HIGH-LEVEL ARCHITECTURAL DESIGN

for

MediApp

Prepared by:

Christopher Campbell, 1143732
Purvil Majmudar, 1151489
Michael Ngo, 1152487
Mostapha Mohammed, 1153832
Fady Makram Abdel-Malik, 1159519
Sahiti Bonthu, 1164578

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1 Introduction

1.1 Purpose

This document provides the system architects, designers, and OO design analysts with a set of use case diagrams, analysis class diagrams, an architectural design of the system, and class responsibility collaboration (CRC) cards in the proceeding sections. This will give the users of this document an understanding of the system's functionality, a logical and abstract structure for the system, the classes of the system and their responsibilities, and an overall architecture of the system-to-be.

1.2 System Description

The MediApp Android application is a system that provides doctors, nurses, patients, administrators, and pharmacists with all the information they need on their Android devices. The application employs different levels of permissions to differentiate between the viewing and editing privileges of each user as well as providing them with the appropriate interface.
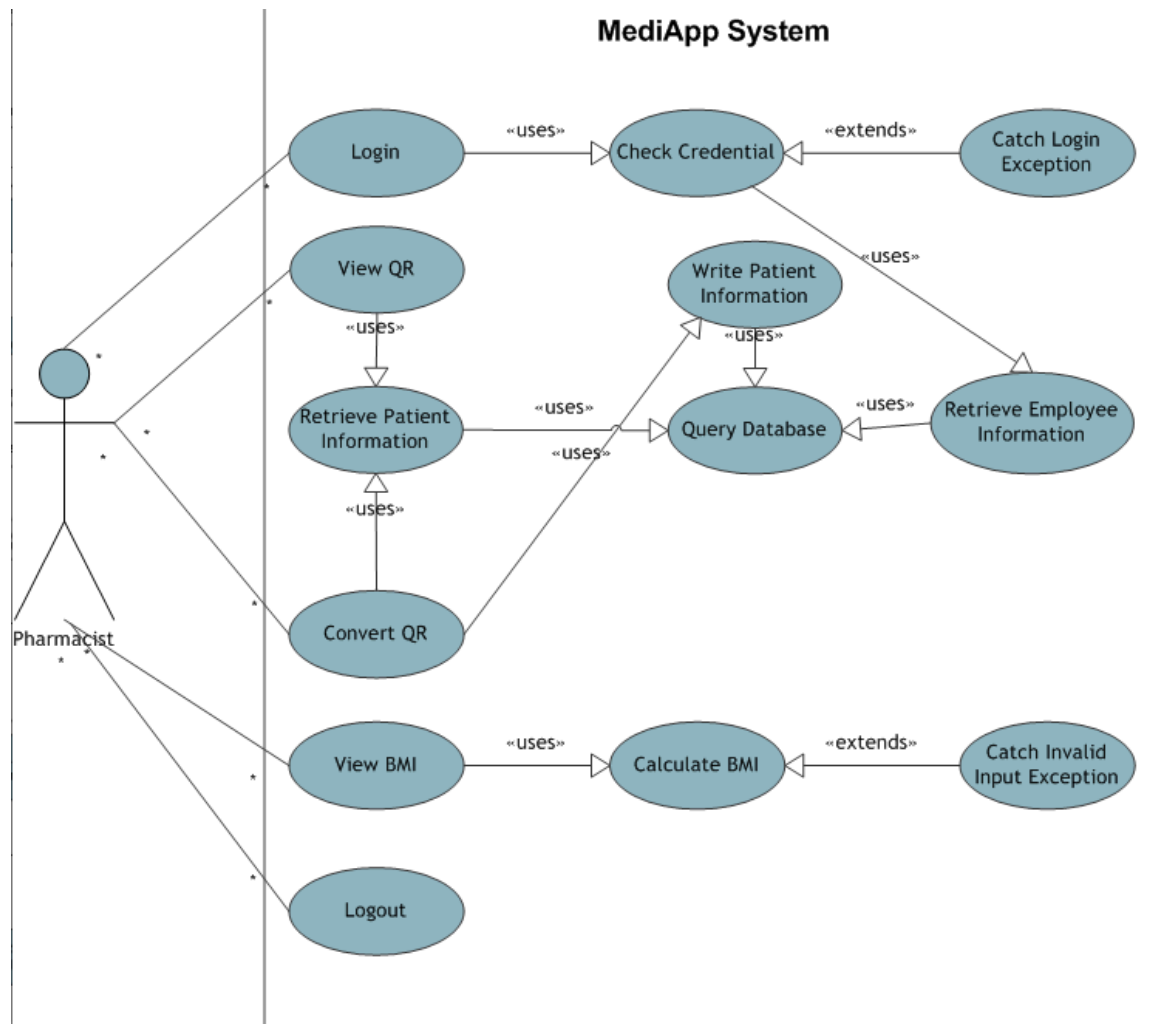
It allows doctors to view, edit, and update their patients' medical records and plots, make appointment notes, maintain their schedule, prescribe medicine using a QR code generator, contact other employees in the medical center, compute BMI and receive push notifications. The nurses' interface has the same features with the exception of prescribing medicine. The patient has the ability to view upcoming appointments and reminders, generate plots of their appointments history, compute their BMI, receive push notifications, as well as view their prescriptions. The pharmacists within the medical center are able to scan the patients QR code to retrieve the required prescription for them.
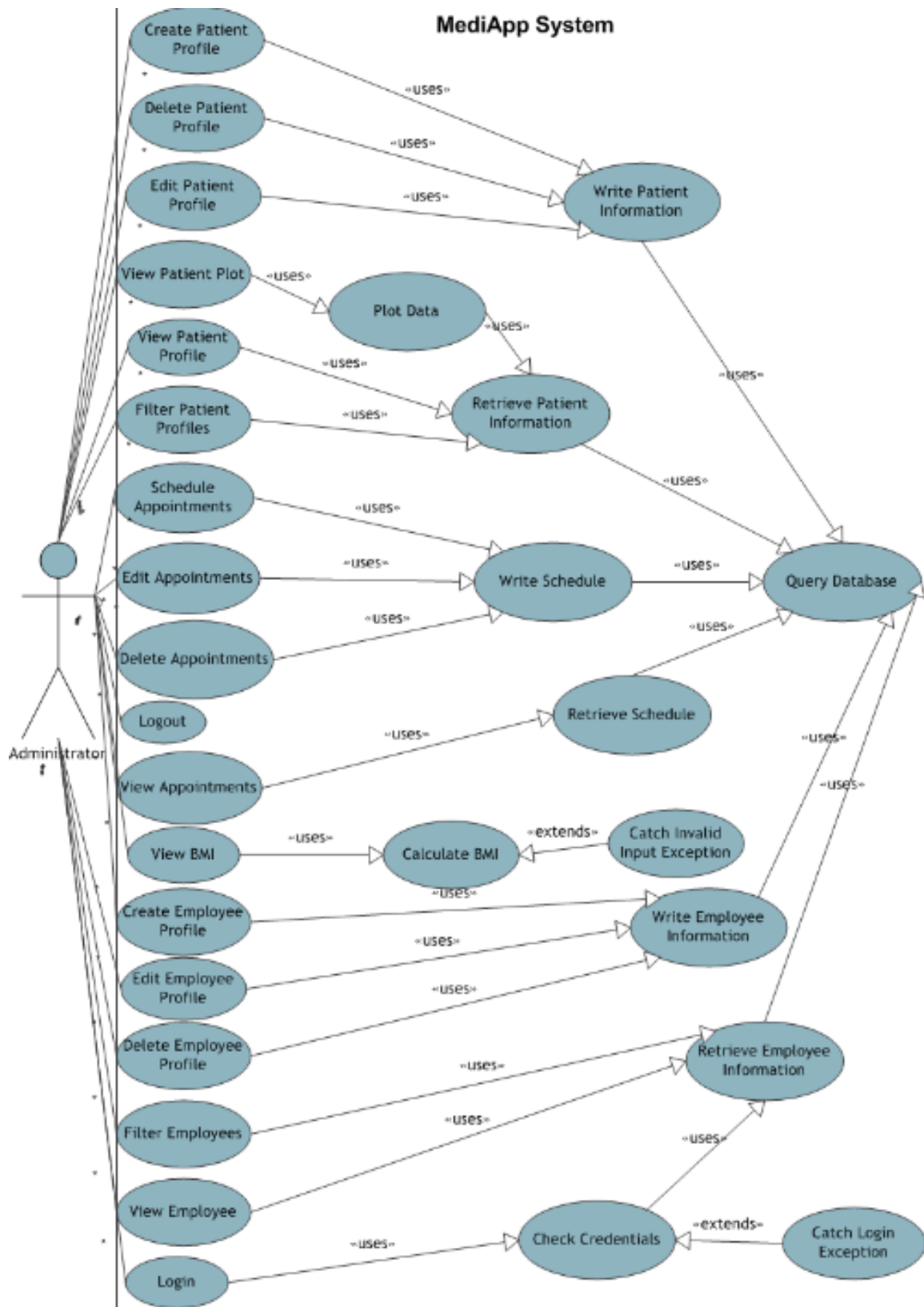
1.3 Overview

