

# CSCE 361 - Project Phase 2

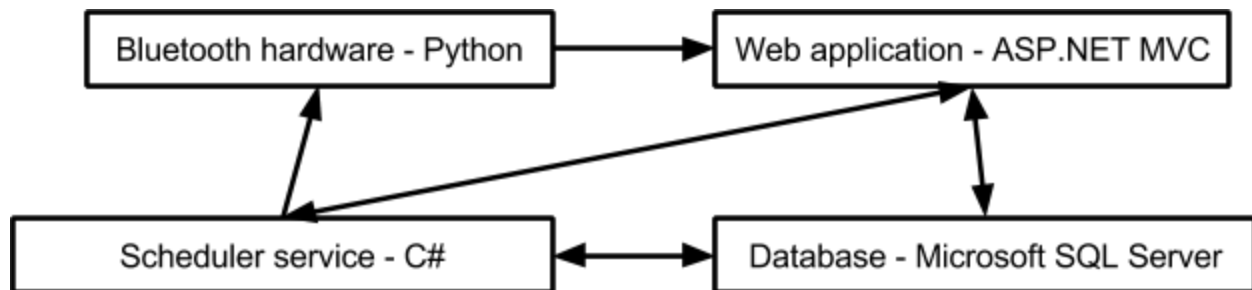
## Group 8

### 1. Introduction

The purpose of this design document is to demonstrate the high level architecture and entity relations for the Attendance Tracking system. This document includes information about the architecture, and entity relation diagrams showing the relationship between different parts of the system. The audience of this document are the software engineers who will be implementing and maintaining the system.

### 2. Architecture

#### 2.1 Introduction

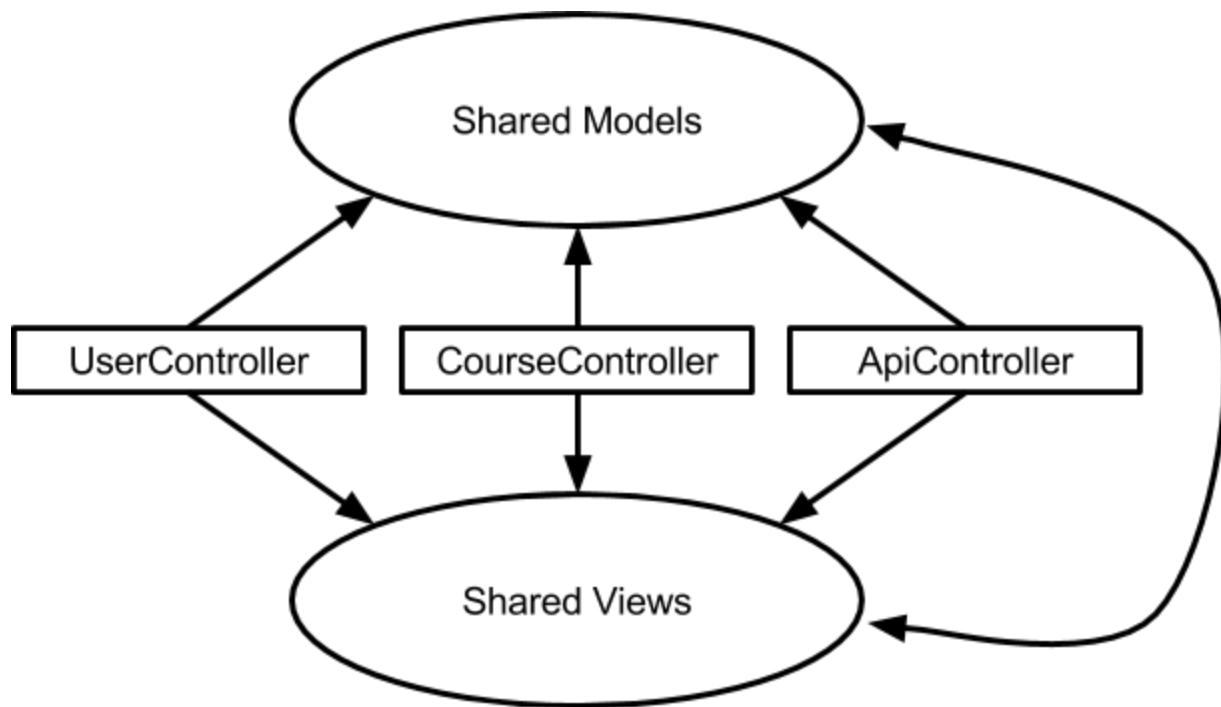


The Attendance Tracking system is composed of three major components. First is the ASP.NET MVC web application. There is also a Python Bluetooth logging device. A C# scheduler service keeps the web application and the Bluetooth logging device in sync. A Microsoft SQL Server will be used to store data for the web application and the scheduler service.

