Team: Selva Priyanka Selvarathinavel, Selva Priya Selvarathinavel, Poorwa Hirve (Wimbledon)
Title: Electronic Medical Record (EMR) System
Project Summary:
The primary function of our system is to maintain medical records electronically and provide functions for different kinds of users in a medical environment. This involves the use of a medical portal as a common platform for all the users to utilize. Medical records will maintained, appointments can be scheduled, and the hospital daily activities will be monitored and maintained in the system. Users include patients, doctors, nurses, attendants, accountants and pharmacists. Activities include scheduling shifts, appointments, surgeries, prescribing medicines, performing follow ups, recording patient vitals, storing medical history, creating invoices, claiming insurance and updating inventory of medicines. Patient records will be regularly updated by doctors and nurses, and new patients and employees will be handled by the receptionist. The pharmacist will maintain the medical inventory. Accountant takes care of auditing and invoicing.

Project Requirements:
  ● **Business Requirements:**

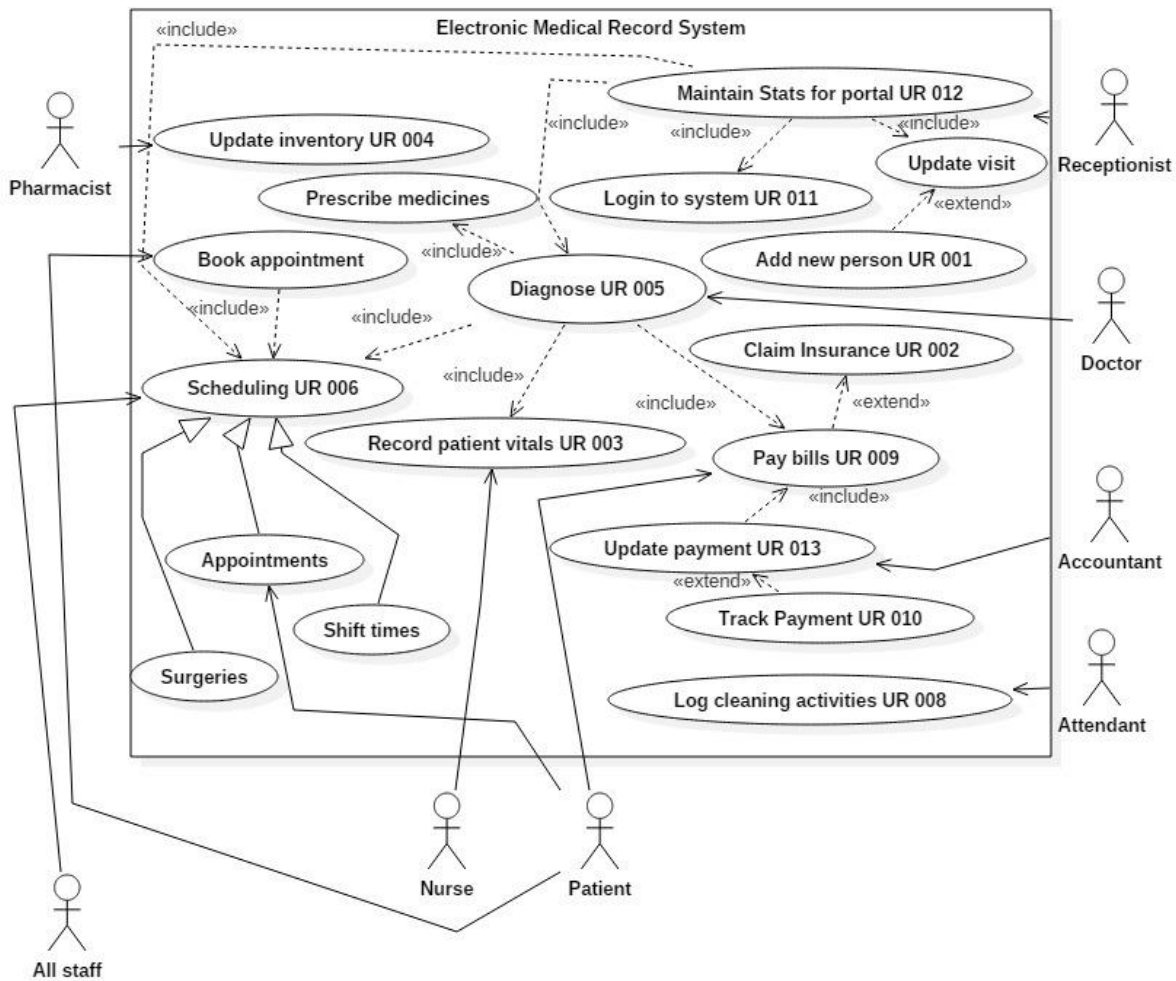| ID	Requirement	Topic Area	Actor	Priority
BR001	Login must be through corporate email	Authentication	Doctor, Attendant, Receptionist, Accountant, Pharmacist	Critical
BR002	Insurance officials currently involved with patients only have access to only their patients' records	Authentication	Insurance Official	High
BR003	Employee payments are distributed last working day of each month	Payroll	Receptionist, Doctor, Attendant, Pharmacist, Accountant	High
BR004	All employees can avail leave as per their prescribed leaves with a notice of one week	Logistics	Receptionist, Doctor, Pharmacist, Attendant, Accountant	Medium

