

**CAPSTONE PROJECT REPORT**

**Report 4 – Software Design Document**

– Ho Chi Minh, January 2022 –

**Table of Contents**

[IV. Software Design Document 9](#_Toc101866803)

[1. Overall Description 9](#_Toc101866804)

[1.1 Assumptions 9](#_Toc101866805)

[1.2 Design Constraints 9](#_Toc101866806)

[2. System Architecture Design 10](#_Toc101866807)

[2.1 Overall Architecture 10](#_Toc101866808)

[2.2. Backend Architecture 11](#_Toc101866809)

[2.3. Web Application Architecture 11](#_Toc101866810)

[2.4. Mobile Application Architecture 12](#_Toc101866811)

[2.5 Package Diagram 13](#_Toc101866812)

[2.3.1. Backend Package Diagram 13](#_Toc101866813)

[2.3.2. Web Application Package Diagram 14](#_Toc101866814)

[2.3.3. Mobile Application Package Diagram 16](#_Toc101866815)

[3. System Detailed Design 19](#_Toc101866816)

[3.1 Sequence Diagrams 19](#_Toc101866817)

[3.1.1. Account management 19](#_Toc101866818)

[● Create account 19](#_Toc101866819)

[● Update account 19](#_Toc101866820)

[● Disable account 20](#_Toc101866821)

[● View account list 20](#_Toc101866822)

[● Reset password 21](#_Toc101866823)

[3.1.2. Subject management 21](#_Toc101866824)

[● Create subject 21](#_Toc101866825)

[● Update subject 22](#_Toc101866826)

[● Disable subject 22](#_Toc101866827)

[● View subject list 23](#_Toc101866828)

[3.1.3. Semester management 23](#_Toc101866829)

[● Create semester 23](#_Toc101866830)

[● Update semester 24](#_Toc101866831)

[● Disable semester 24](#_Toc101866832)

[● View semester list 25](#_Toc101866833)

[● Add subject to semester 25](#_Toc101866834)

[● Remove subject from semester 26](#_Toc101866835)

[3.1.4. Tool management 26](#_Toc101866836)

[● Create tool 26](#_Toc101866837)

[● Update tool 27](#_Toc101866838)

[● Disable tool 27](#_Toc101866839)

[● View tool list 28](#_Toc101866840)

[● Add tool to subject 28](#_Toc101866841)

[● Remove tool from subject 29](#_Toc101866842)

[3.1.5. Room management 29](#_Toc101866843)

[● Create room 29](#_Toc101866844)

[● Update room 30](#_Toc101866845)

[● Disable room 30](#_Toc101866846)

[● View room list 31](#_Toc101866847)

[3.1.6. Manage shift 31](#_Toc101866848)

[● Create shift 31](#_Toc101866849)

[● Update shift 32](#_Toc101866850)

[● Delete shift 32](#_Toc101866851)

[● Lock shift 33](#_Toc101866852)

[● Start staffing 33](#_Toc101866853)

[● View shift list 34](#_Toc101866854)

[● View shift detail 34](#_Toc101866855)

[3.1.7. Manage examinee 35](#_Toc101866856)

[● Import examinees 35](#_Toc101866857)

[● Remove examinee from semester’s subject 36](#_Toc101866858)

[● View subject assignments list 36](#_Toc101866859)

[● View subject assignments detail 37](#_Toc101866860)

[3.1.8. Manage exam room 37](#_Toc101866861)

[● Create exam room 37](#_Toc101866862)

[● Update exam room 38](#_Toc101866863)

[● Remove exam room 38](#_Toc101866864)

[● View exam shift list 39](#_Toc101866865)

[● Create attendance 39](#_Toc101866866)

[● Delete attendance 40](#_Toc101866867)

[● Export attendance 40](#_Toc101866868)

[● Export locked shift 41](#_Toc101866869)

[● Assign staff 41](#_Toc101866870)

[● Auto assign staff 42](#_Toc101866871)

[3.1.9. Login 42](#_Toc101866872)

[3.1.10. Logout 43](#_Toc101866873)

[3.1.11. Change password 43](#_Toc101866874)

[3.1.12. View profile 44](#_Toc101866875)

[3.1.13. Update profile 44](#_Toc101866876)

[3.1.14. View notification list 45](#_Toc101866877)

[3.1.15. View report list 45](#_Toc101866878)

[3.1.16. View report detail 46](#_Toc101866879)

[3.1.17. Resolve report 47](#_Toc101866880)

[3.2 Activity Diagrams 48](#_Toc101866881)

[3.2.1. Update attendance 48](#_Toc101866882)

[3.2.2. View attendances of exam room 49](#_Toc101866883)

[3.2.3. Create report 50](#_Toc101866884)

[3.2.4. View assigned exam room 51](#_Toc101866885)

[3.2.5. View assigned exam room report list 52](#_Toc101866886)

[3.2.6. Update report 53](#_Toc101866887)

[3.2.7. View own exam schedule 54](#_Toc101866888)

[3.2.8. Check attendance 55](#_Toc101866889)

[3.3 State Diagrams 56](#_Toc101866890)

[3.3.1. Shift 56](#_Toc101866891)

[3.3.2. Exam room 56](#_Toc101866892)

[3.3.3. Attendance 57](#_Toc101866893)

[3.4 Class Diagrams 58](#_Toc101866894)

[4. Class Specifications 59](#_Toc101866895)

[4.1. Account class 59](#_Toc101866896)

[4.2. Role class 59](#_Toc101866897)

[4.3. Room class 60](#_Toc101866898)

[4.4. Semester class 60](#_Toc101866899)

[4.5. Shift class 61](#_Toc101866900)

[4.6. Subject class 61](#_Toc101866901)

[4.7. Notification class 62](#_Toc101866902)

[4.8. Tool class 62](#_Toc101866903)

[4.9. Subject Semester class 62](#_Toc101866904)

[4.10. Subject Examinee class 63](#_Toc101866905)

[4.11. Attendance class 63](#_Toc101866906)

[4.12. Exam room class 64](#_Toc101866907)

[4.13. Report class 65](#_Toc101866908)

[4.14. Attempt class 65](#_Toc101866909)

[5. Data & Database Design 67](#_Toc101866910)

[5.1. Database Design 67](#_Toc101866911)

[5.2. Data Dictionary 68](#_Toc101866912)

[5.2.1. App user table 68](#_Toc101866913)

[5.2.2. App user role table 69](#_Toc101866914)

[5.2.3. Attempt table 69](#_Toc101866915)

[5.2.4. Attendance table 70](#_Toc101866916)

[5.2.5. Exam room table 70](#_Toc101866917)

[5.2.6. Notification table 71](#_Toc101866918)

[5.2.7. Report table 72](#_Toc101866919)

[5.2.8. Room table 73](#_Toc101866920)

[5.2.9. Semester table 74](#_Toc101866921)

[5.2.10. Shift table 74](#_Toc101866922)

[5.2.11. Subject table 75](#_Toc101866923)

[5.2.12. Subject examinee table 75](#_Toc101866924)

[5.2.13. Subject semester table 76](#_Toc101866925)

[5.2.14. Subject tool table 76](#_Toc101866926)

[5.2.15. Tool table 77](#_Toc101866927)

**Table of Figures**

[Figure 1. Overall Architecture 10](#_Toc101866928)

[Figure 2. Backend Architecture 11](#_Toc101866929)

[Figure 3. Web Application Architecture 11](#_Toc101866930)

[Figure 4. Mobile Application Architecture 12](#_Toc101866931)

[Figure 5. Backend Package Diagram 13](#_Toc101866932)

[Figure 6. Web Application Package Diagram 15](#_Toc101866933)

[Figure 7. Web Application Package Diagram 17](#_Toc101866934)

[Figure 8. <Sequence Diagram> Create account 19](#_Toc101866935)

[Figure 9. <Sequence Diagram> Update account 19](#_Toc101866936)

[Figure 10. <Sequence Diagram> Disable account 20](#_Toc101866937)

[Figure 11. <Sequence Diagram> View account list 20](#_Toc101866938)

[Figure 12. <Sequence Diagram> Reset password 21](#_Toc101866939)

[Figure 13. <Sequence Diagram> Create subject 21](#_Toc101866940)

[Figure 14. <Sequence Diagram> Update subject 22](#_Toc101866941)

[Figure 15. <Sequence Diagram> Disable subject 22](#_Toc101866942)

[Figure 16. <Sequence Diagram> View subject list 23](#_Toc101866943)

[Figure 17. <Sequence Diagram> Create semester 23](#_Toc101866944)

[Figure 18. <Sequence Diagram> Update semester 24](#_Toc101866945)

[Figure 19. <Sequence Diagram> Disable semester 24](#_Toc101866946)

[Figure 20. <Sequence Diagram> View semester list 25](#_Toc101866947)

[Figure 21. <Sequence Diagram> Add subject to semester 25](#_Toc101866948)

[Figure 22. <Sequence Diagram> Remove subject from semester 26](#_Toc101866949)

[Figure 23. <Sequence Diagram> Create tool 26](#_Toc101866950)

[Figure 24. <Sequence Diagram> Update tool 27](#_Toc101866951)

[Figure 25. <Sequence Diagram> Disable tool 27](#_Toc101866952)

[Figure 26. <Sequence Diagram> View tool list 28](#_Toc101866953)

[Figure 27. <Sequence Diagram> Add tool to subject 28](#_Toc101866954)

[Figure 28. <Sequence Diagram> Remove tool from subject 29](#_Toc101866955)

[Figure 29. <Sequence Diagram> Create room 29](#_Toc101866956)

[Figure 30. <Sequence Diagram> Update room 30](#_Toc101866957)

[Figure 31. <Sequence Diagram> Disable room 30](#_Toc101866958)

[Figure 32. <Sequence Diagram> View room list 31](#_Toc101866959)

[Figure 33. <Sequence Diagram> Create shift 31](#_Toc101866960)

[Figure 34. <Sequence Diagram> Update shift 32](#_Toc101866961)

[Figure 35. <Sequence Diagram> Delete shift 32](#_Toc101866962)

[Figure 36. <Sequence Diagram> Lock shift 33](#_Toc101866963)

[Figure 37. <Sequence Diagram> Start staffing 33](#_Toc101866964)

[Figure 38. <Sequence Diagram> View shift list 34](#_Toc101866965)

[Figure 39. <Sequence Diagram> View shift detail 34](#_Toc101866966)

[Figure 40. <Sequence Diagram> Import examinees 35](#_Toc101866967)

[Figure 41. <Sequence Diagram> Remove examinee from semester's subject 36](#_Toc101866968)

[Figure 42. <Sequence Diagram> View subject assignment list 36](#_Toc101866969)

[Figure 43. <Sequence Diagram> View subject assignments detail 37](#_Toc101866970)

[Figure 44. <Sequence Diagram> Create exam room 37](#_Toc101866971)

[Figure 45. <Sequence Diagram> Update exam room 38](#_Toc101866972)

[Figure 46. <Sequence Diagram> Remove exam room 38](#_Toc101866973)

[Figure 47. <Sequence Diagram> View exam shift list 39](#_Toc101866974)

[Figure 48. <Sequence Diagram> Create attendance 39](#_Toc101866975)

[Figure 49. <Sequence Diagram> Delete attendance 40](#_Toc101866976)