#### 2.2 Modules

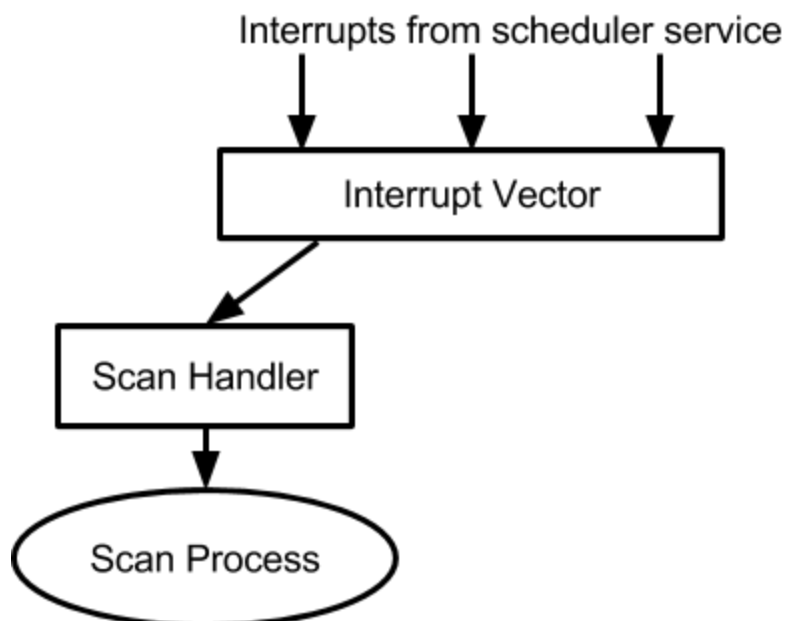
##### 2.2.1 Web application

The web application follows the Model-View-Controller (MVC) architectural pattern. The web server sends requests from users and forwards them to the corresponding actions in the corresponding controller. The controller then retrieves necessary data from the model, and returns a view for the user. The system is divided into multiple models, multiple views, and multiple controllers to be more modular and maintainable.



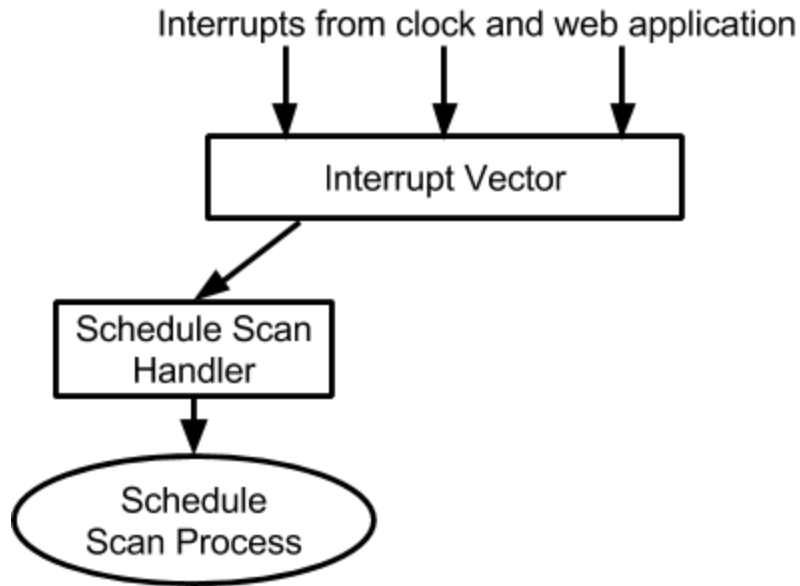
### 2.2.2 Bluetooth hardware

The software running on the Bluetooth hardware follows the event-driven architectural pattern. When the hardware is triggered by the scheduler service it will run a process where it scans for the requested student Bluetooth devices, and reports the results to the web application.



