Lab 4: Ashesi Nantembea Health Clinic

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CS 213: Object-Oriented Programming

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During the implementation of our program, we used data structures such as the HashMap, TreeMap, and ArrayList. We also utilized concepts such as inheritance and interfaces to establish relationships between our classes.

In our `ClinicManagementSystem` class, we used the following collections: HashMap, TreeMap, and ArrayList. We used the `patient` HashMap to store patients' records. Each patient has a unique integer value, `patientId`, which is used as the key for the HashMap. Whenever we need patients' details in any other class, for example, in the appointment class, we use the `patient.get(patientId)` to access all the patient's personal details. Using this HashMap helps because HashMaps are fast at looking up values. This means that each patient's details can be retrieved in constant time, regardless of the number of patients registered.

We then used the `appointmentsByDate` Treemap to schedule and track appointments. The TreeMap automatically sorts appointments by date, making it easy to process them in chronological order. The `doctors` ArrayList is used for space efficiency, as there are only a few doctors, and iteration is sufficient to retrieve their details.

Inheritance is implemented through the `Doctor` and `Patient` classes, which inherit from the Person class to ensure consistency and validation of personal details, such as name, email, and phone, and also to minimize code duplication. The system also implements two interfaces, `FileOperations`, which allows the system to save data and read from a text file. The `ReportGenerator` defines the methods for the system to report all the daily appointments as Strings.