[Figure 50. <Sequence Diagram> Export attendance 40](#_Toc101866977)

[Figure 51. <Sequence Diagram> Export locked shift 41](#_Toc101866978)

[Figure 52. <Sequence Diagram> Assign staff 41](#_Toc101866979)

[Figure 53. <Sequence Diagram> Auto assign staff 42](#_Toc101866980)

[Figure 54. <Sequence Diagram> Login 42](#_Toc101866981)

[Figure 55. <Sequence Diagram> Logout 43](#_Toc101866982)

[Figure 56. <Sequence Diagram> Change password 43](#_Toc101866983)

[Figure 57. <Sequence Diagram> View profile 44](#_Toc101866984)

[Figure 58. <Sequence Diagram> Update profile 44](#_Toc101866985)

[Figure 59. <Sequence Diagram> View notification list 45](#_Toc101866986)

[Figure 60. <Sequence Diagram> View report list 45](#_Toc101866987)

[Figure 61. <Sequence Diagram> View report detail 46](#_Toc101866988)

[Figure 62. <Sequence Diagram> Resolve report 47](#_Toc101866989)

[Figure 63. <Activity Diagram> Update attendance 48](#_Toc101866990)

[Figure 64. <Activity Diagram> View attendances of exam room 49](#_Toc101866991)

[Figure 65. <Activity Diagram> Create report 50](#_Toc101866992)

[Figure 66. <Activity Diagram> View assigned exam room 51](#_Toc101866993)

[Figure 67. <Activity Diagram> View assigned exam room report list 52](#_Toc101866994)

[Figure 68. <Activity Diagram> Update report 53](#_Toc101866995)

[Figure 69. <Activity Diagram> View own exam schedule 54](#_Toc101866996)

[Figure 70. <Activity Diagram> Check attendance 55](#_Toc101866997)

[Figure 71. <State Diagram> Shift 56](#_Toc101866998)

[Figure 72. <State Diagram> Exam room 56](#_Toc101866999)

[Figure 73. <State Diagram> Attendance 57](#_Toc101867000)

[Figure 74. Class Diagram 58](#_Toc101867001)

[Figure 75. Database design 67](#_Toc101867002)

**List of Tables**

[Table 1. Backend Package Diagram - Code Package 13](#_Toc101867003)

[Table 2. Web Application Package Diagram - Code Package 16](#_Toc101867004)

[Table 3. Mobile Application Package Diagram - Code Package 18](#_Toc101867005)

[Table 4. <Class Specification> Account class 59](#_Toc101867006)

[Table 5. <Class Specification> Role class 59](#_Toc101867007)

[Table 6. <Class Specification> Room class 60](#_Toc101867008)

[Table 7. <Class Specification> Semester class 60](#_Toc101867009)

[Table 8. <Class Specification> Shift class 61](#_Toc101867010)

[Table 9. <Class Specification> Subject class 61](#_Toc101867011)

[Table 10. <Class Specification> Notification class 62](#_Toc101867012)

[Table 11. <Class Specification> Tool class 62](#_Toc101867013)

[Table 12. <Class Specification> Subject Semester class 62](#_Toc101867014)

[Table 13. <Class Specification> Subject Examinee Class 63](#_Toc101867015)

[Table 14. <Class Specification> Attendance class 63](#_Toc101867016)

[Table 15. <Class Specification> Exam room class 64](#_Toc101867017)

[Table 16. <Class Specification> Report class 65](#_Toc101867018)

[Table 17. <Class Specification> Attempt class 65](#_Toc101867019)

[Table 18. <Database Design> App user table 68](#_Toc101867020)

[Table 19. <Database Design> App user role table 69](#_Toc101867021)

[Table 20. <Database Design> Attempt table 69](#_Toc101867022)

[Table 21. <Database Design> Attendance table 70](#_Toc101867023)

[Table 22. <Database Design> Exam room table 70](#_Toc101867024)

[Table 23. <Database Design> Notification table 71](#_Toc101867025)

[Table 24. <Database Design> Report table 72](#_Toc101867026)

[Table 25. <Database Design> Room table 73](#_Toc101867027)

[Table 26. <Database Design> Semester table 74](#_Toc101867028)

[Table 27. <Database Design> Shift table 74](#_Toc101867029)

[Table 28. <Database Design> Subject table 75](#_Toc101867030)

[Table 29. <Database Design> Subject examinee table 75](#_Toc101867031)

[Table 30. <Database Design> Subject semester table 76](#_Toc101867032)

[Table 31. <Database Design> Subject tool table 76](#_Toc101867033)

[Table 32. <Database Design> Tool table 77](#_Toc101867034)

# IV. Software Design Document

## 1. Overall Description

### 1.1 Assumptions

VaLua is designed based on the following assumptions:

* **Hardware:**
  + Camera resolution: 720p/30fps or higher, and a viewing angle of 60°.
  + Central Processing Unit (CPU): Intel Core i5 8th Generation processor or higher.
  + RAM – 8GB or higher
  + Graphic Processing Unit (GPU): NVIDIA GeForce GTX 1050ti or higher.
* **Software:**
  + Chrome (version 87 or higher)
  + IE (version 11 or higher) or any browser that supports HTML5 and CSS3
  + NodeJS 14.16.1
  + Java 11
  + Flutter 2.8
  + PostgreSQL version 13
* **Operating systems:**
  + Android version 6.0 (Marshmallow) or higher
  + Windows 10 (Professional edition version 1909 or higher)
* **End-user characteristics:**
  + **Manager:** using the system to manage accounts, rooms, subjects with their tools, semesters and their subjects.
  + **Shift Manager:** using the system to manage examinees’ assignments, shifts with exam rooms and reports about violations or incidents that may occur during the exams.
  + **Staff:** using the system to register shifts, view proctoring schedules, manage attendances checking, create reports and finish exams they supervise.
  + **Examinee:** using the system to view their exam schedules and check their attendances.

### 1.2 Design Constraints

* **Interoperability requirements:**
  + Data transmission over the internet
* **Performance and reliability requirements:**
  + Processing examinee images to check attendance should handle timeout and must provide results within 10 seconds.
  + Sending emails must be restricted to 100 emails per task, 2 minutes between tasks.
  + Using multitasking, multithreading to handle concurrent tasks.

## 2. System Architecture Design

### 2.1 Overall Architecture



Figure . Overall Architecture

### 2.2. Backend Architecture



Figure . Backend Architecture

### 2.3. Web Application Architecture

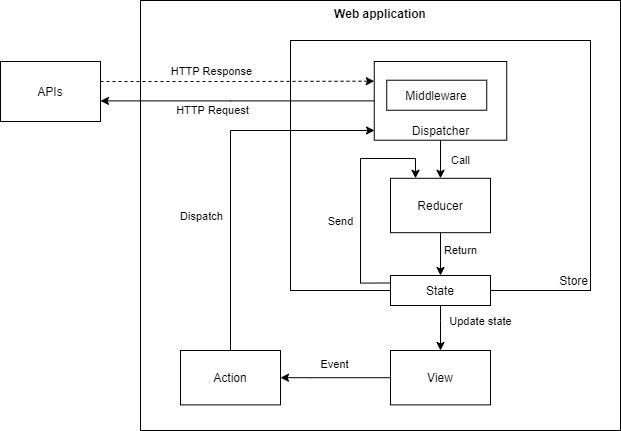


Figure . Web Application Architecture

### 2.4. Mobile Application Architecture

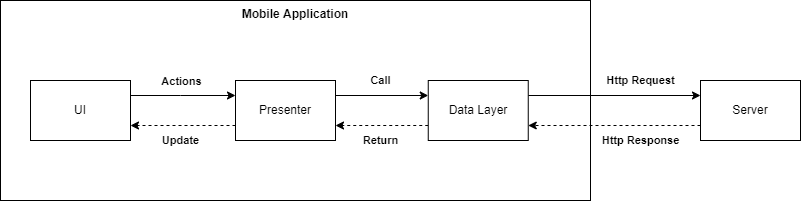


Figure . Mobile Application Architecture

### 2.5 Package Diagram

#### 2.3.1. Backend Package Diagram

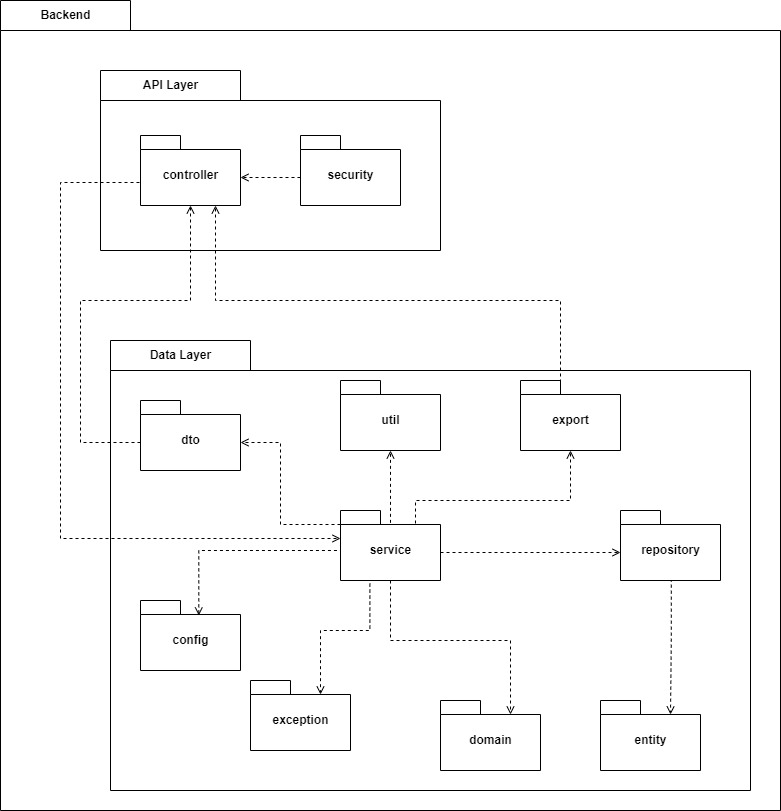


Figure . Backend Package Diagram

Table . Backend Package Diagram - Code Package

|  |  |  |
| --- | --- | --- |
| **No** | **Package** | **Description** |
| 1 | controller | The package contains controller classes, responsible for handling the HTTP requests and returning responses with values. |
| 2 | config | The package contains configuration classes and constant classes used in the backend. |
| 3 | dto | The package contains classes used for data binding and mapping response. |
| 4 | service | The package contains service classes used for handling business logic. |
| 5 | repository | The package contains repository classes for handling data access queries. |
| 6 | entity | The package contains entity classes for data mapping from the database tables. |
| 7 | exception | The package contains exception handlers and custom exceptions defined in the system. |
| 8 | export | The package contains view resolver and view models classes for excel, csv and pdf file exports. |
| 9 | utils | The package contains utility methods for common uses. |
| 10 | security | The package contains Json Web Token provider class, user principal class and Oauth2 service classes. |
| 11 | domain | The package contains custom pageable classes for pagination, custom quartz scheduler service and executor classes, custom QR code service class. |