● **User Requirements:**

ID	Requirement	Topic Area	Actor	Piority
UR001	Add new users to the system	Updating	Receptionist	Medium
UR002	Claim Insurance	Payment	Patient	Medium
UR003	Record patient problem list, patient history, vitals	Reporting	Patient, Receptionist, Nurse	High
UR004	Update medicine inventory	Updating	Pharmacist	Critical
UR005	Diagnose a patient	Diagnosis	Nurse, Patient, Doctor, Pharmacist	Critical
UR006	Schedule doctor appointment, surgeries, shifts	Scheduling	Patient, Receptionist, Doctor, Patient, Nurse, Attendant	Critical
UR007	Access shift times and schedules	Scheduling	Doctor, Nurse, Attendant	High
UR008	Keep track of periodic cleaning	Reporting	Attendant	High
UR009	Pay bills	Payment	Patient, Receptionist, Accountant	High
UR010	Track payments	Payment	Accountant	High
UR011	Login to system	Portal	All	Medium
UR012	Maintain statistics	Portal	Receptionist	High
UR013	Update payments	Payment	Accountant	High

- **Non Functional Requirements:**

ID	Requirement	Topic Area	Actor	Priority
NFR001	Medical records must be secure and access control must be maintained	Security	System	Critical
NFR002	Patient records must be available to doctors without observable latency (< 10 ms)	Performance	Doctor	High
NFR003	Patients must be able to schedule an appointment using a calendar at the first page on the dashboard	Usability	Patient	Medium
NFR004	Any data from the database must be returned correctly or not at all. Wrong data is intolerable	Reliability	Doctor, Patient, Receptionist, Accountant	High

Use Case Diagram:

Electronic Medical Record System

«include»

Maintain Stats for portal UR 012
«include»   «include»   «include»
Update inventory UR 004
Update visit   Receptionist
Prescribe medicines
Login to system UR 011
«extend»
Book appointment
Add new person UR 001
«include»
Diagnose UR 005
«include»   «include»
Scheduling UR 006
Claim Insurance UR 002   Doctor
«include»   «extend»
Record patient vitals UR 003
Pay bills UR 009
«include»
Appointments
Update payment UR 013   Accountant
«extend»
Shift times
Track Payment UR 010
Surgeries
Log cleaning activities UR 008   Attendant

Pharmacist

Nurse   Patient

All staff

Use Case Documents:

Use Case ID	UC-01
Use Case Name	Diagnosis and Treatment
Description	Patient can be diagnosed and treated by the doctor
Actors	Patient, Doctor, Nurse, Pharmacist, Receptionist
Pre-conditions	Doctor, Nurse and Pharmacist are available Patient has sufficient money for the diagnosis and treatment
Post-conditions	Patient is diagnosed and medicines are prescribed
Frequency of Use	Frequently used all the time by patients
Flow of Events	(see table below)

|	Actor Action	System Response
1	Receptionist updates details of Patient visiting/ Adds new record if new user	Visit is updated in patient record
2	Patient is assigned for diagnosis to doctor	Doctor gets patient's record in his view
3	Nurse takes required vitals based on problem	Vitals with timestamp is added to patient record
4	Doctor diagnoses	-
5	Doctor uploads medicine prescription	Notifies Pharmacist with the medicine prescription and Patient details
6	Pharmacist dispatches medicines to the correct Patient	Notifies Patient
7	Patient opens payment portal	Provides options for insurance claim
8	Patient claims	Adds insurance related

		insurance	details to the bill
	9	Patient pays bill	Patient is notified, Accountant is notified

Developer Notes	Make sure all the parts of this use case is placed conveniently near each other in the dashboard for all the actors.

Use Case ID	UC-02
Use Case Name	Scheduling
Description	Appointments, Surgeries, Shifts can be scheduled
Actors	Doctor, Nurse, Attendant, Receptionist, Patient
Pre-conditions	Time requirements of shifts and employees should be met.
Post-conditions	Schedule for appointment, surgeries correlated with shifts of employees.
Frequency of Use	Daily by all
Flow of Events	

	Actor Action	System Response
1	Doctors, Attendants, Nurses, Receptionists submit time slots	Shift schedule is updated
2	Patient books an appointment to see a doctor	System sees available shifts of doctor and appoints patient to doctor
3	Doctor schedules surgery if required	Surgery timings are coordinated with shifts of doctors and nurses.