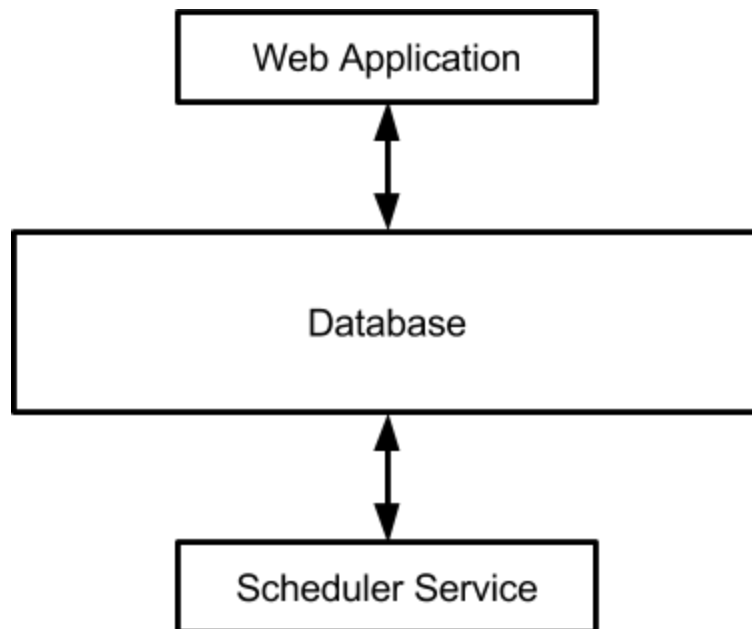
### 2.2.3 Scheduler service

The scheduler service follows the event-driven architectural pattern. At specific times the service will run processes that trigger the Bluetooth hardware to scan for students. The web application is used to configure the scheduler service.



### 2.2.4 Database

The database follows the repository architectural pattern. It is a central repository that stores information that is used by the web application, and the scheduler service. Nine tables are used to store information about users, courses, and attendance records.