#### 2.3.2. Web Application Package Diagram

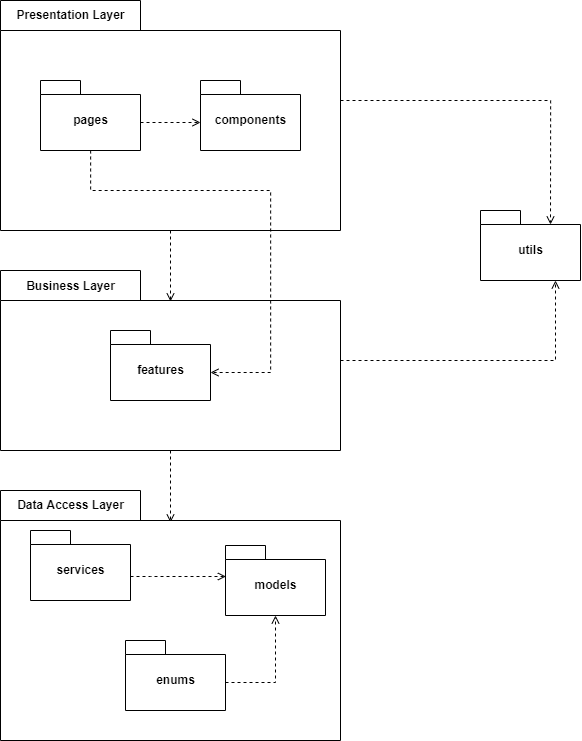


Figure . Web Application Package Diagram

Table . Web Application Package Diagram - Code Package

|  |  |  |
| --- | --- | --- |
| **No** | **Package** | **Description** |
| 1 | pages | The package contains pages, responsible for grouping components together |
| 2 | components | The package contains components for specific use in a specific page. |
| 3 | utils | The package contains utility methods for common use. |
| 4 | features | The package contains classes used for handling business logic, managing state. |
| 5 | services | The package contains classes responsible for handling data between REST APIs and web application. |
| 6 | models | The package contains model classes for data binding. |
| 7 | enums | The package contains all the enums for data mapping and components |

#### 2.3.3. Mobile Application Package Diagram

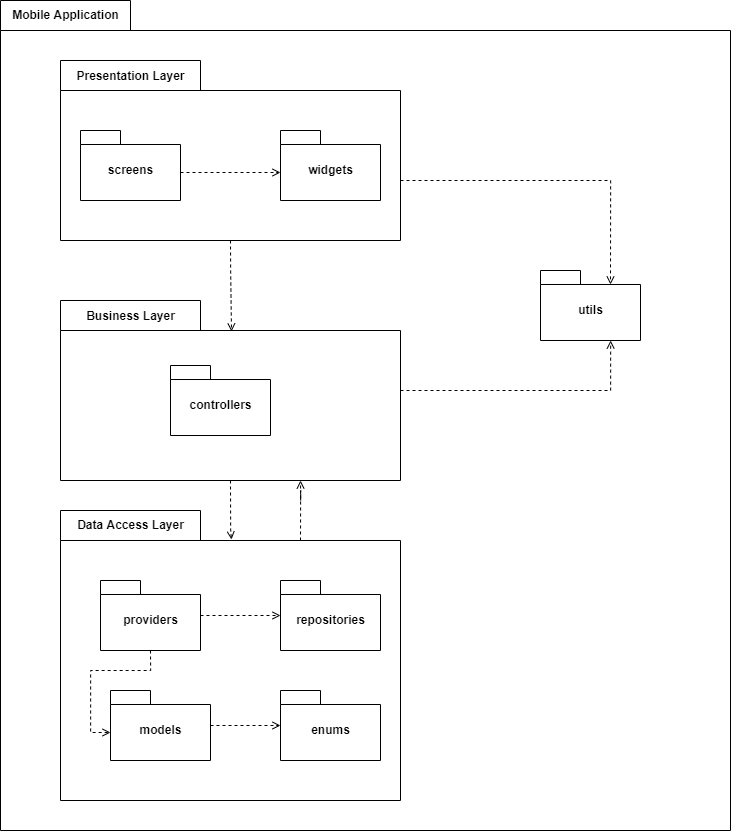


Figure . Web Application Package Diagram

Table . Mobile Application Package Diagram - Code Package

|  |  |  |
| --- | --- | --- |
| **No** | **Package** | **Description** |
| 1 | screens | The package contains screens, responsible for grouping widgets together |
| 2 | widgets | The package contains widgets for specific use in a specific screen. |
| 3 | utils | The package contains utility methods for common use. |
| 4 | controllers | The package contains controller classes used for handling business logic. |
| 5 | providers | The package contains classes responsible for handling data between REST APIs and mobile application. |
| 6 | repositories | The package contains all repository classes for the data access layer. |
| 7 | models | The package contains model classes for data binding. |
| 8 | enums | The package contains all the enums for data mapping and widgets |