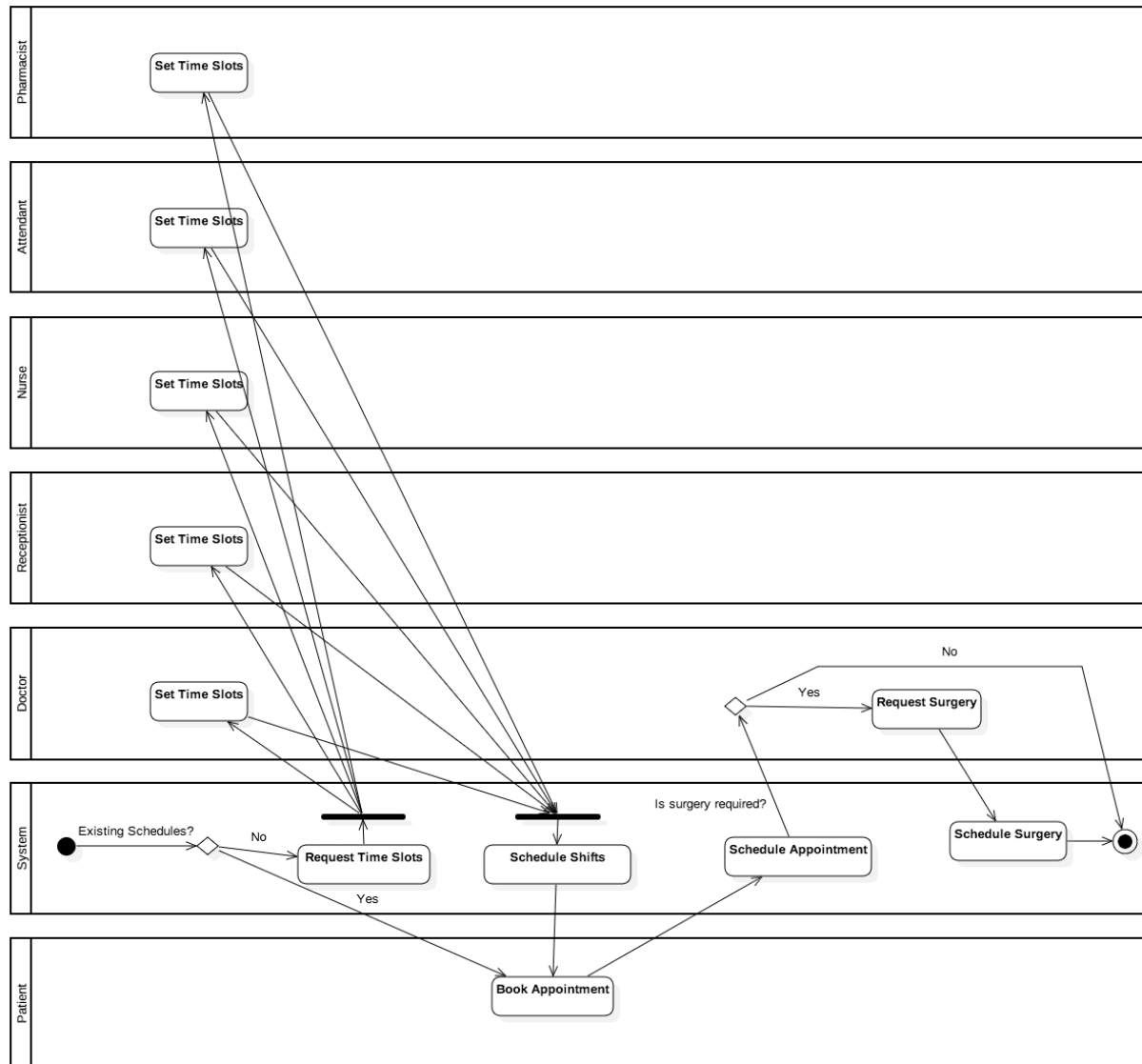|	
Developer Notes	Make sure all the parts of this use case are taken into consideration so that there is no conflict.