Section 2 contains use case diagrams for the administrator, doctor, patient, nurse, and pharmacist actors depicting scenarios of how the system reacts to requests from these external users. Following that, section 3 describe the systems functionality in terms of abstractions (classes) as well as their logical relationships to provide the reader with an understanding of the system's overall architecture. Section 4 includes the description of the system's architecture, its type, and the reasoning behind the choice of this architecture. Finally, section 3 identifies all the classes required for this system, their responsibilities and which classes they depend on through the use of CRC cards.
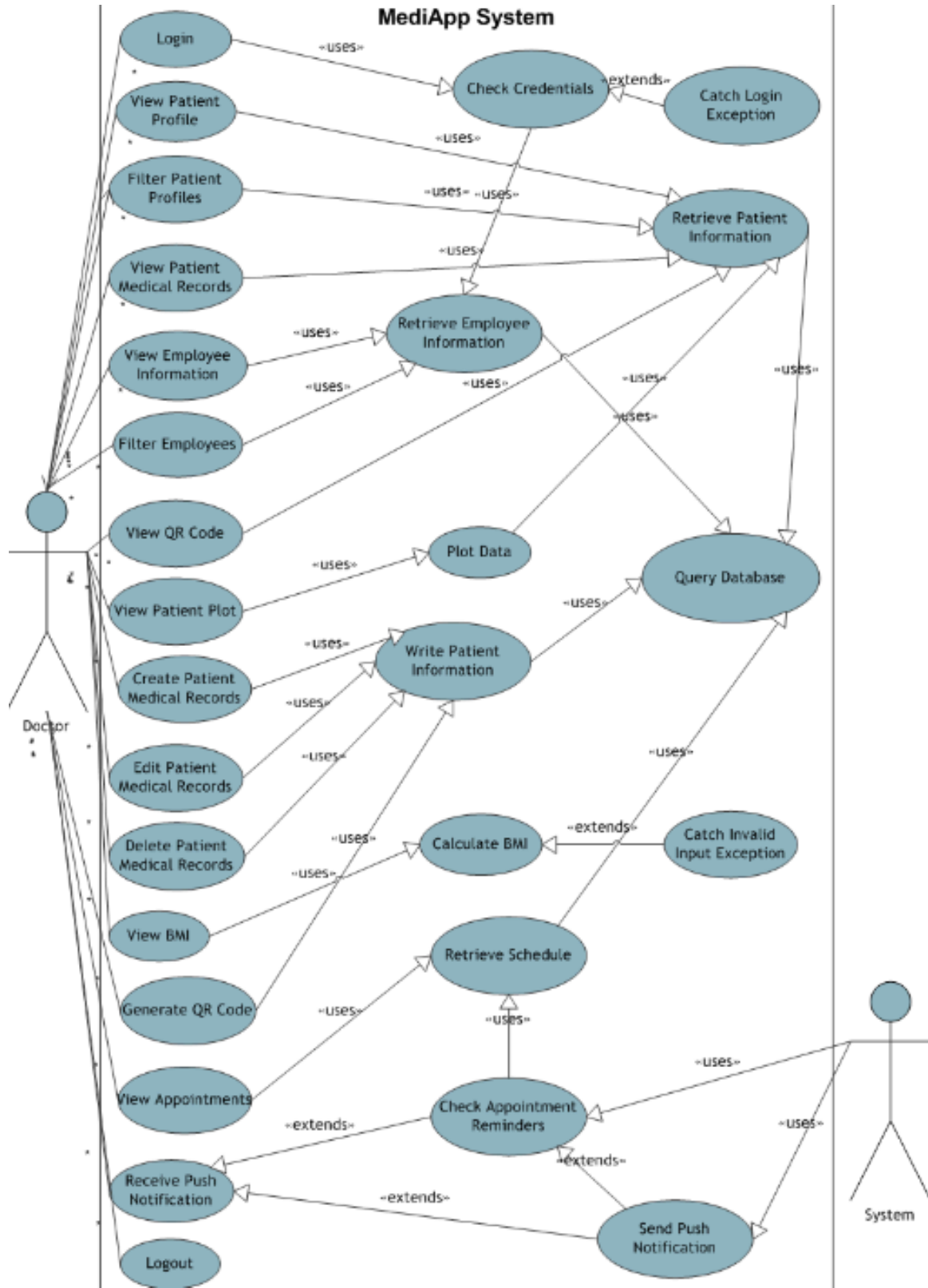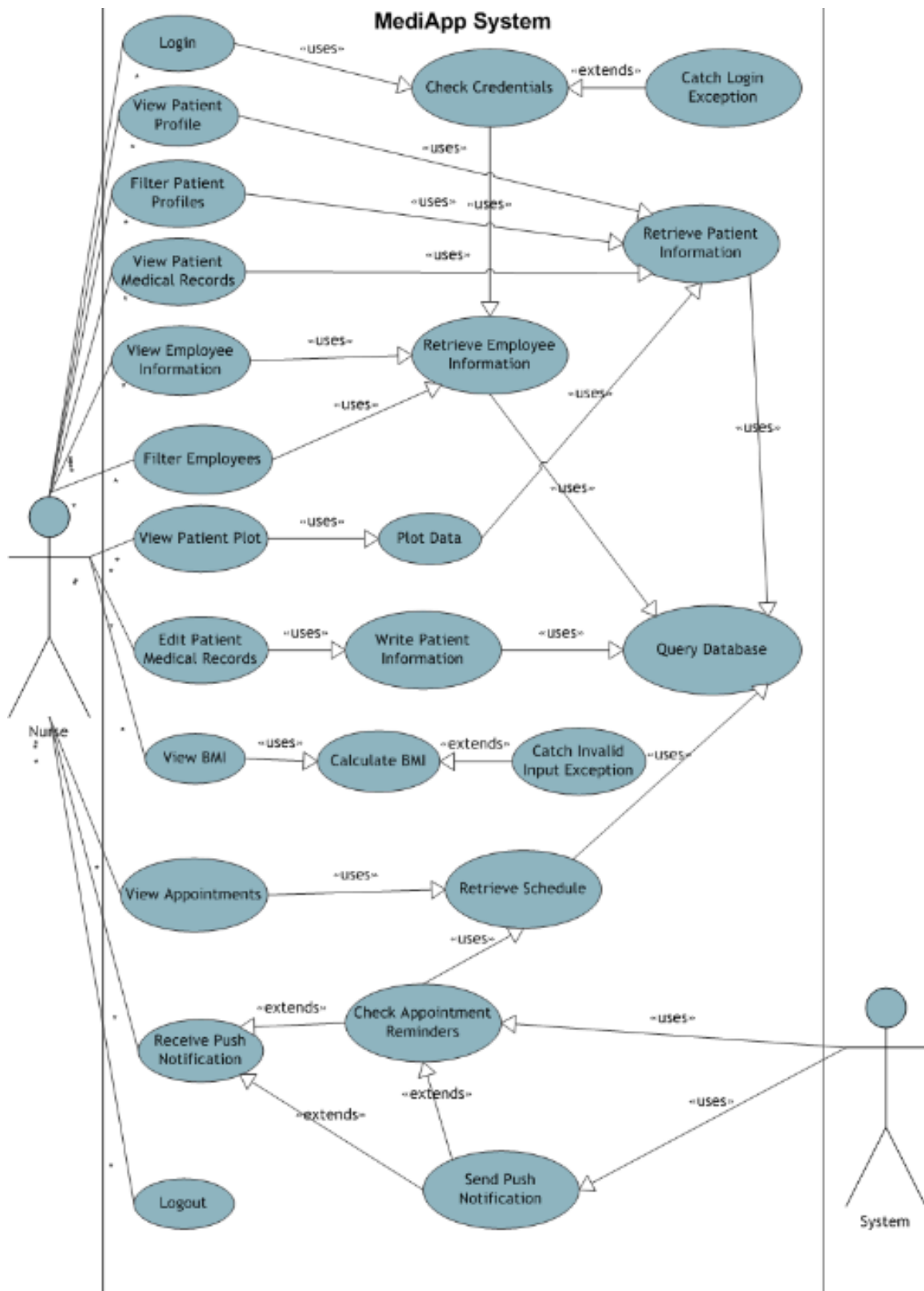
2 Use Case Diagram