## 3. System Detailed Design

### 3.1 Sequence Diagrams

#### 3.1.1. Account management

##### Create account

Diagram

Description automatically generated

Figure . <Sequence Diagram> Create account

##### Update account

Diagram

Description automatically generated

Figure . <Sequence Diagram> Update account

##### Disable account

Diagram

Description automatically generated

Figure . <Sequence Diagram> Disable account

##### View account list

Diagram

Description automatically generated

Figure . <Sequence Diagram> View account list

##### Reset password

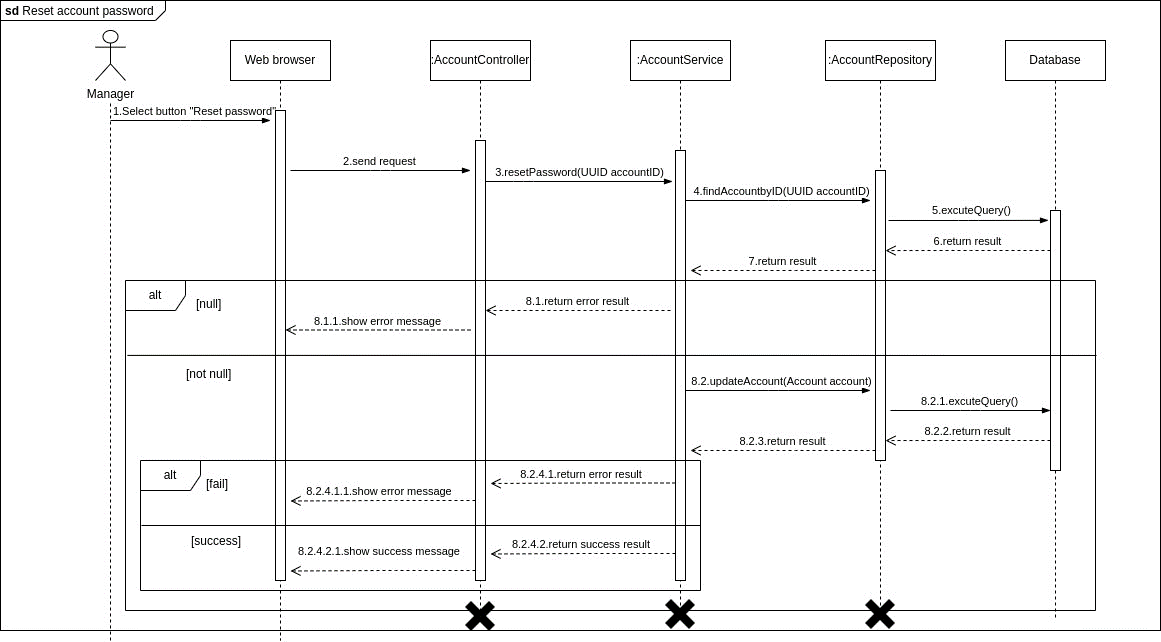


Figure . <Sequence Diagram> Reset password

#### 3.1.2. Subject management

##### Create subject

Diagram

Description automatically generated

Figure . <Sequence Diagram> Create subject

##### Update subject

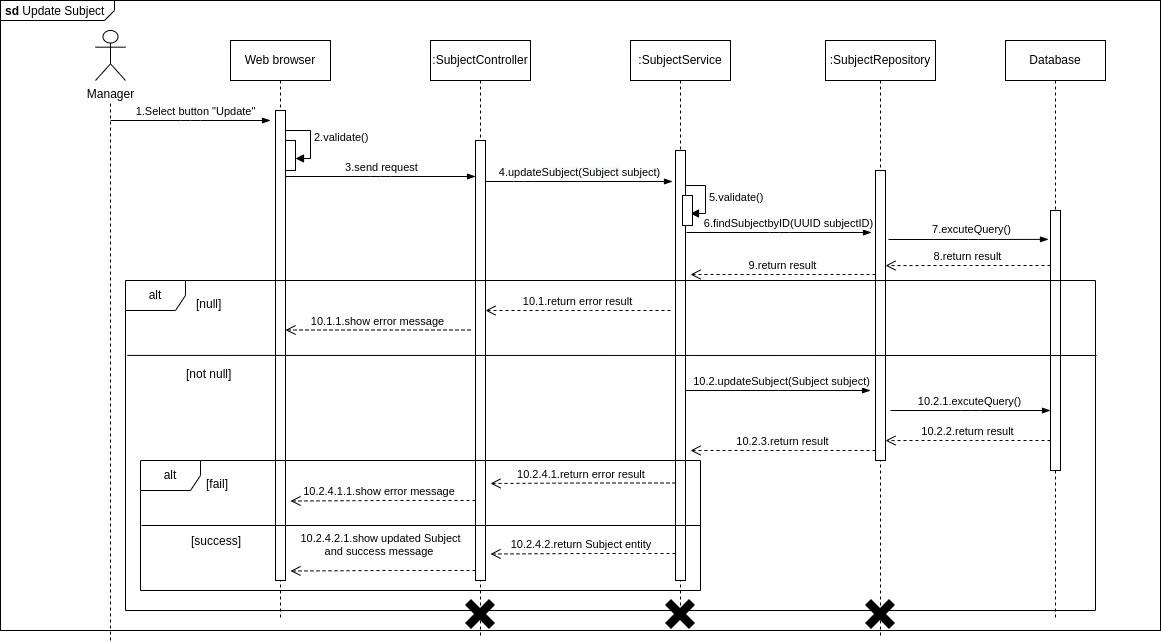


Figure . <Sequence Diagram> Update subject

##### Disable subject

Diagram

Description automatically generated

Figure . <Sequence Diagram> Disable subject

##### View subject list

Diagram

Description automatically generated

Figure . <Sequence Diagram> View subject list

#### 3.1.3. Semester management

##### Create semester

Diagram

Description automatically generated

Figure . <Sequence Diagram> Create semester

##### Update semester

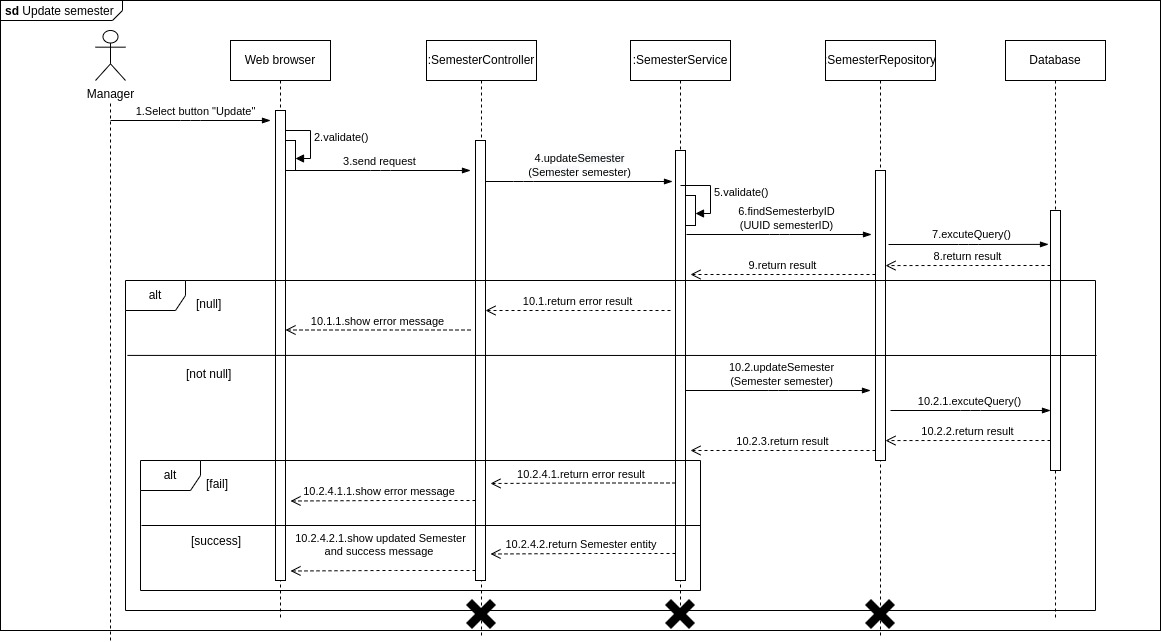


Figure . <Sequence Diagram> Update semester

##### Disable semester

Diagram

Description automatically generated