Activity Diagrams

- Activity Diagram 1
- Requirement ID: UR005
- Use Case ID: UC-01
- Patient can be diagnosed and treated by the doctor
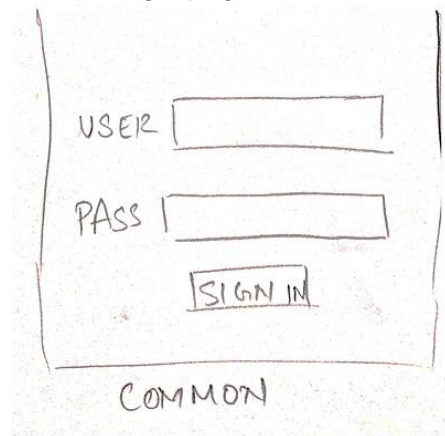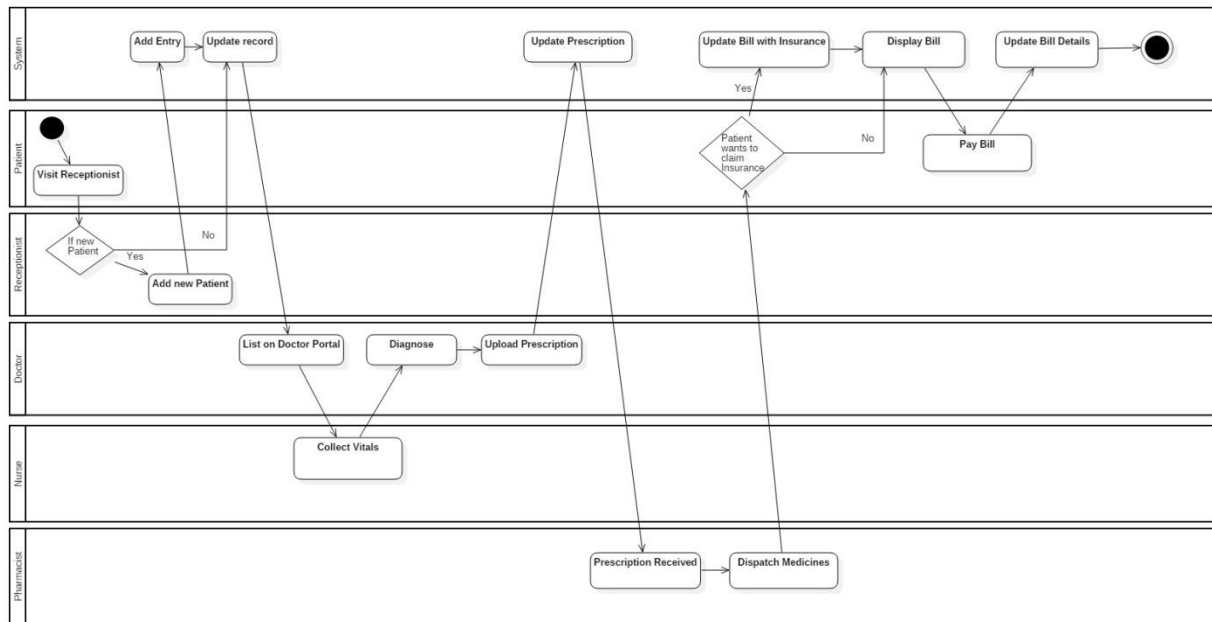

Activity Diagram 1

- Activity Diagram 2
- Requirement ID: UR006
- Use Case ID: UC-02
- Appointments, Surgeries, Shifts can be scheduled
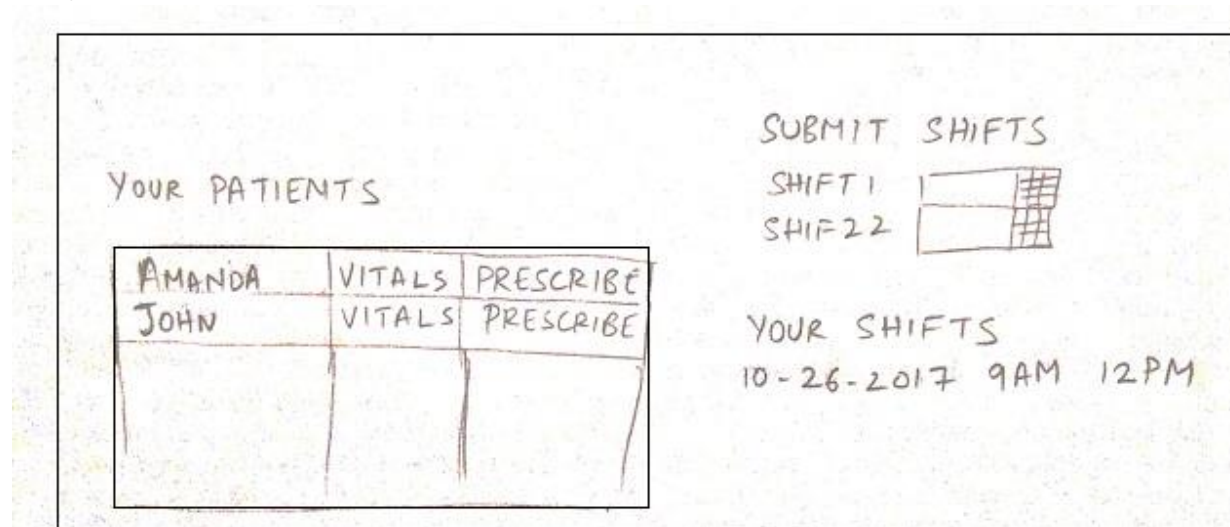