The Use Case Diagram has been broken into five parts, each for a specific user.
All uses with the same name refer to the same action for all five parts.

MediApp System

MediApp System

Create Patient Profile

Delete Patient Profile

Edit Patient Profile

«uses»

«uses»

«uses»

Write Patient Information

View Patient Plot «uses»

Plot Data

«uses»

View Patient Profile

«uses»

Filter Patient Profiles

«uses»

Retrieve Patient Information

«uses»

Schedule Appointments

«uses»

Edit Appointments

«uses»

Write Schedule

«uses»

Query Database

Delete Appointments

«uses»

«uses»

Logout

Retrieve Schedule

View Appointments

«uses»

«uses»

«uses»

View BMI

«uses»

Calculate BMI

«extends»

Catch Invalid Input Exception

«uses»

Create Employee Profile

Write Employee Information

Edit Employee Profile

«uses»

«uses»

Delete Employee Profile

«uses»

Retrieve Employee Information

Filter Employees

«uses»

View Employee

«uses»

Login

«uses»

Check Credentials

«extends»

Catch Login Exception

Administrator

MediApp System

MediApp System

MediApp System

3 Analysis Class Diagram

The Analysis Class Diagram has also been broken into five parts, each for a specific user. All classes with the same name refer to the same class for all five parts.