Figure . <Sequence Diagram> Disable semester

##### View semester list

Diagram

Description automatically generated

Figure . <Sequence Diagram> View semester list

##### Add subject to semester

Diagram

Description automatically generated

Figure . <Sequence Diagram> Add subject to semester

##### Remove subject from semester

Diagram

Description automatically generated

Figure . <Sequence Diagram> Remove subject from semester

#### 3.1.4. Tool management

##### Create tool

Diagram

Description automatically generated

Figure . <Sequence Diagram> Create tool

##### Update tool

Diagram

Description automatically generated

Figure . <Sequence Diagram> Update tool

##### Disable tool

Diagram

Description automatically generated

Figure . <Sequence Diagram> Disable tool

##### View tool list

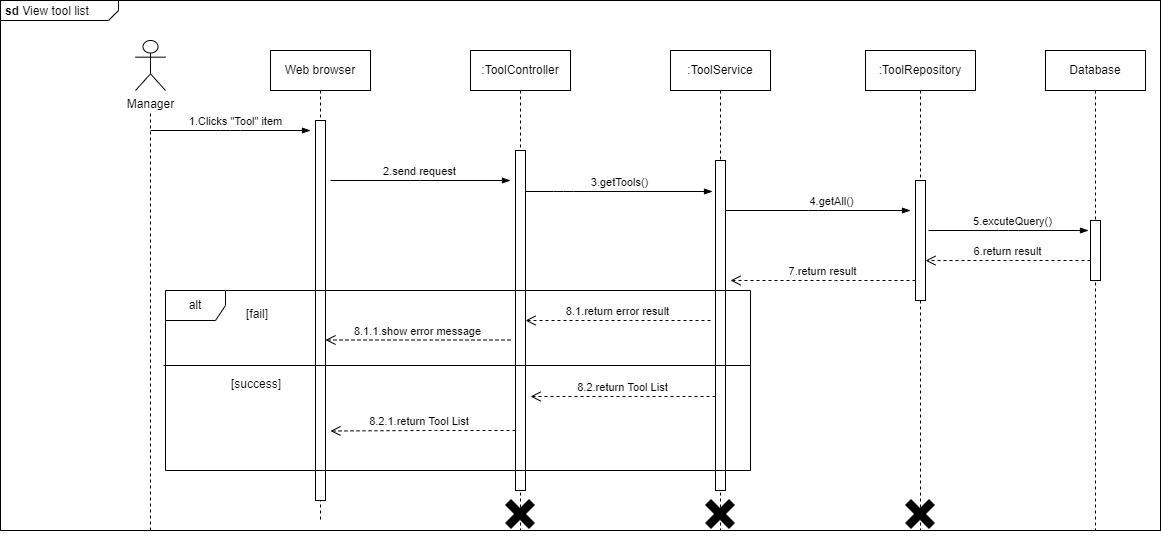


Figure . <Sequence Diagram> View tool list

##### Add tool to subject

Diagram

Description automatically generated

Figure . <Sequence Diagram> Add tool to subject

##### Remove tool from subject

Diagram

Description automatically generated

Figure . <Sequence Diagram> Remove tool from subject

#### 3.1.5. Room management

##### Create room

Diagram

Description automatically generated

Figure . <Sequence Diagram> Create room

##### Update room

Diagram

Description automatically generated

Figure . <Sequence Diagram> Update room

##### Disable room

Diagram

Description automatically generated

Figure . <Sequence Diagram> Disable room