Activity Diagram 2

UI Mockups

1) Login page

USER [   ]

PASS [   ]

[SIGN IN]

COMMON

2) Doctor Dashboard

YOUR PATIENTS

AMANDA	VITALS	PRESCRIBE
JOHN	VITALS	PRESCRIBE

SUBMIT SHIFTS
SHIFT 1 [   ]
SHIF22 [   ]

YOUR SHIFTS
10-26-2017 9AM 12PM

Doctor can access patient vitals. Doctors can upload prescription.

3) Patient Dashboard

YOUR APPOINTMENTS

[NEW]

10-26-2017	DR BOB	PAY	PRESCRIPTION
10-21-2017	DR AMY	PAY	PRESCRIPTION

Patients can create new appointments, pay for earlier appointments and access prescriptions.

4) Nurse Dashboard

PATIENT	TEMPERATURE	PRESSURE	HEIGHT	WEIGHT
JOHN	▽	▽	▽	▽

SUBMIT SHIFTS
SHIFT 1   [   ] ▦
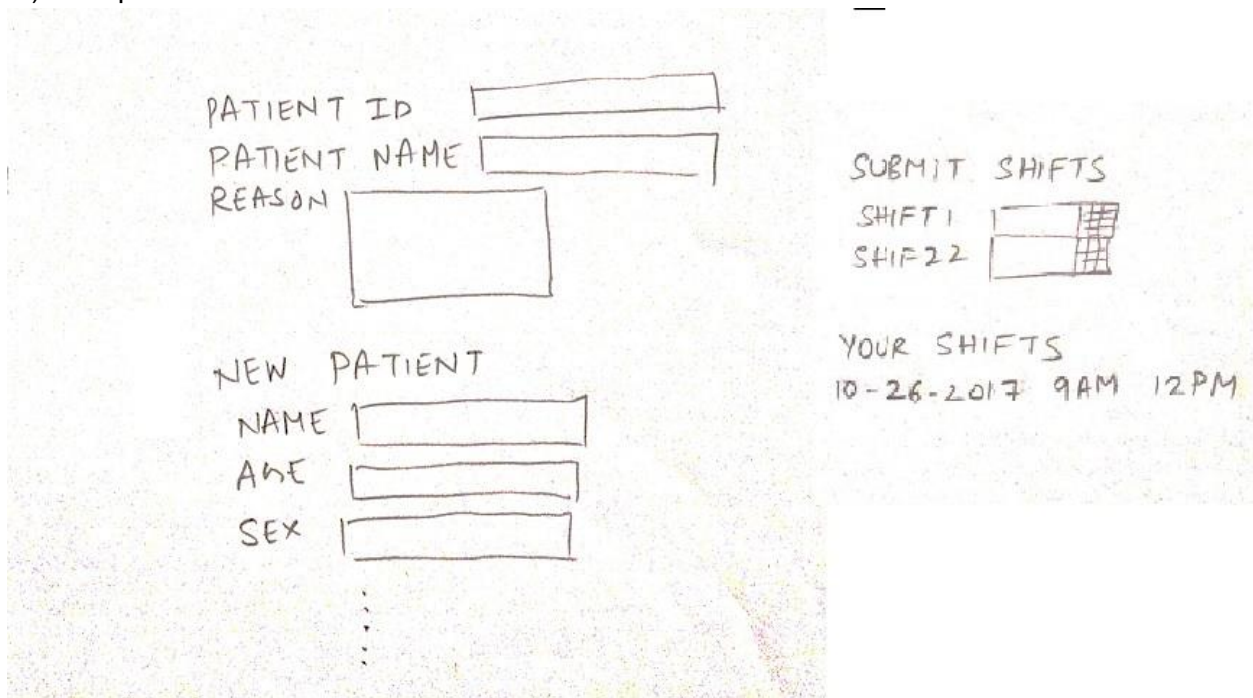SHIF 22   [   ] ▦

YOUR SHIFTS
10-26-2017 9AM 12PM

Nurses can upload vitals of patients.