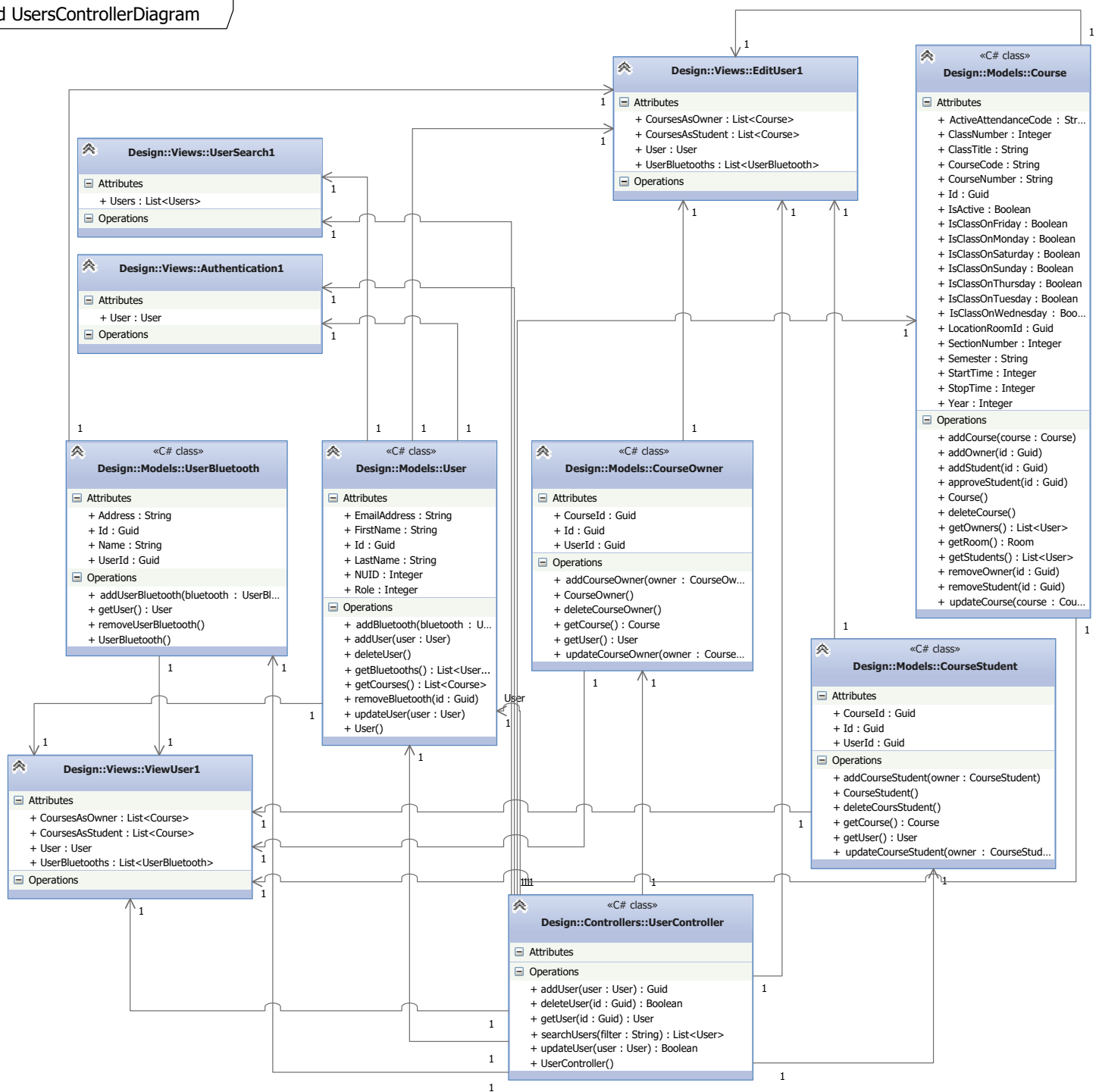
## 3. Class Diagrams

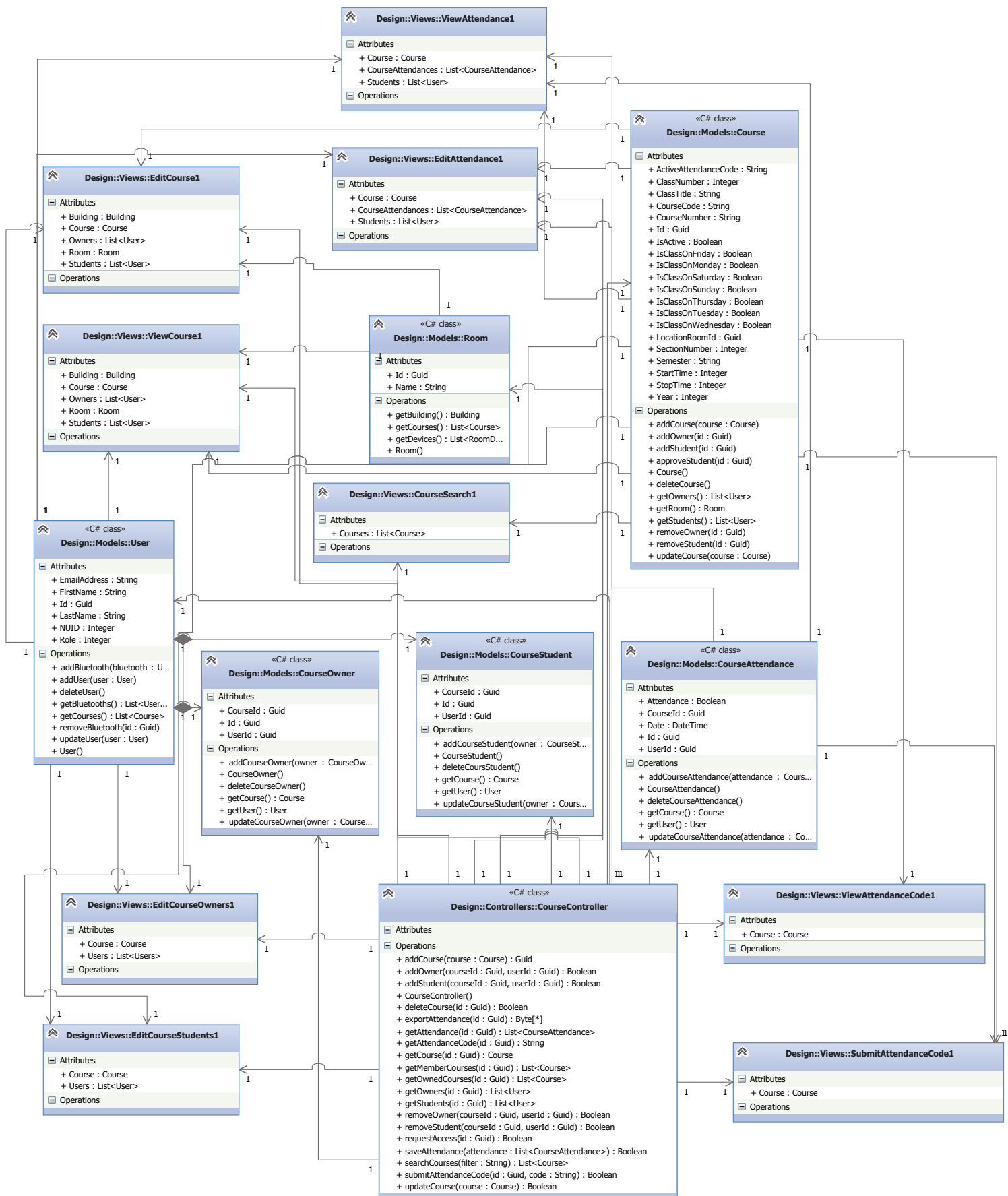
### 3.1 Web application

Because there are so many models, views, and controllers, they can't all fit onto a single diagram. Instead there is a diagram for each of the controllers containing the controller and the models and views that it is associated with. Models that appear in multiple diagrams are the same models. The diagrams each have their own page after this section.

The user controller handles user management within the system. Controller actions include adding, deleting, retrieving, updating, and searching for users. Users are represented with the user model. A user can have a CourseStudent or CourseOwner model associated with them for each course they are a part of. Additionally, there is a UserBluetooth model that stores the user's Bluetooth addresses. There are views that allow the users to perform controller actions, they include add, view, edit, authentication, and search views.