Login

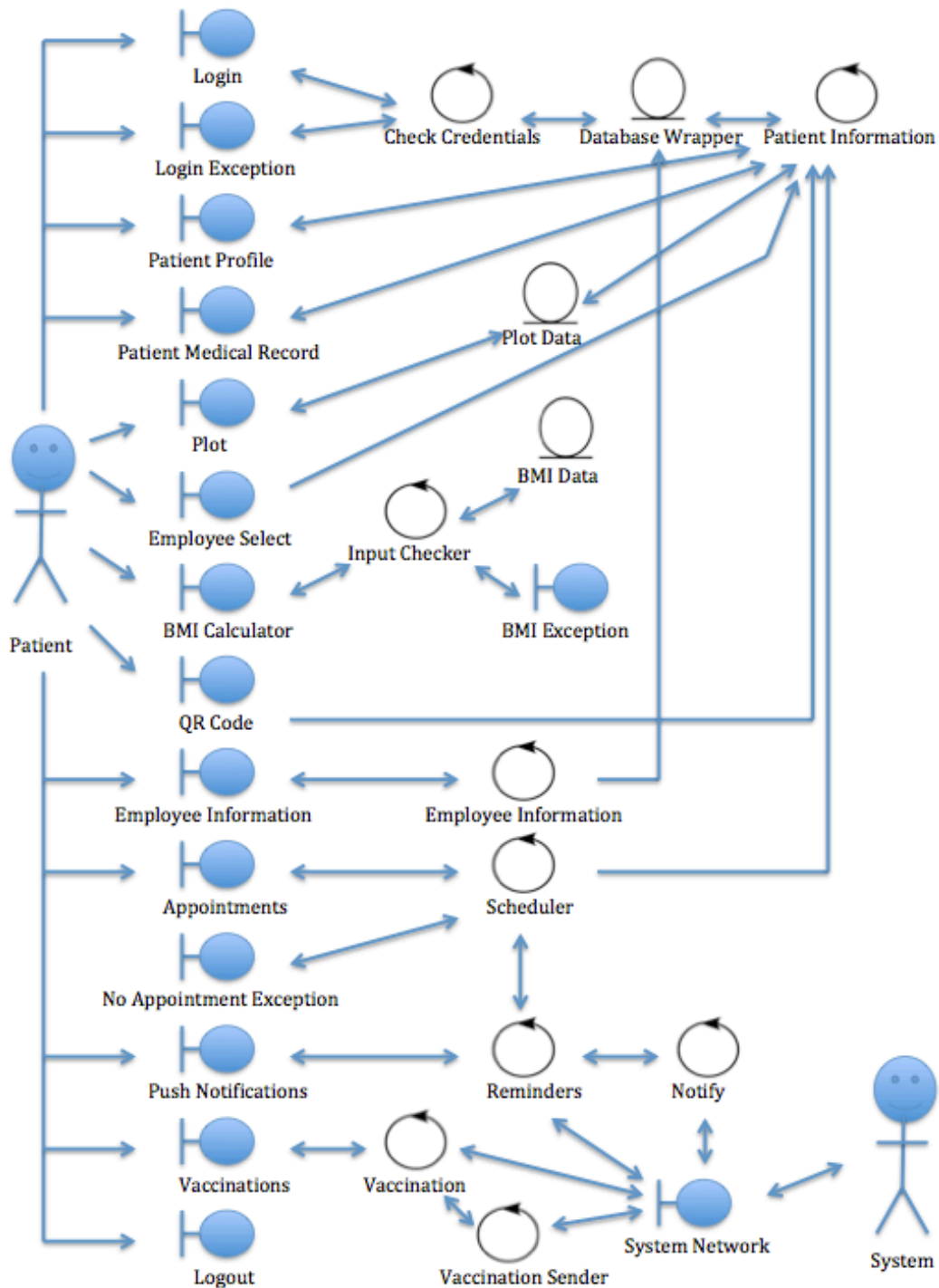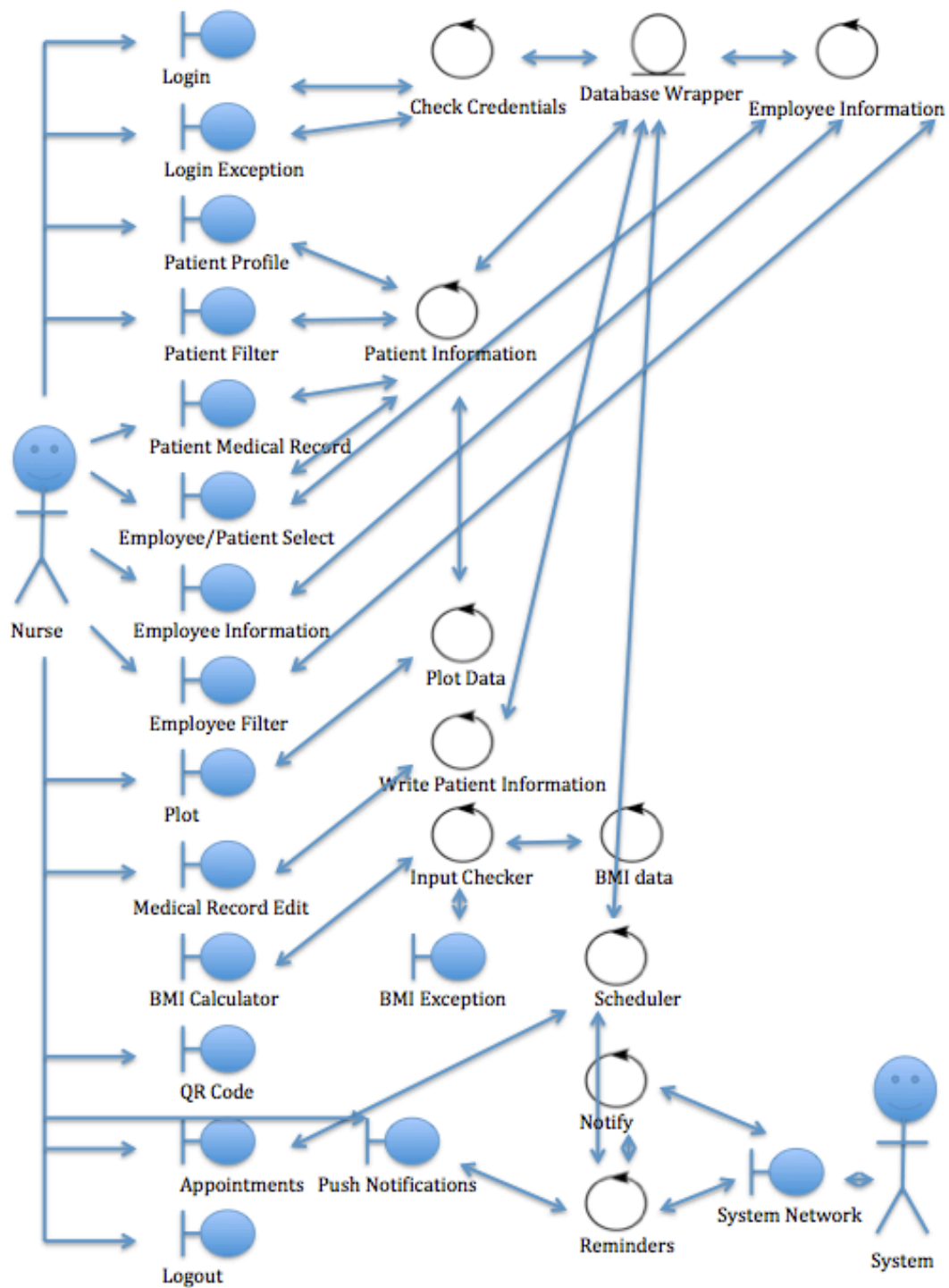