5) Receptionist Dashboard

PATIENT ID [_____]
PATIENT NAME [_____]
REASON [_____]

NEW PATIENT

NAME [_____]
AGE [_____]
SEX [_____]

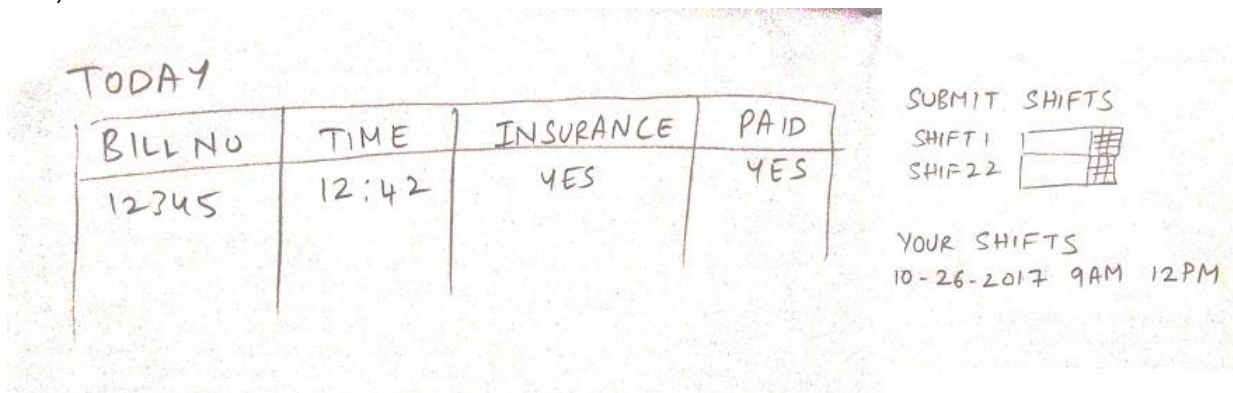SUBMIT SHIFTS
SHIFT1 [_____]
SHIF22 [_____]

YOUR SHIFTS
10-26-2017 9AM 12PM

Receptionist can update visit of a patient and add new patient.

6) Accountant Dashboard

TODAY

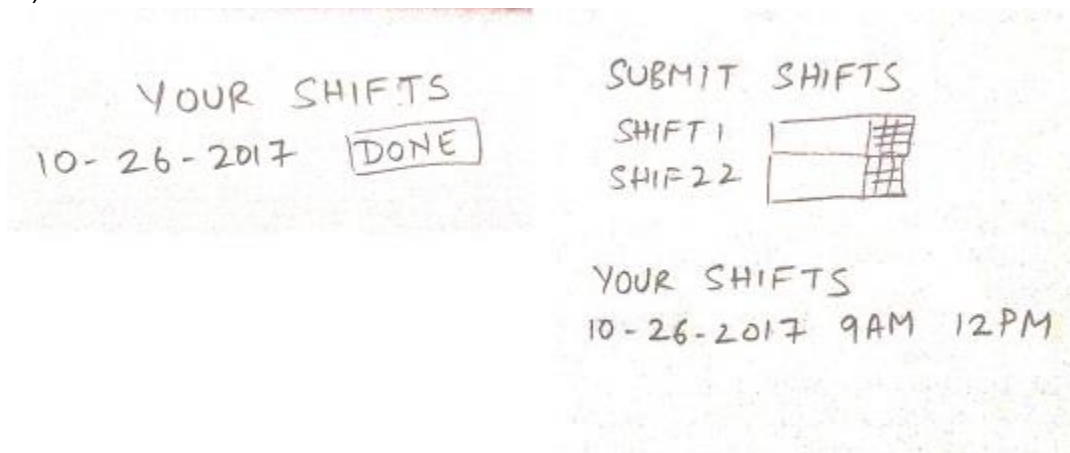| BILL NO	TIME	INSURANCE	PAID
12345	12:42	YES	YES

SUBMIT SHIFTS
SHIFT1 [_____]
SHIF22 [_____]

YOUR SHIFTS
10-26-2017 9AM 12PM

Accountant can view and audit bills and records.