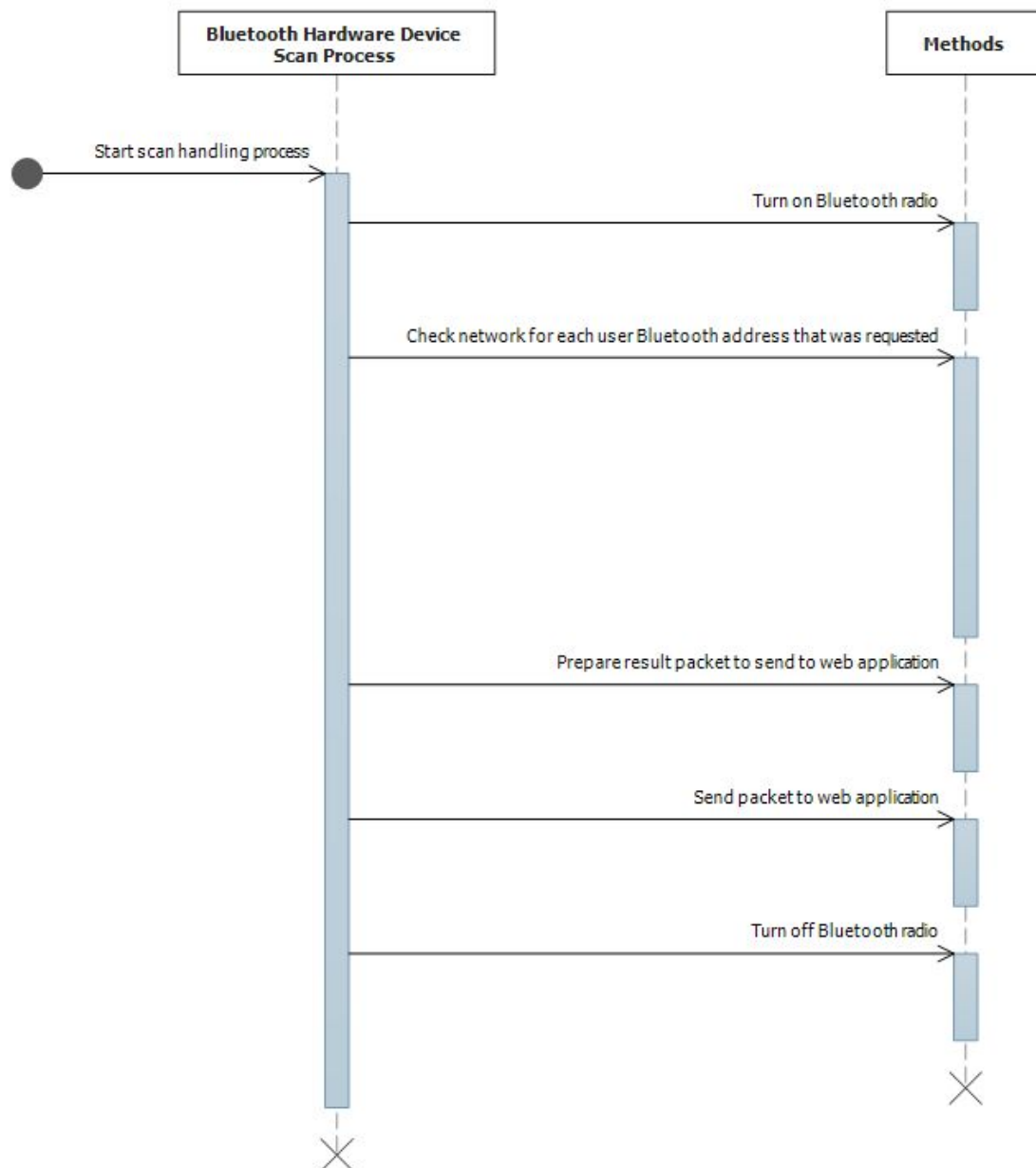
The course controller handles course management and attendance tracking. Controller actions include adding, deleting, retrieving, updating, and searching for courses. There are also actions that relate to user management like adding and removing students and owners from a course. Additionally there are actions for taking, updating, and retrieving attendance. Course, user, CourseAttendance, and room models are used to hold the data for this controller. There are views that allow the users to perform controller actions.