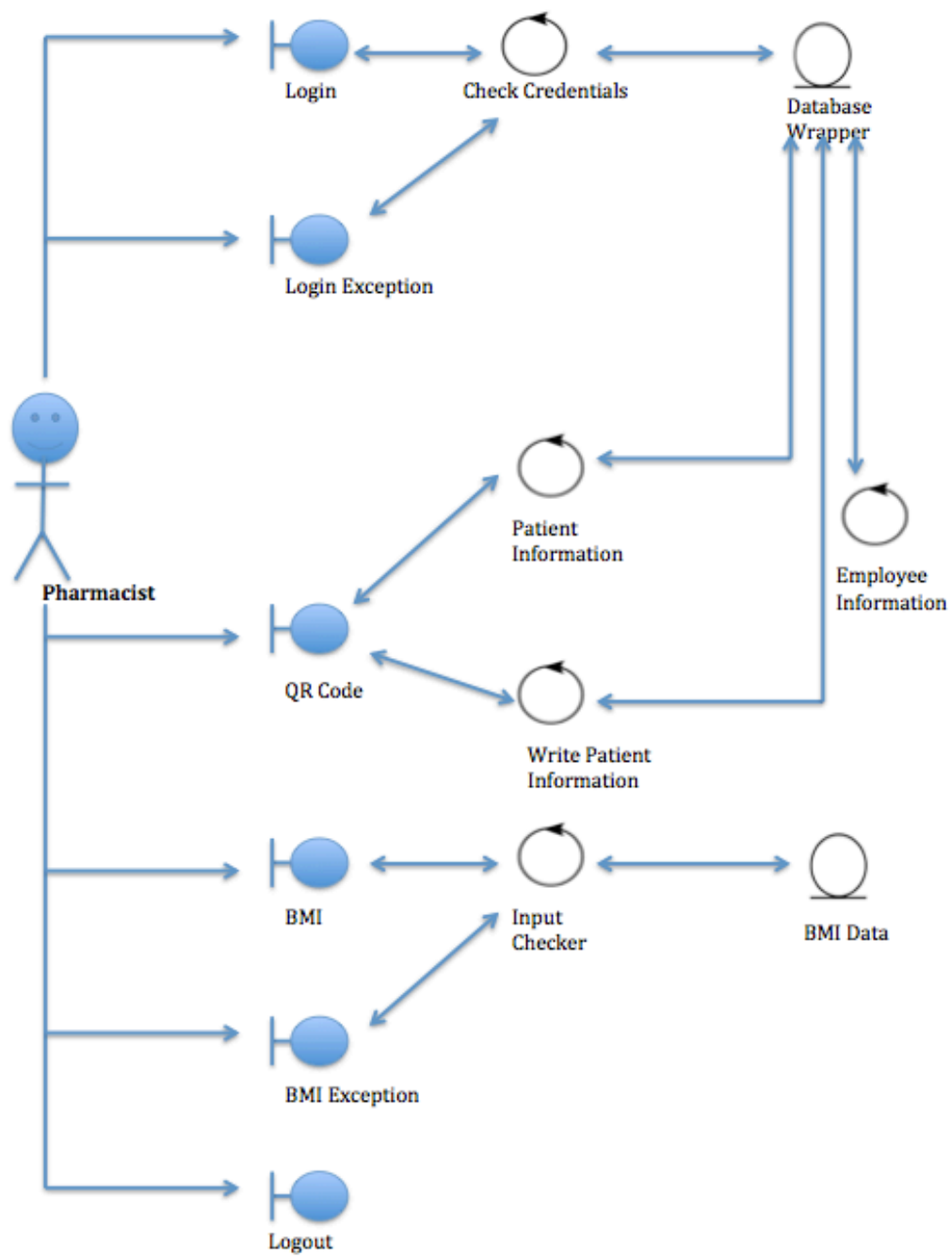Login Exception