##### View room list

Diagram

Description automatically generated

Figure . <Sequence Diagram> View room list

#### 3.1.6. Manage shift

##### Create shift

Diagram

Description automatically generated

Figure . <Sequence Diagram> Create shift

##### Update shift

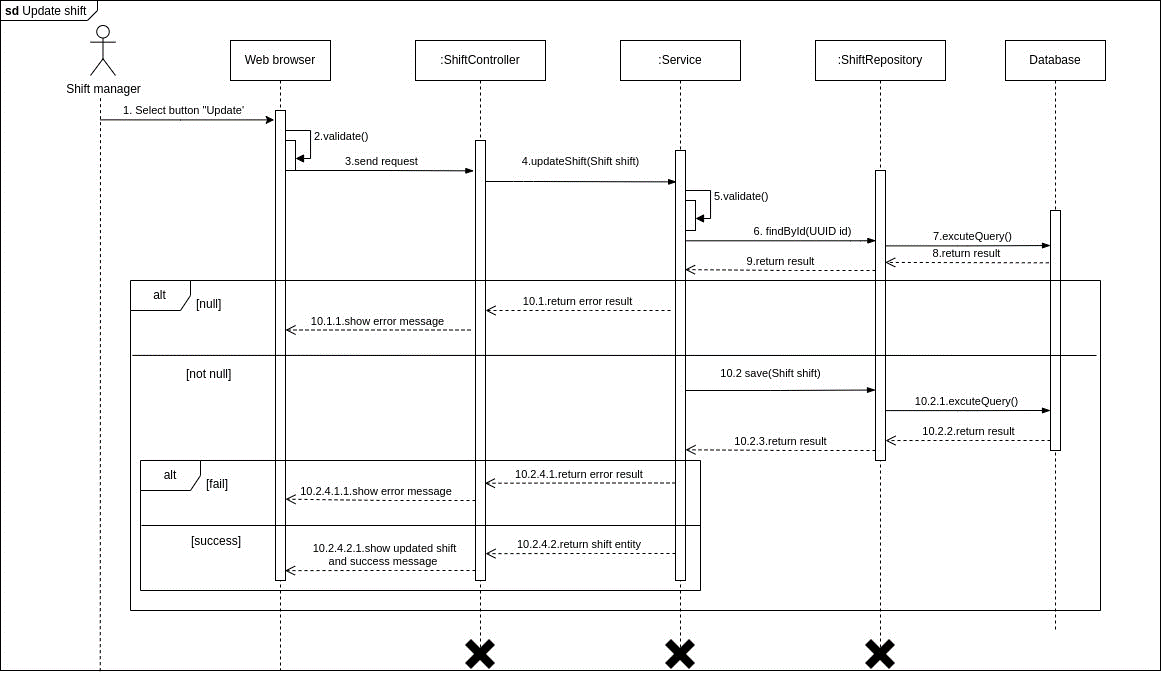


Figure . <Sequence Diagram> Update shift

##### Delete shift

Diagram

Description automatically generated

Figure . <Sequence Diagram> Delete shift

##### Lock shift

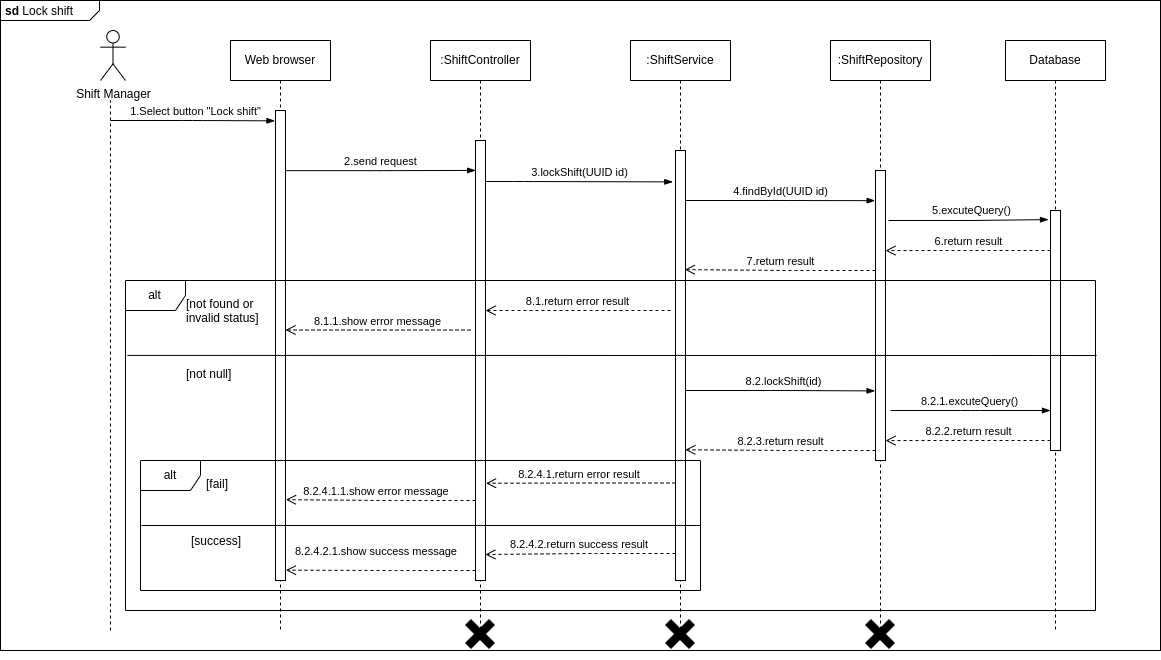


Figure . <Sequence Diagram> Lock shift

##### Start staffing

Diagram

Description automatically generated

Figure . <Sequence Diagram> Start staffing

##### View shift list

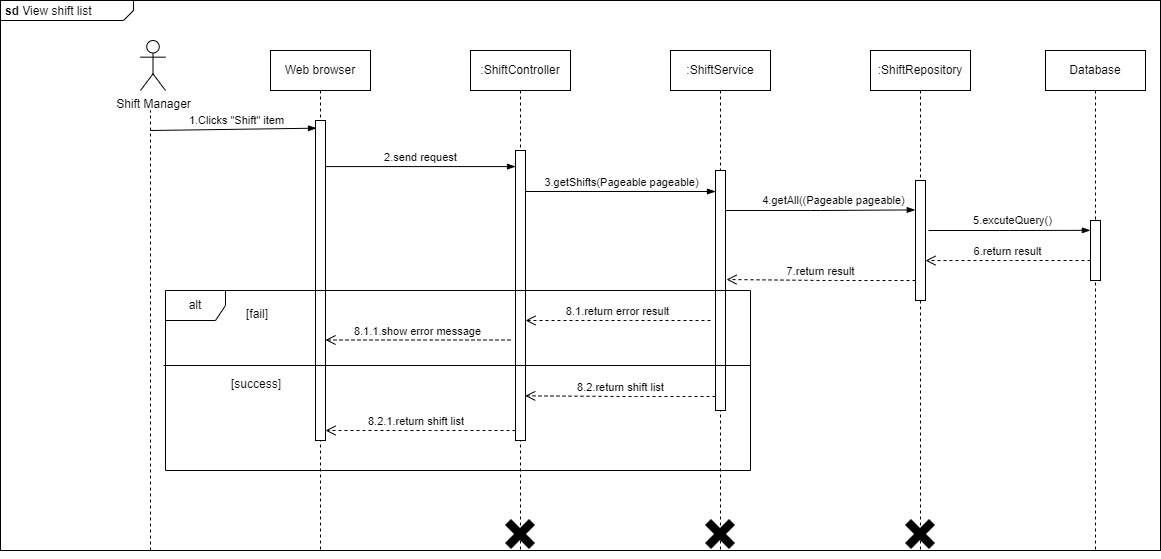


Figure . <Sequence Diagram> View shift list

##### View shift detail

Diagram

Description automatically generated

Figure 39. <Sequence Diagram> View shift detail

#### 3.1.7. Manage examinee

##### Import examinees

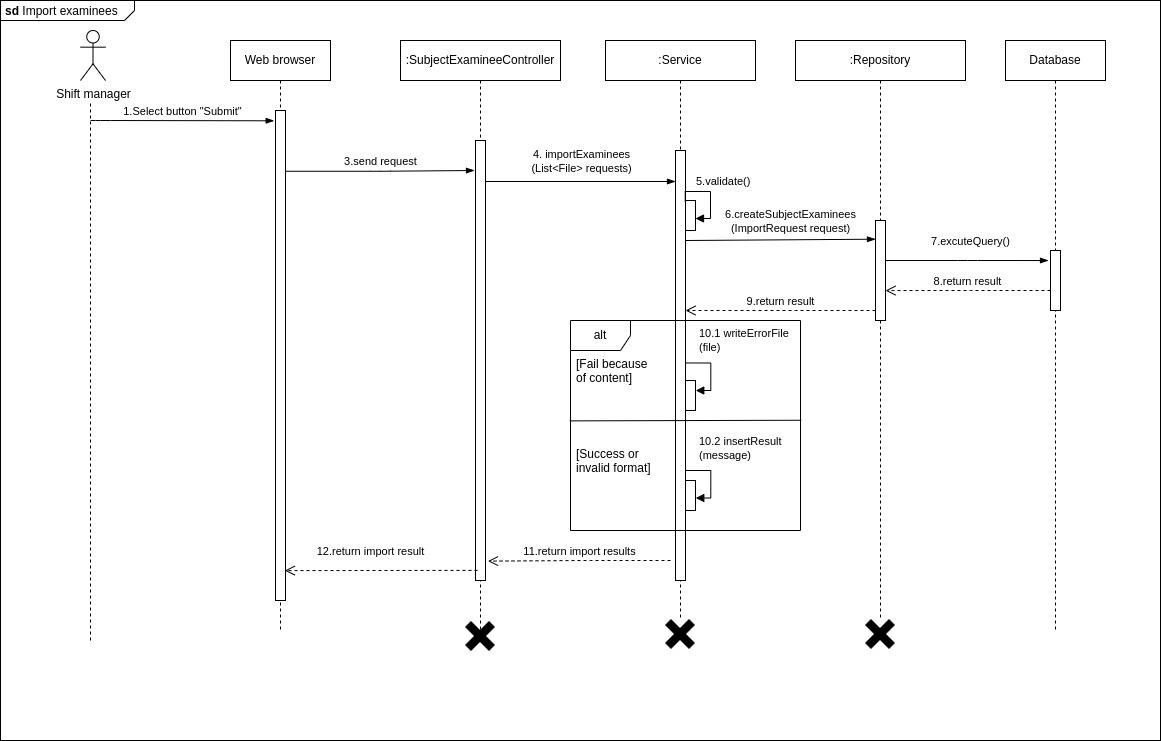


Figure . <Sequence Diagram> Import examinees

##### Remove examinee from semester’s subject

Diagram

Description automatically generated

Figure . <Sequence Diagram> Remove examinee from semester's subject

##### View subject assignments list

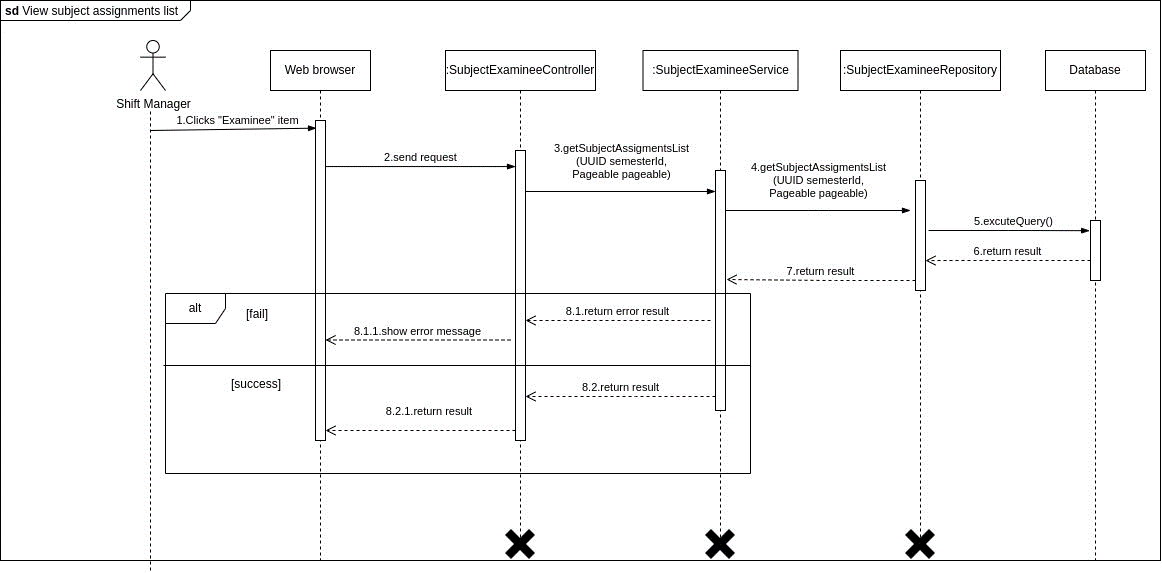


Figure . <Sequence Diagram> View subject assignment list

##### View subject assignments detail

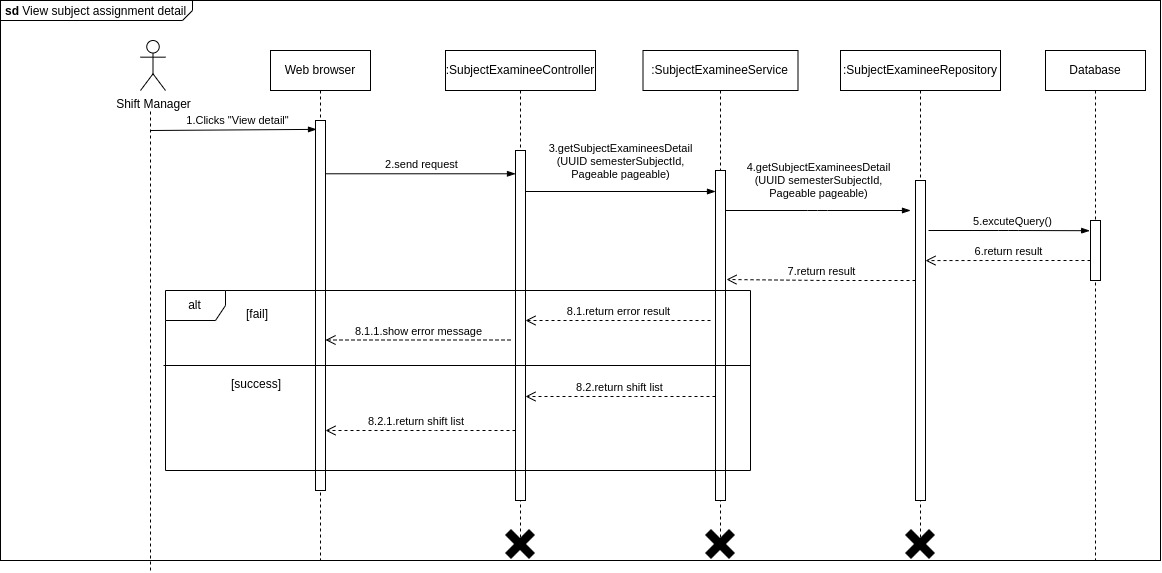


Figure . <Sequence Diagram> View subject assignments detail

