

Health Care System (HCS)

Problem Definition

You have been requested to develop a prototype for a health care system with the following characteristics:

A hospital has 20 doctors and 20 nurses and 7 health care staff. The CEO of the hospital plans to build a computerized information system, which manages the information on patients and keeps patients' privacy. A customer can make an appointment, change, or cancel the appointment through a health care staff by calling the hospital. The health care staff checks the available time for a doctor, with whom the customer makes an appointment. The appointment will be recorded in the system, and updated whenever the customer requests change to the appointment. The appointments will be cleared when customers visit the hospital. In case of missing appointments, the system clears automatically the appointments on a daily basis at 8:00 pm. The hospital does not provide walk-in customers with health services, except for appointments.

When a new patient arrives at the hospital, the health care staff creates patient information. The information includes patient name, address, phone number, social security number, and insurance name. Then the health care staff creates a patient record for the visit, and adds the record to a list of patients being served by each doctor, and the nurse of a doctor calls patients one by one for medical services. The health care staff just creates a patient record and adds it to the list of patients if a patient visited the hospital previously. The nurse measures a patient's weight, height, blood pressure, and pulse every time a patient visits the hospital, updating the patient record with those basic facts. The nurse also adds the reason of patient's visit to the hospital to the patient record.

A doctor can look at the next patient record before he meets the patient. After meeting a patient, a doctor updates a patient record with his treatment.

A patient pays for the medical service after getting a health service. A patient can pay it by credit/debit/check/cash. In cases of credit or debit card payments, the card is validated by the financial institute and the amount is charges to the patient card account in the financial institution. Then the financial institute sends a reference number to the hospital, which is stored with patient payment information. A patient gets a receipt for the payment.

At the evening at 9:00 pm, the system generates a daily summary report. The report will show the information on each doctor's income per a day. There will be each doctor name, the number of patients served by a doctor in a day, and health service income. The report will be stored so that the CEO looks at it any time.

Doctors, nurses, staff and CEO are allowed to access their patient information, patient records, and payment information on the basis of their permission. A doctor has all permission on read/write on his patient information and record. A nurse has read/write permission on patient information and record, but she cannot write treatment. A doctor or nurse cannot access the patient information and record if the patient is not his one. A health care staff can create, read, and write patient information. And a health care staff can access patient payment information. The CEO can read patient information, patient records, and payment information, but he cannot write on it.

Term Project: Phase I

For Phase I of the project, you are required to develop:

Requirements Modeling:

- a) Develop a use case model defining functionality of the system. The use case model consists of actors and use cases. Describe each use case using the template in lecture note.

Analysis Modeling:

- b) Develop a System Context Class Model using a class diagram, which shows how the system interfaces to the external environment.
- c) Develop a conceptual static model showing entity classes in the system. The relationships among entity classes should be defined on the static model in which multiplicity of associations are also represented on the associations.
- d) Define attributes of each entity class.
- e) Develop the communication model depicting objects participating in each use case and the sequence of interactions among the objects. A use case needs a communication model.

Term Project: Phase II

Architectural Design:

- a) Design a software architectural model for the system where the model is defined in terms of subsystems and their interactions. Each subsystem should be represented with objects supporting the subsystem.

Detailed Design:

- b) Design relational database tables if the entity classes in (d in Phase 1) map to database wrapper classes.
- c) Define additional classes except for entity classes in (d in Phase 1). You may include interface classes, control classes, business logic classes and so on.

- d) Derive operations of classes from the communication diagrams and define the operations with parameters.

Implementation:

- e) Develop a running prototype. You need to implement classes using C++ or Java, and then integrate them to each subsystem, which should be further integrated into a system. GUI is preferred to Textual UI (Like DOS-Based).

Testing:

- f) Design test cases that have test data and expected results. Test the prototype using test data to each use case and then record the test results. You are required to turn in your test results with test data and expected results.

Make your assumptions if needed