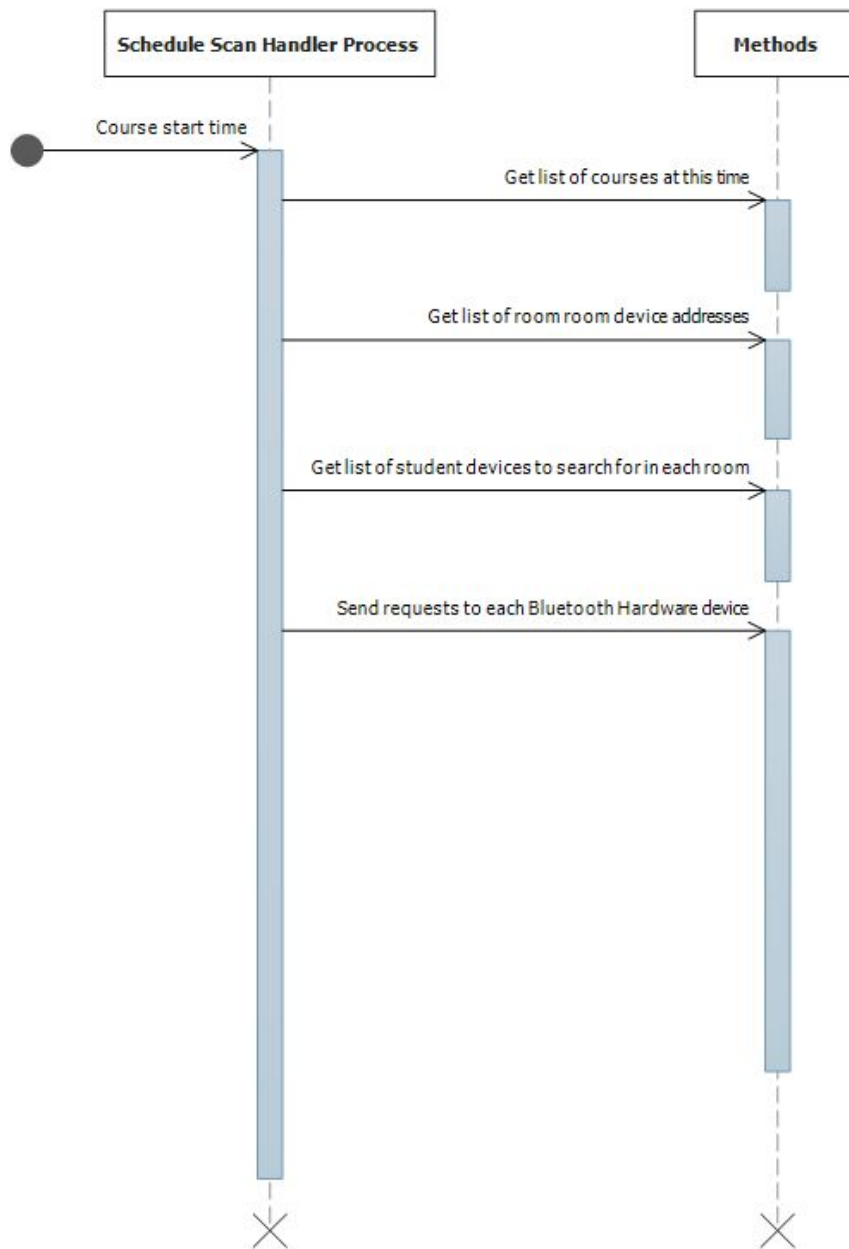
### 3.2 Bluetooth hardware

The scheduler service will send an interrupt over the network to the Bluetooth hardware. The scheduler requests that the hardware scans the Bluetooth network for a list of Bluetooth addresses. The interrupt process will turn on the Bluetooth radio, scan the network for the requested Bluetooth addresses, make and send a result packet to the web application, turn off the Bluetooth radio, and go back to waiting for another interrupt.



### 3.3 Scheduler service

The scheduler service functions in a way that is similar to the Bluetooth hardware. It is interrupted based on the clock. The service runs through a schedule scan handler process. This process gets a list of courses that are in session, and gets information about each course including student Bluetooth devices to search for, and the Bluetooth hardware devices that need to be triggered. Once the process has the information it needs, it will send requests to each of the Bluetooth hardware devices in order to trigger an attendance scan.





### 3.4 Database

The database is composed of nine tables, that correspond to the nine models in the web application. The web application models store and retrieve their data from the database. Both the web application, and the scheduler service connect to the central database. This section includes a description of each of the tables, and a diagram showing how all of the tables and columns are related.

#### 3.4.1 Database schema information

<b>Building</b>	Holds the name and code of buildings. Example, name: Avery Hall, code: AVH.
<b>Course</b>	Holds information about courses. Information stored includes the course name, number, section, schedule, and location. Example, name: Linear Algebra, number: Math 314, section: 140, AVH 118.
<b>CourseAttendance</b>	Holds attendance records. A row is created every time a student attends a class. Information stored includes if they attended, the course ID, the student ID, and a date. Example, Attendance: Yes/No, course ID: 1002, Student ID: 15572966, Date: 1/16/2005.
<b>CourseOwner</b>	This table associates owner users with courses. Users can manage the courses that they are marked as the owner of. Example, CourseOwner: True.
<b>CourseStudent</b>	This table associates student users with course. If a user is marked as a student in a course, their attendance will be taken. Example, CourseStudent: True.
<b>Room</b>	Holds room numbers that are within a building. For example, 110.
<b>RoomDevice</b>	Holds a list of the Bluetooth hardware devices. Information stored includes the associated room, and the IP address of the device. Example, Location: AVH 118, IP Address: 192.168.0.123.
<b>User</b>	Holds information about the people using the system. Information stored includes email address, name, and NUID. Example, Email: <a href="mailto:y_fang@outlook.com">y_fang@outlook.com</a> , Name: Yang Fang, NUID: 15572966.
<b>UserBluetooth</b>	Holds the Bluetooth device addresses of devices owned by students. Example, IP Address: 001060AA36F8

### 3.4.2 Database schema