#### 3.1.8. Manage exam room

##### Create exam room

Diagram

Description automatically generated

Figure . <Sequence Diagram> Create exam room

##### Update exam room

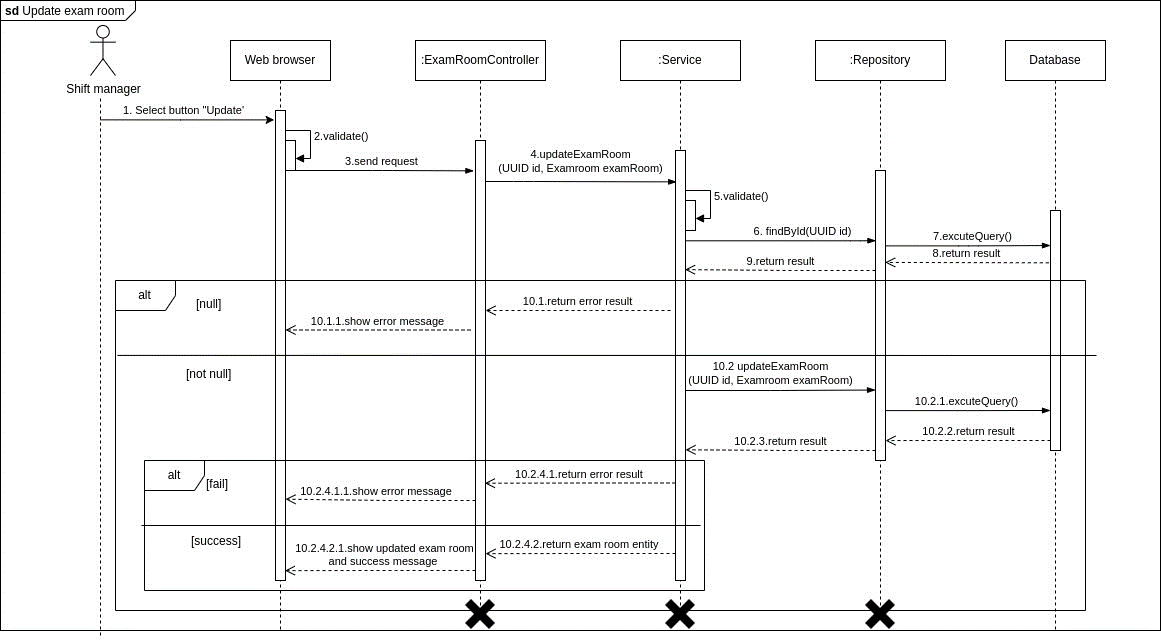


Figure . <Sequence Diagram> Update exam room

##### Remove exam room

Diagram

Description automatically generated with low confidence

Figure . <Sequence Diagram> Remove exam room

##### View exam shift list

Diagram

Description automatically generated

Figure . <Sequence Diagram> View exam shift list

##### Create attendance

Diagram

Description automatically generated

Figure . <Sequence Diagram> Create attendance

##### Delete attendance

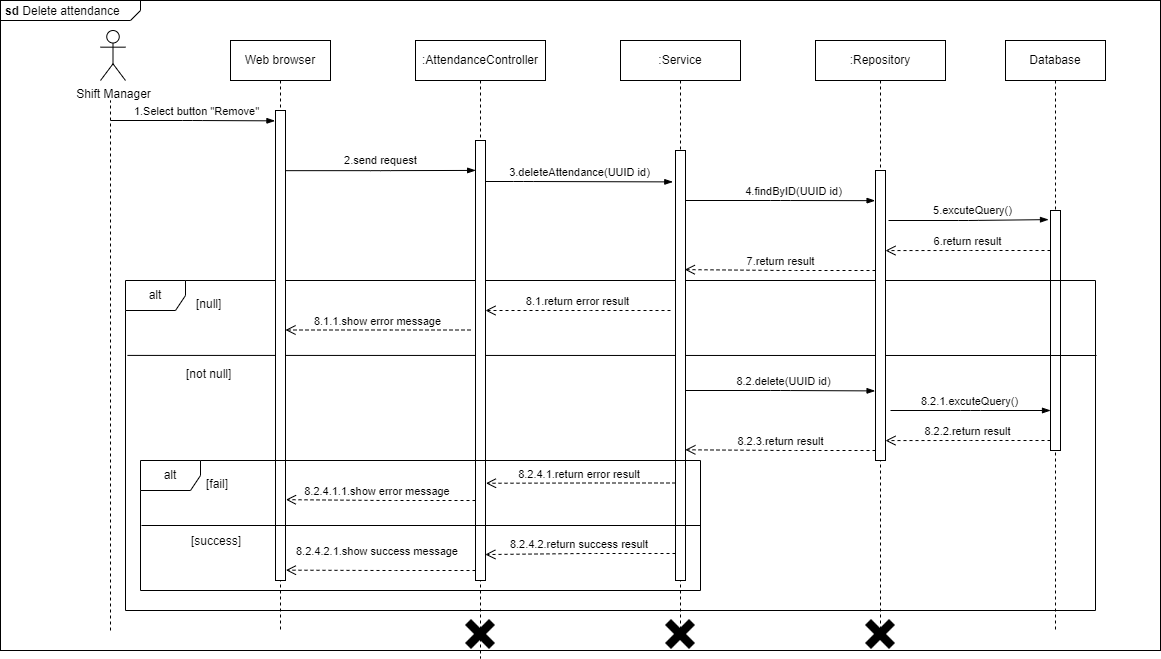


Figure . <Sequence Diagram> Delete attendance

##### Export attendance

Diagram

Description automatically generated

Figure . <Sequence Diagram> Export attendance

##### Export locked shift

Diagram

Description automatically generated

Figure 51. <Sequence Diagram> Export locked shift

##### Assign staff

Diagram

Description automatically generated

Figure 52. <Sequence Diagram> Assign staff

##### Auto assign staff

Diagram

Description automatically generated

Figure 53. <Sequence Diagram> Auto assign staff

#### 3.1.9. Login

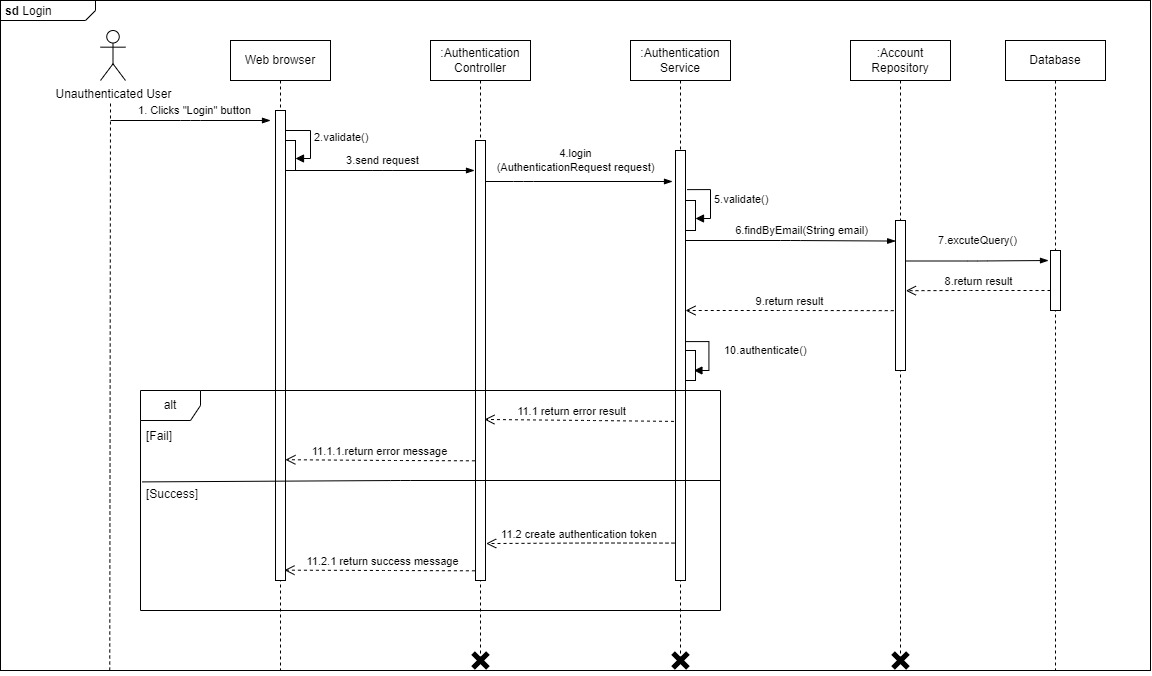


Figure . <Sequence Diagram> Login

#### 3.1.10. Logout

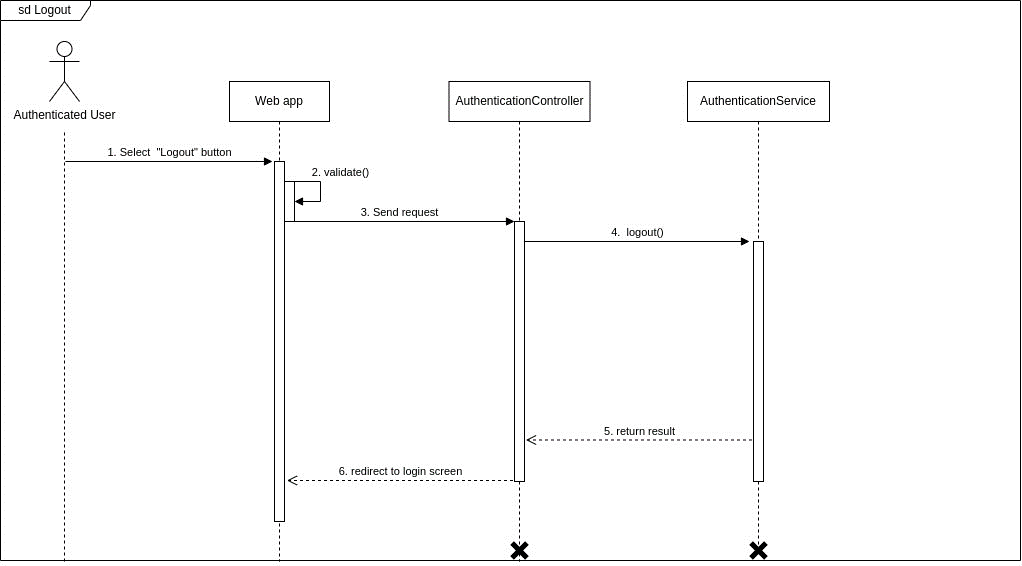
**

Figure . <Sequence Diagram> Logout

#### 3.1.11. Change password

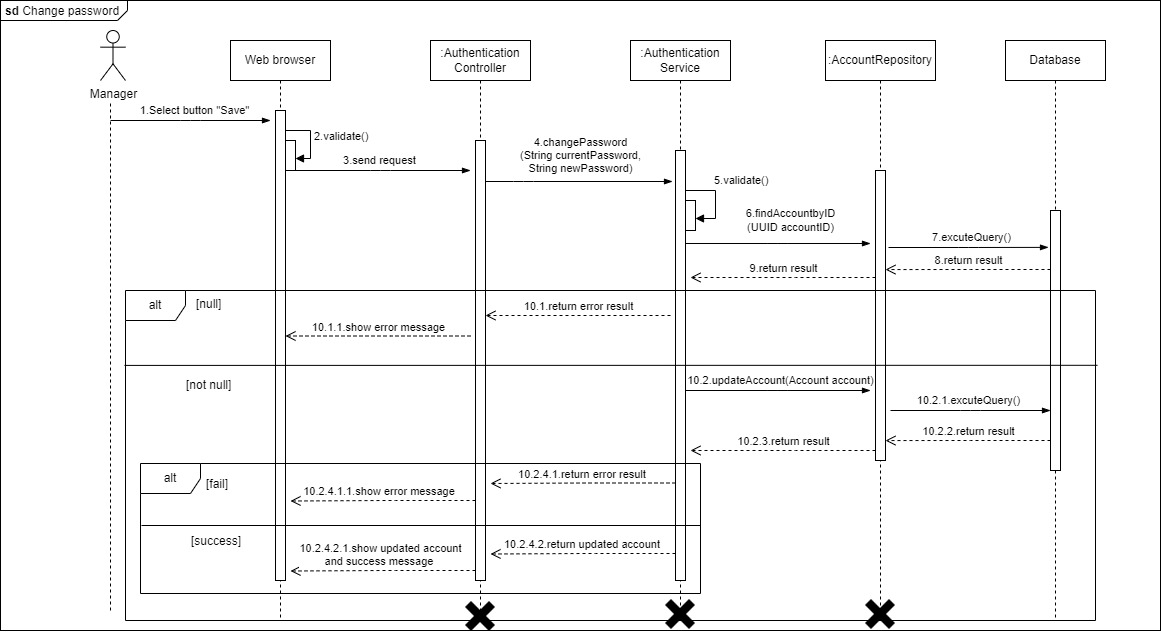