7) Attendant Dashboard

YOUR SHIFTS
10-26-2017 [DONE]

SUBMIT SHIFTS
SHIFT 1 [____] ▦
SHIF 22 [____] ▦

YOUR SHIFTS
10-26-2017 9AM 12PM
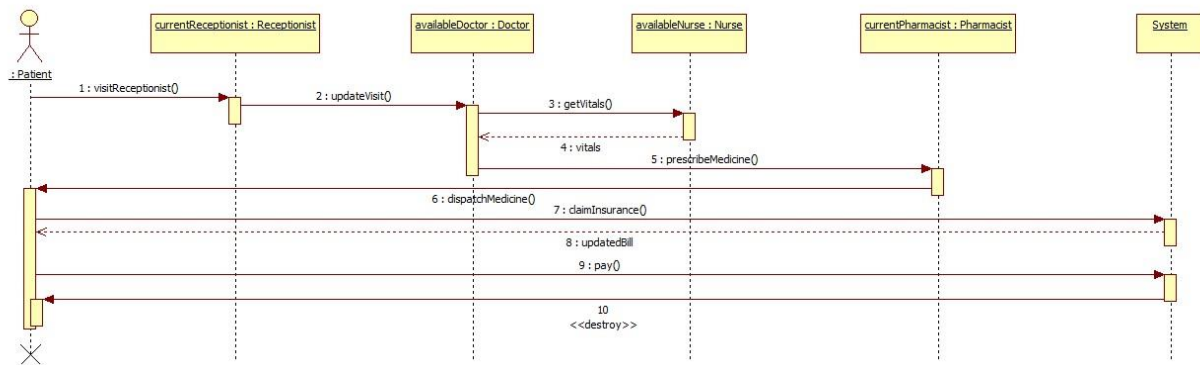
Attendant can view and mark shifts as done.
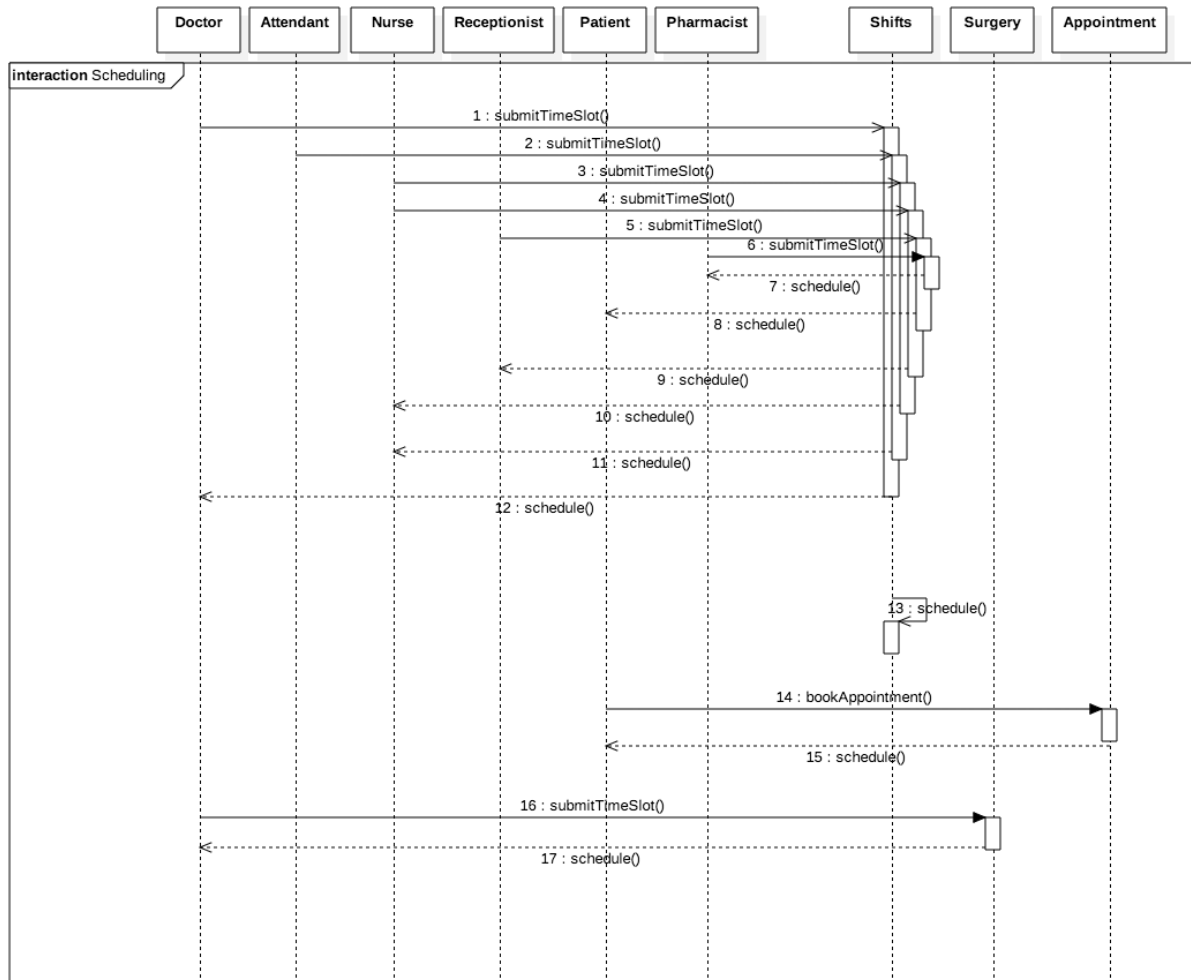All staff can submit shifts and view them.