Patient Profile

Profile Filter

Patient Medical Record

Employee Information

Employee Filter

Plot

Medical Record Edit

Patient/Employee Select

BMI

QR Code

Appointments

Logout

Doctor

Check Credentials

Database Wrapper

Employee Information

Patient Information

Plot Data

Write Patient Information

Input Checker

BMI data

BMI Exception

Scheduler

Notify

Push Notifications

Reminders

System Network

System

Login

Login Exception

Patient Profiler

Plot

Patient Profile

Patient Filter

Patient/Employee Select

Admin

Check Credentials

Database Wrapper

Employee Information

Write Patient Information

Plot Data

Patient Information

Scheduler

Appointments

Input Checker

BMI Data

BMI

BMI Exception

Employee Profiler

Write Employee Information

Employee Profile

Employee Filter
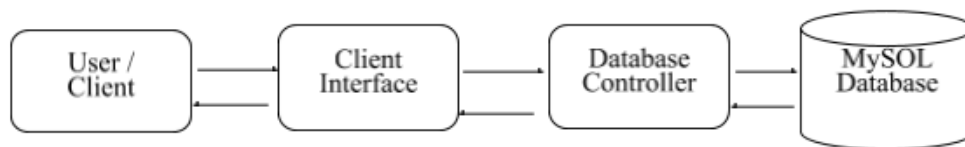
Logout

4 Architectural Design

4.1   System Architecture

Since our application involves the usage of a centralized database server which receives requests for data access from a localized application client, our system implements the **Client-Server** software architecture.

As a two-tier system, users would run a local application on their Android device, our MediApp application (client), that would make a connection request to the MySQL database application (server), which responds to the request and returns only the data that was requested.

As an example of our architecture style, say the patient runs the Android application and makes a request to access and view patient information. The request is processed to an event-controller which makes a request to access the database server. The MySQL database server processes the request and returns the data (patient information) back to the user application.

The reason our system is structured with client-server architecture is to have the ability to support multiple clients that simultaneously login to the system to manipulate and retrieve data. The client information is kept separate from the server information through a boundary which allows data encapsulation. This allows, for example, the client to run the application and manipulate patient data while the server database system is able to manage the information that is being manipulated and stored.

```
┌──────────┐      ┌──────────┐      ┌──────────┐      ┌──────────┐
│  User /  │ ───  │  Client  │ ───  │ Database │ ───  │  MySOL   │
│  Client  │ ───  │Interface │ ───  │Controller│ ───  │ Database │
└──────────┘      └──────────┘      └──────────┘      └──────────┘
```

4.2 Subsystems

User: Consisting of patient, nurse, doctor, administrator and pharmacist. Interacts with boundary classes and the client interface to make requests to the database server.

Client Interface: The application interface. Interacts directly with the user, usually through a graphical interface which gives the user the ability to initiate requests to the server while receiving server responses.

Event-Controller: Working in connection to the database server, the controller is able to approve / reject server data requests.

MySQL Database Server: The database server. Control, manipulates, and processes application data by serving user client requests and responding with the appropriate data requested.
This section should provide an overview of the overall architectural design of your application. You overall architecture should show the division of the system into subsystems with high cohesion and low coupling.

5 Class Responsibility Collaboration (CRC) Cards

Class Name: Login	
Responsibilities:	**Collaborators:**
Display prompt to input username and password	
Send username and password to Credential Checker for validation	Check Credentials
Display validation errors	Check Credentials
Receive user permissions	Check Credentials
Display Doctor menu	Doctor
Display Nurse menu	Nurse
Display Administrator menu	Administrator
Display Pharmacist menu	Pharmacist
Display Patient menu	Patient
Respond to Logout Button being pressed by user	

Class Name: Check Credentials	
Responsibilities:	**Collaborators:**
Receive username and password from Login	Login
Validate username and password	Patient Information/Employee Information
Validate user permissions	Patient Information/Employee Information
Send user permissions to Login	Login
Send user permissions to Patient Profile	Patient Profile
Send user permissions to Patient Medical Record	Patient Medical Record
Send user permissions to Scheduler	Scheduler
Send user permissions to Plot Data	Plot Data

