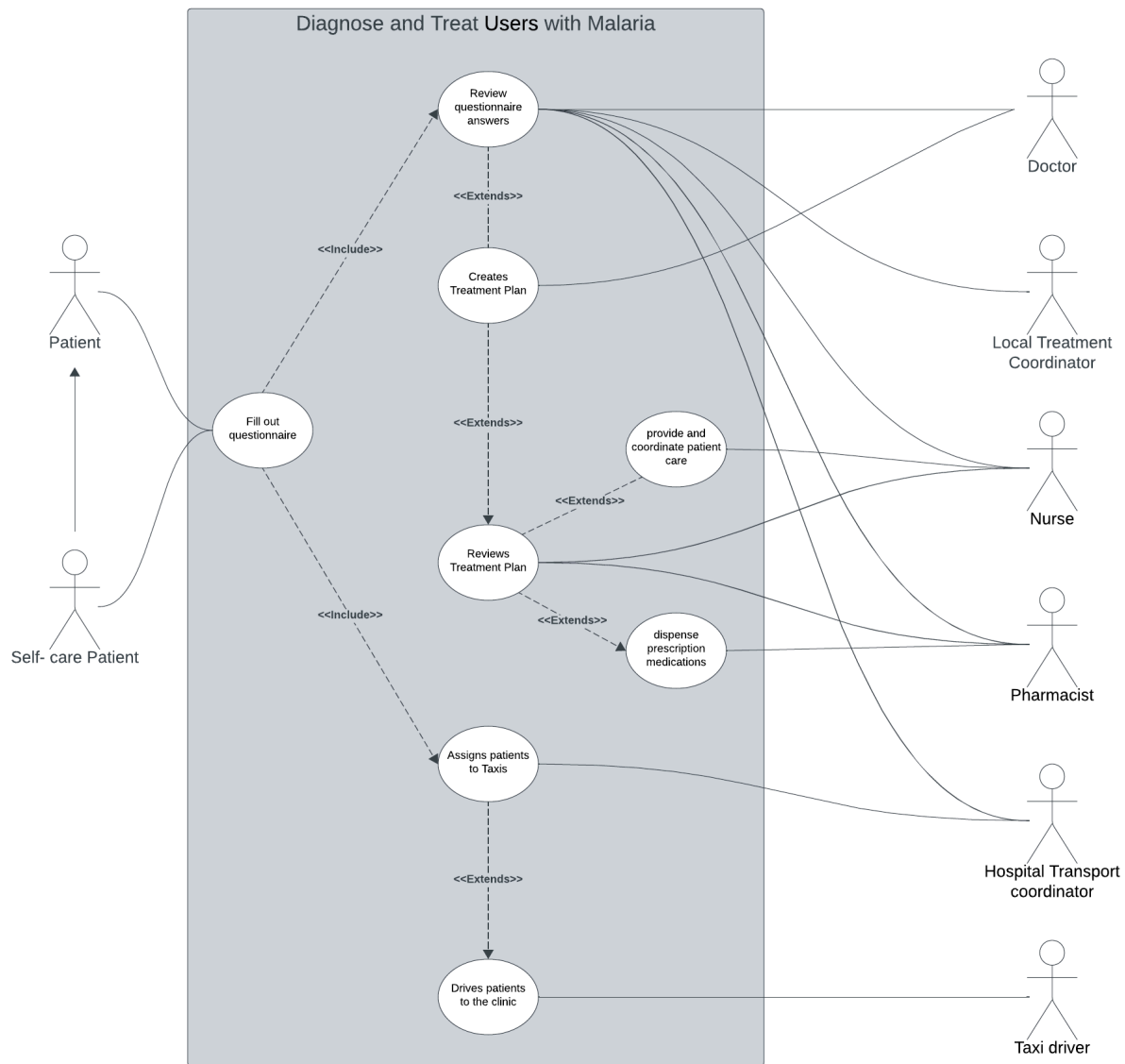b. Class Diagram (larger copy and image link on Page 10)

i.

c. Assumptions Made
i. While creating the Class Diagram, the five key assumptions that we made were: privacy compliance, multilingual support, prediction algorithm accuracy, implementation of privileged access to attributes, and real-time communication. To break those down the class diagram assumes privacy compliance (1), which means that patient information is relayed with secure encryption and transmissions. Next, the class diagram assumes multilingual support (2). Doctors and physicians can freely interact with the interface in a language they are fluent in and the interface can be used in a multitude of locations, varying in regional dialects. This assumption may include a translation layer. Additionally, the class diagram assumes the prediction algorithm (3) runs seamlessly and has an acceptable level of accuracy. Furthermore, the diagram assumes privileged access (4), meaning that users have an appropriate level of access to the information stored. This includes increased privileges for accessing medical records for doctors and nurses as compared to the transportation coordinator. Finally, we assume real-time communication (5). This final assumption states that the diagram assumes both users and those related to the clinic can communicate in real time allowing time-sensitive events to be handled properly.

https://lucid.app/publicSegments/view/cbef26b6-8fb8-47b2-9e90-7ef5764884e0/image.png

Diagnose and Treat Users with Malaria

https://lucid.app/publicSegments/view/25c8bac7-9d0f-4c3a-b837-42520f495a78/image.png

https://lucid.app/publicSegments/view/e506d7d2-e3f9-4468-afc3-3bdcc81fbba0/image.png