Sequence Diagrams
- Sequence Diagram 1
- Requirement ID: UR005
- Use Case ID: UC-01
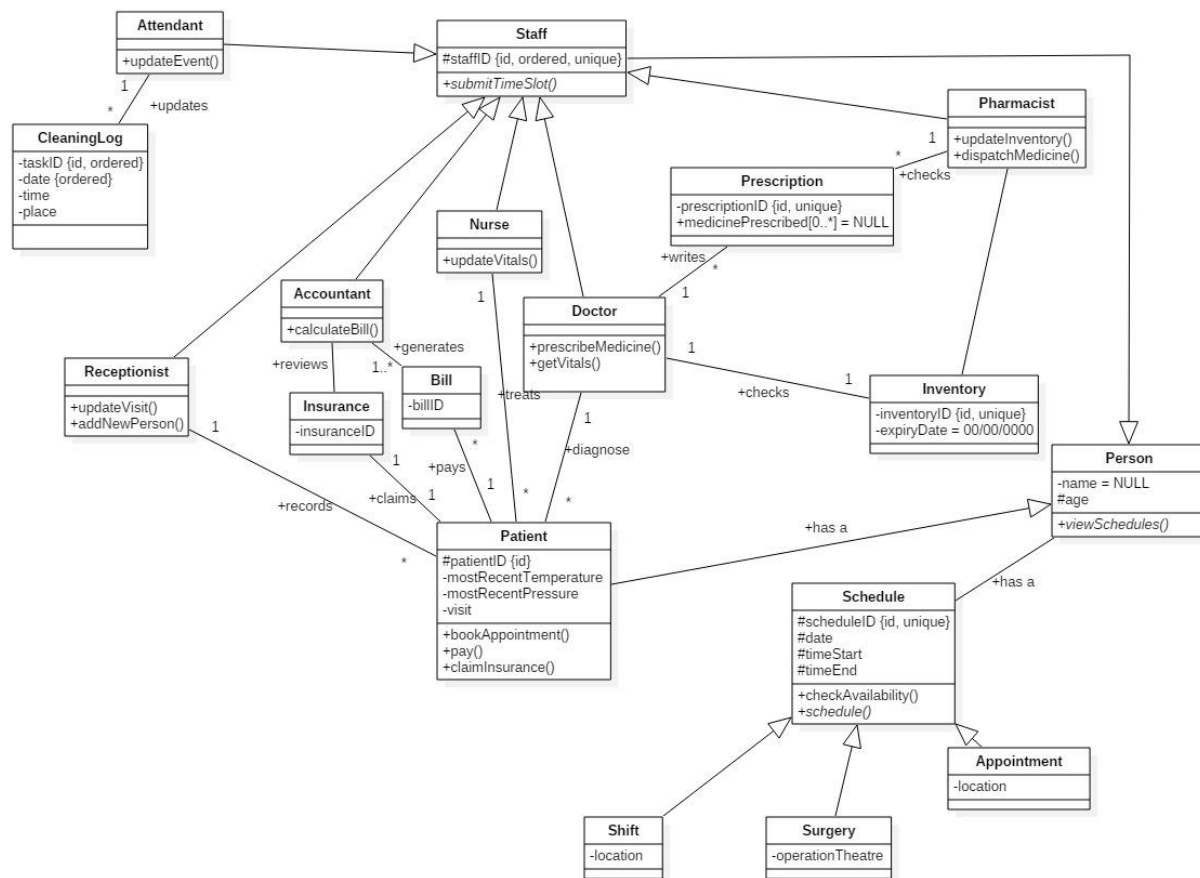- Patient can be diagnosed and treated by the doctor

Sequence Diagram 1

- Sequence Diagram 2
- Requirement ID: UR006
- Use Case ID: UC-02
- Appointments, Surgeries, Shifts can be scheduled

Sequence Diagram 2

Class Diagram

Data Storage:

1. MySQL will be used to store the data.
2. Abstract classes like Person, Staff, and Schedule are not represented as tables.
3. Every other class is represented as a table.
4. Each object of the class will have its rows in the table based on a unique primary key.
5. Unique primary key is maintained for each table with foreign keys representing the relation between the two tables.
6. Foreign keys will be decided by the functions involving more than 1 class.
7. Primary key will be made unique by including the object name as part of the key.
8. Once the object is destroyed, that row will be deleted with the object name as part of the key.