Class Name: Patient Profile	
Responsibilities:	**Collaborators:**
Receive patient profile information	Patient Information
Receive user permissions	Check Credentials
Display patient profile information	
Respond to Edit Patient Profile button being pressed by user	Write Patient Information
Respond to Delete Patient Profile button being pressed by user	Write Patient Information
Respond to Add Patient Profile button being pressed by user	Write Patient Information
Respond to Filter Patient Profiles button being pressed by user	Patient Information

Class Name: Patient Medical Record	
Responsibilities:	**Collaborators:**
Receive patient medical record information	Patient Information
Receive user permissions	Check Credentials
Display patient medical record information	
Respond to Edit Patient Medical Record button being pressed by user	Write Patient Information
Respond to Delete Patient Medical Record button being pressed by user	Write Patient Information
Respond to Add Patient Medical Record button being pressed by user	Write Patient Information
Respond to Filter Patient Medical Records button being pressed by user	Patient Information

Class Name: Patient Information	
Responsibilities:	**Collaborators:**
Receive patient medical record information	Database Wrapper
Send patient medical record information to	Patient Medical Record

Patient Medical Record	
Filter patient medical records	
Receive patient profile information	Database Wrapper
Send patient profile information to Patient Profile	Patient Profile
Filter patient profiles	
Receive QR Code information	Database Wrapper

Class Name: Write Patient Information	
Responsibilities:	**Collaborators:**
Prompts user to input changes to existing patient profile	
Responds to Save Patient Profile button pressed by user	Database Wrapper
Prompts user to input information for new patient profile	
Responds to Add Patient Profile button pressed by user	Database Wrapper
Prompts user to select a patient profile to delete	
Responds to Delete Patient Profile button pressed by user	Database Wrapper
Prompts user to input changes to existing patient medical record	
Responds to Save Patient Medical Record button pressed by user	Database Wrapper
Prompts user to input information for new patient medical record	
Responds to Add Patient Medical Record button pressed by user	Database Wrapper
Prompts user to select a patient medical record to delete	
Responds to Delete Patient Medical Record button pressed by user	Database Wrapper
Prompts user to input patient, medication, dosage and description for QR Code	
Responds to Generate QR Code button pressed by user	QR Code

Class Name: QR Code	
Responsibilities:	**Collaborators:**
Receives patient, medication, dosage and description from Write Patient Information	Write Patient Information

Generates a unique QR Code based on information	
Sends the QR Code to Database Wrapper	Database Wrapper
Receives QR Code	Patient Information
Converts QR Code	
Displays contents of QR Code	
Deletes QR Code	Database Wrapper

Class Name: BMI Calculator	
Responsibilities:	**Collaborators:**
Prompts user to input age, height, weight, activity level	
Responds to Calculate BMI button pressed by user	
Calculates BMI for provided information	
Displays BMI details and short analysis	
Display invalid input errors	

Class Name: Plot Data	
Responsibilities:	**Collaborators:**
Receive user permissions	Check Credentials
Prompts user to select patient	Patient Information
Responds to Plot Patient Data button pressed by user	
Receives appointment history information	Scheduler
Displays a plot of appointments vs. time	

Class Name: Scheduler	
Responsibilities:	**Collaborators:**
Receive patient appointment schedule	Database Wrapper
Receive user permissions	Check Credentials
Display patient appointment schedule	
Prompts user to input patient, doctor, data and time for new appointment	
Responds to Add Appointment button pressed by user	Database Wrapper
Prompts user to input modifications for existing appointment	
Responds to Edit Appointment button pressed by user	Database Wrapper
Prompts user to input date and time to delete appointment	

Responds to Delete Appointment button pressed by user	Database Wrapper

Class Name: Employee Information	
Responsibilities:	**Collaborators:**
Receive doctor information	Database Wrapper
Receive nurse information	Database Wrapper
Receive pharmacist information	Database Wrapper
Filter doctors	
Filter nurses	
Filter pharmacists	
Send doctor information to Administrator	Administrator
Send doctor information to Nurse	Nurse
Send doctor information to Doctor	Doctor
Send doctor information to Patient	Patient
Send doctor information to Pharmacist	Pharmacist

Class Name: Write Employee Information	
Responsibilities:	**Collaborators:**
Prompt user to input changes to existing doctor	
Responds to Save Doctor button pressed by user	Database Wrapper
Prompts user to input information for new doctor	
Responds to Add Doctor button pressed by user	Database Wrapper
Prompts user to select a doctor to delete	
Responds to Delete Doctor button pressed by user	Database Wrapper
Prompts user to input changes to existing nurse	
Responds to Save Nurse button pressed by user	Database Wrapper
Prompts user to input information for new nurse	
Responds to Add Nurse button pressed by user	Database Wrapper
Prompts user to select a nurse to delete	
Responds to Delete Nurse button pressed by user	Database Wrapper
Prompts user to input changes to existing pharmacist	

Responds to Save Pharmacist button pressed by user	Database Wrapper
Prompts user to input information for new pharmacist	
Responds to Add Pharmacist button pressed by user	Database Wrapper
Prompts user to select a pharmacist to delete	
Responds to Delete Pharmacist button pressed by user	Database Wrapper

Class Name: Administrator	
Responsibilities:	**Collaborators:**
Display patient profiles	Patient Profile
Respond to Filter Patient Profiles button pressed by user	Patient Profile
Respond to Create Patient Profile button pressed by user	Patient Profile
Respond to Edit Patient Profile button pressed by user	Patient Profile
Respond to Delete Patient Profile button pressed by user	Patient Profile
Display patient plots	Plot Data
Responds to View Appointments button pressed by user	Scheduler
Responds to Edit Appointments button pressed by user	Scheduler
Responds to Create Appointments button pressed by user	Scheduler
Responds to Delete Appointments button pressed by user	Scheduler
Respond to BMI Calculator button pressed by user	BMI Calculator
Display employee information	Employee Information
Respond to Filter Employee button pressed by user	Employee Information
Respond to Create Employee profile button pressed by user	Employee Information
Respond to Edit Employee profile button pressed by user	Employee Information
Respond to Delete Employee profile button pressed by user	Employee Information
Respond to Logout button pressed by user	Login

Class Name: Doctor	
Responsibilities:	**Collaborators:**
Display patient profiles	Patient Profile
Respond to Filter Patient Profiles button pressed by user	Patient Profile
Display patient medical records	Patient Medical Records
Respond to Filter Patient Medical Records pressed by user	Patient Medical Records
Display employee information	Employee Information
Respond to filter Employee button pressed by user	Employee Information
Display patient plots	Plot Data
Respond to Create Patient Medical Record button pressed by user	Patient Medical Records
Respond to Edit Patient Medical Record button pressed by user	Patient Medical Records
Respond to Delete Patient Medical Record button pressed by user	Patient Medical Records
Respond to BMI Calculator button pressed by user	BMI Calculator
Display QR codes	Patient Information
Responds to Generate QR Code button pressed by user	QR Code
Display appointments	Scheduler
Displays message for approaching appointments notification	Notify
Respond to Logout button pressed by user	Login

Class Name: Nurse	
Responsibilities:	**Collaborators:**
Display patient profiles	Patient Profile
Respond to Filter Patient Profiles button pressed by user	Patient Profile
Display patient medical records	Patient Medical Records
Respond to Filter Patient Medical Records pressed by user	Patient Medical Records
Display employee information	Employee Information
Respond to filter Employee button pressed by user	Employee Information
Display patient plots	Plot Data
Respond to Edit Patient Medical Record button pressed by user	Patient Medical Records
Respond to BMI Calculator button pressed by user	BMI Calculator

Display appointments	Scheduler
Displays message for approaching appointments notification	Notify
Respond to Logout button pressed by user	Login

Class Name: Patient	
Responsibilities:	**Collaborators:**
Display patient profile	Patient Profile
Display patient medical record	Patient Medical Record
Display plot	Plot Data
Respond to BMI Calculator button pressed by user	BMI Calculator
Display QR codes	Patient Information
Display employee information	Employee Information
Display appointments	Scheduler
Displays message for approaching appointments notification	Notify
Displays message for overdue vaccination notifications	Notify
Respond to Logout button pressed by user	Login

Class Name: Pharmacist	
Responsibilities:	**Collaborators:**
Display QR codes	Patient Information
Respond to Convert QR Code button pressed by user	QR Code
Responds to BMI Calculator button pressed by user	BMI Calculator
Respond to Logout button pressed by user	Login

Class Name: Database Wrapper	
Responsibilities:	**Collaborators:**
Receive row information from patient medical record table	
Receive row information from patient profile table	
Receive row information from employee table	
Receive row information from scheduler	

table	
Receive row information from QR Code table	
Send row information from patient medical record table to Patient Information	Patient Information
Send row information from patient profile table to Patient Information	Patient Information
Send row information from employee table to Employee Information	Employee Information
Send row information from scheduler table to Scheduler	Scheduler
Send row information from QR Code table to Patient Information	Patient Information
Validate username and password from patient profile table/employee table	
Send validation response to Check Credential	Check Credential
Validate permissions from patient profile table/employee table	
Send user permissions to Check Credential	Check Credential
Receive new patient profile information from Write Patient Information	Write Patient Information
Receive modified patient profile information from Write Patient Information	Write Patient Information
Receive patient to delete profile information from Write Patient Information	Write Patient Information
Receive new patient medical information from Write Patient Information	Write Patient Information
Receive modified patient medical information from Write Patient Information	Write Patient Information
Receive patient to delete patient medical information from Write Patient Information	Write Patient Information
Receive new QR Code information from Write Patient Information	Write Patient Information
Receive new doctor, modified doctor, delete doctor information from Write Employee Information	Write Employee Information
Receive new nurse, modified nurse, delete nurse information from Write Employee Information	Write Employee Information
Receive new pharmacist, modified pharmacist, delete pharmacist information from Write Employee Information	Write Employee Information
Receives QR code to delete from QR Code	QR Code
Receives new appointment from Scheduler	Scheduler

Receives modified appointment from Scheduler	Scheduler
Receives delete appointment request from Scheduler	Scheduler
Create new row in patient medical record table	
Edit existing row in patient medical record table	
Delete existing row in patient medical record table	
Create new row in patient profile table	
Edit existing row in patient profile table	
Delete existing row in patient profile table	
Create new row in employee table	
Edit existing row in employee table	
Delete existing row employee table	
Create new row in scheduler table	
Edit existing row in scheduler table	
Delete existing row in scheduler table	
Create new row in QR Code table	
Delete existing row in QR Code table	

Class Name: Notify	
Responsibilities:	**Collaborators:**
Receive appointment schedule information from Scheduler	Scheduler
Receive vaccination history information from Patient Information	Patient Information
Check for approaching appointments within one week's time	BMI Calculator
Check for overdue vaccinations	Login
Send approaching appointments notification to corresponding patients, doctors, nurses	Patients, Doctors, Nurses
Send overdue vaccination notification to corresponding patients	Patients

A Division of Labour

Team Member	Work Completed
Christopher Campbell	Section 3
Purvil Majmudar	Section 2
Michael Ngo	Section 4
Mostapha Mohammed	Section 3
Fady Makram Abdel-Malik	Section 1
Sahiti Bonthu	Section 5 and Formatting

Signatures

Christopher Campbell
1143732   _____

Purvil Majmudar
1151489   _____

Michael Ngo
1152487   _____

Mostapha Mohammed
1153832   _____

Fady Makram Abdel-Malik
1159519   _____

Sahiti Bonthu
1164578   _____