Figure . <Sequence Diagram> Change password

#### 3.1.12. View profile



Figure . <Sequence Diagram> View profile

#### 3.1.13. Update profile

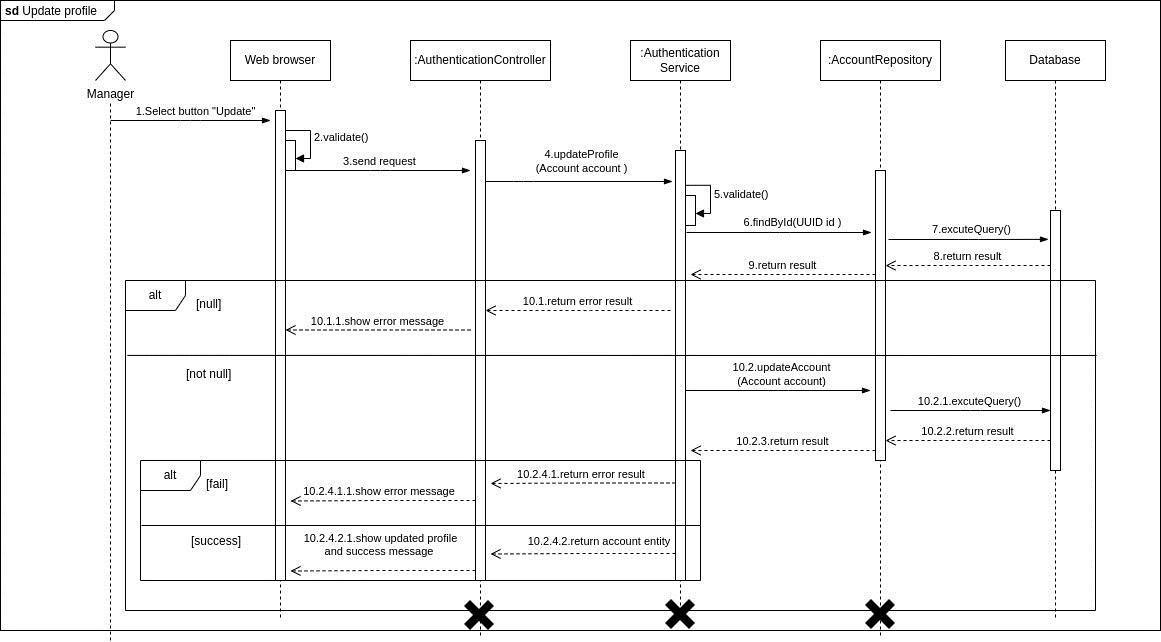


Figure . <Sequence Diagram> Update profile

#### 3.1.14. View notification list

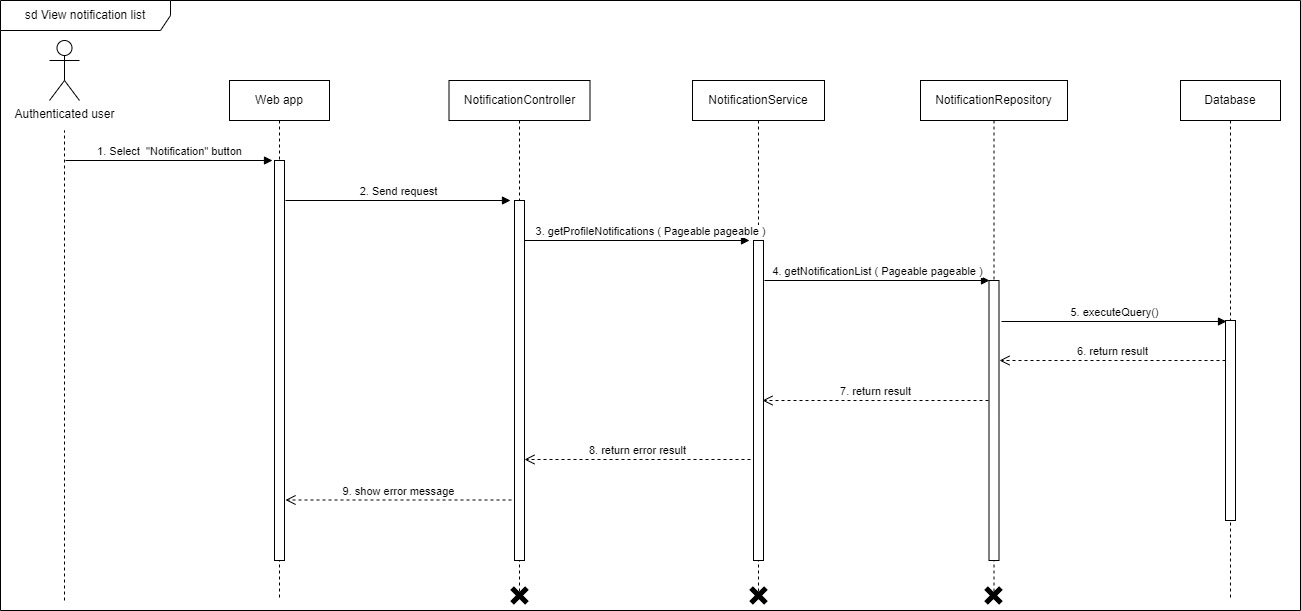


Figure . <Sequence Diagram> View notification list

#### 3.1.15. View report list

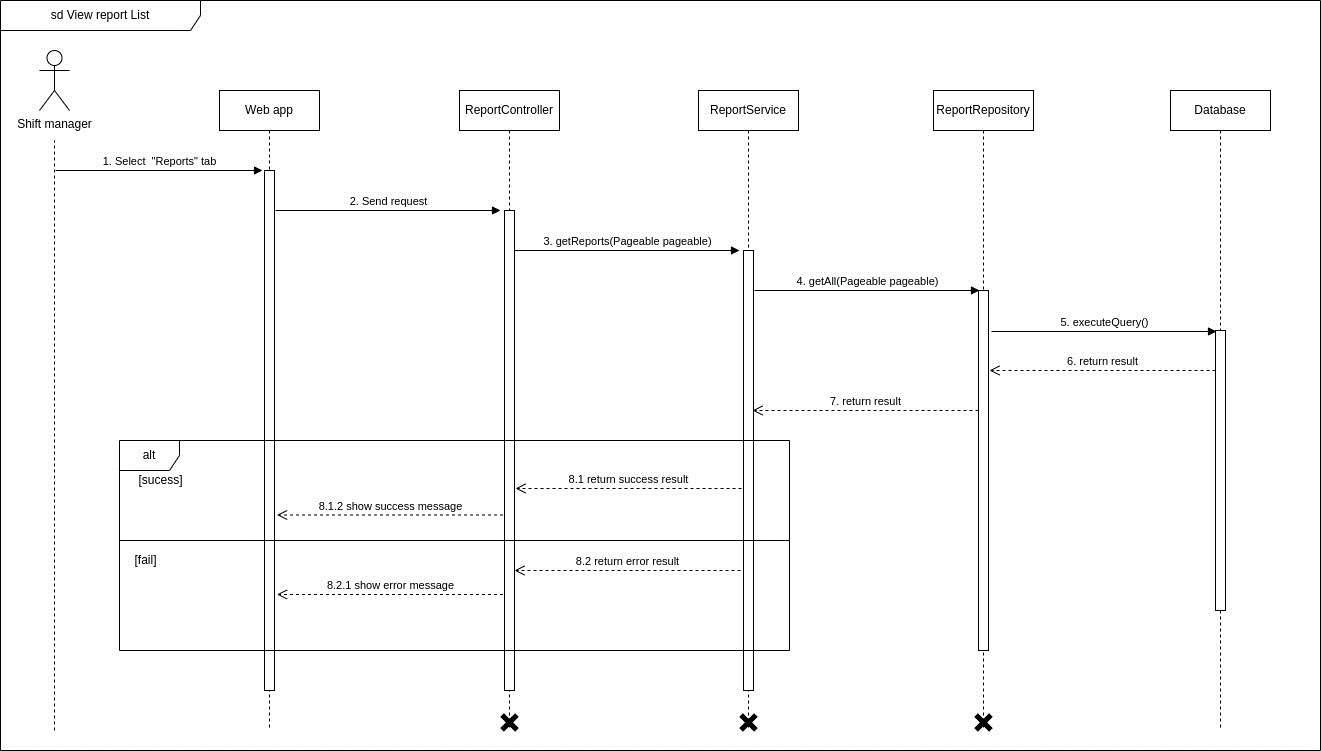


Figure . <Sequence Diagram> View report list

#### 3.1.16. View report detail

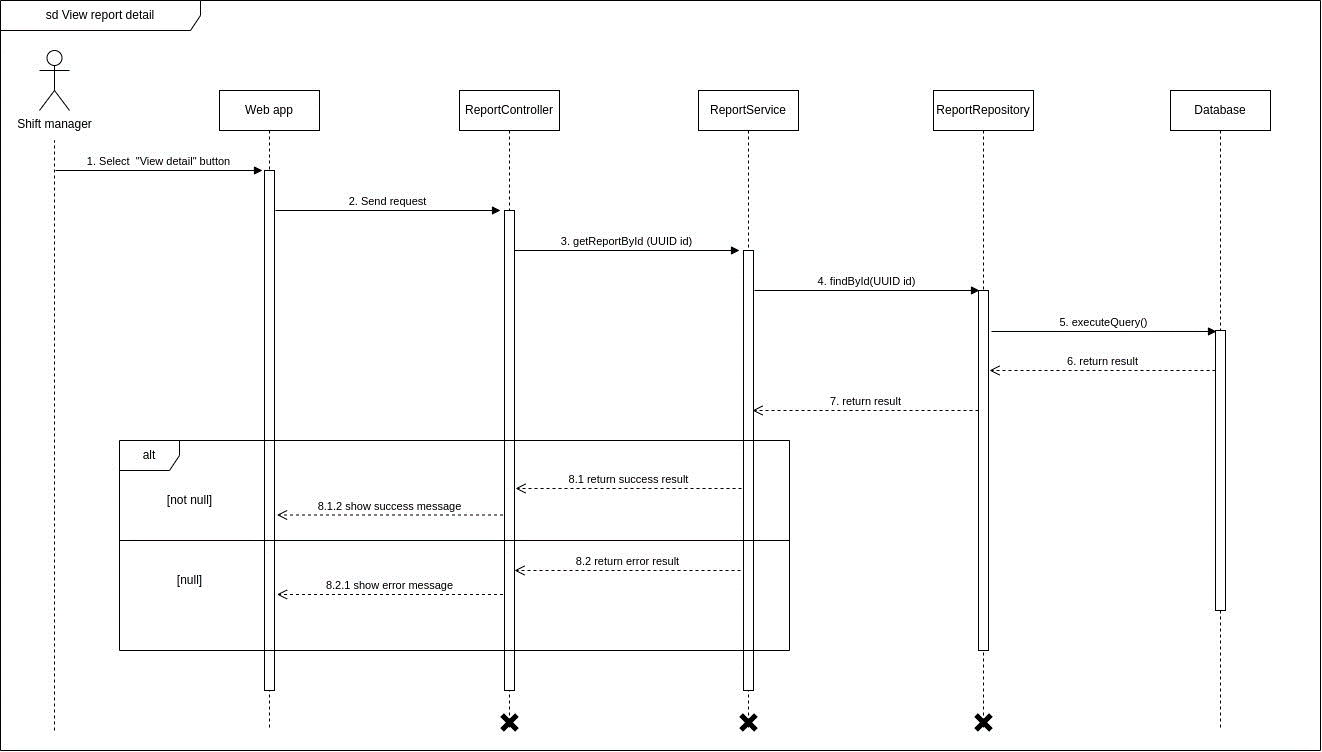


Figure . <Sequence Diagram> View report detail

#### 3.1.17. Resolve report

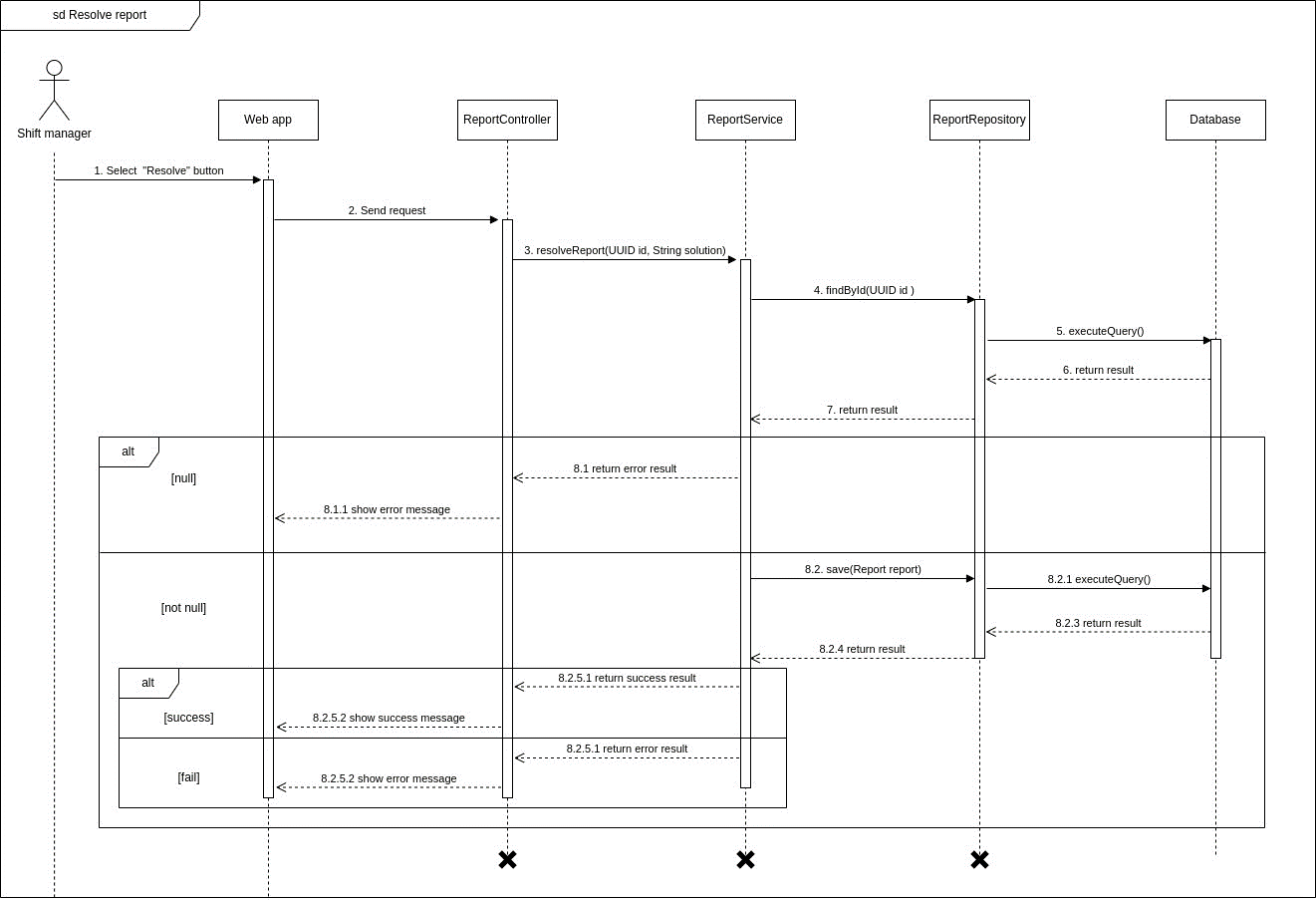


Figure . <Sequence Diagram> Resolve report

### 3.2 Activity Diagrams

#### 3.2.1. Update attendance

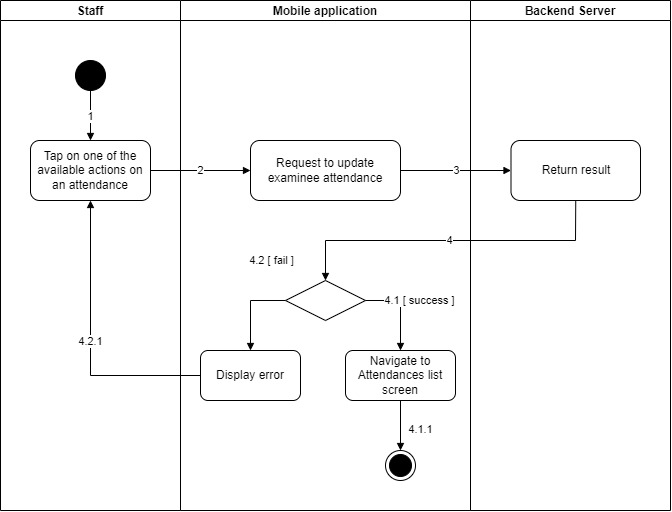


Figure . <Activity Diagram> Update attendance

#### 3.2.2. View attendances of exam room

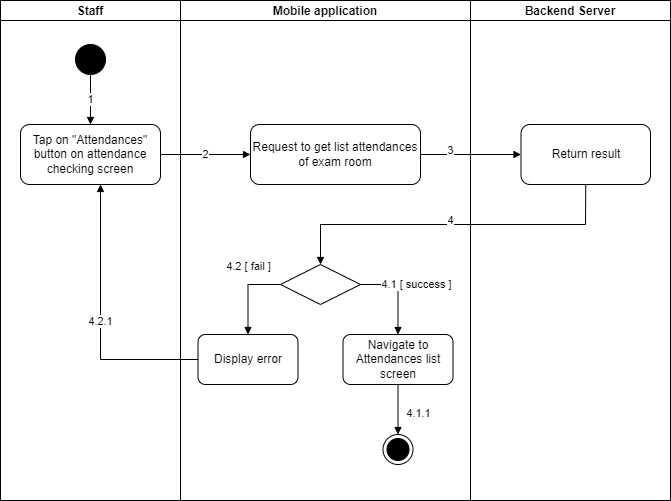


Figure . <Activity Diagram> View attendances of exam room

#### 3.2.3. Create report

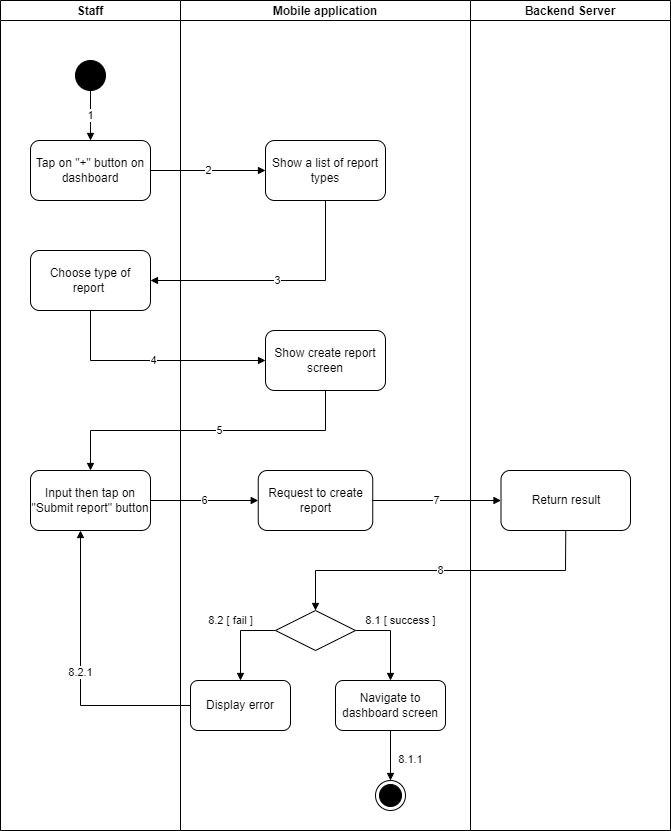


Figure . <Activity Diagram> Create report

#### 3.2.4. View assigned exam room

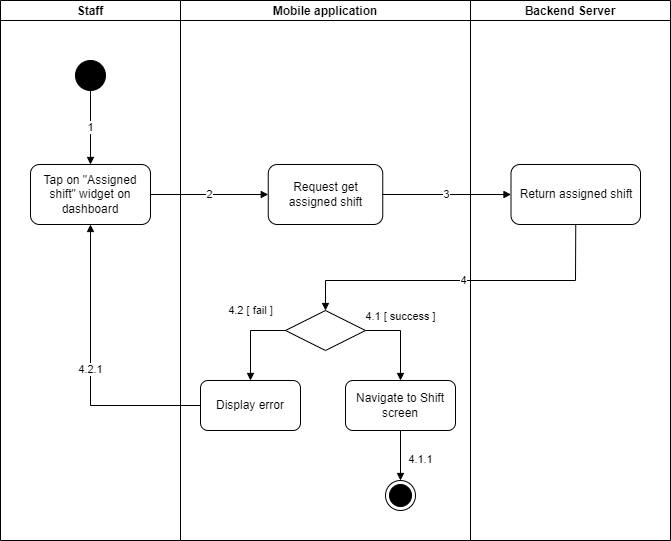


Figure . <Activity Diagram> View assigned exam room

#### 3.2.5. View assigned exam room report list

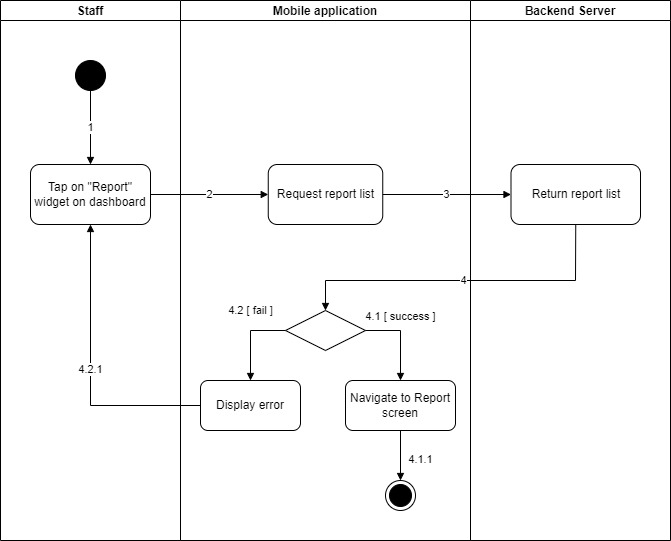


Figure . <Activity Diagram> View assigned exam room report list

#### 3.2.6. Update report

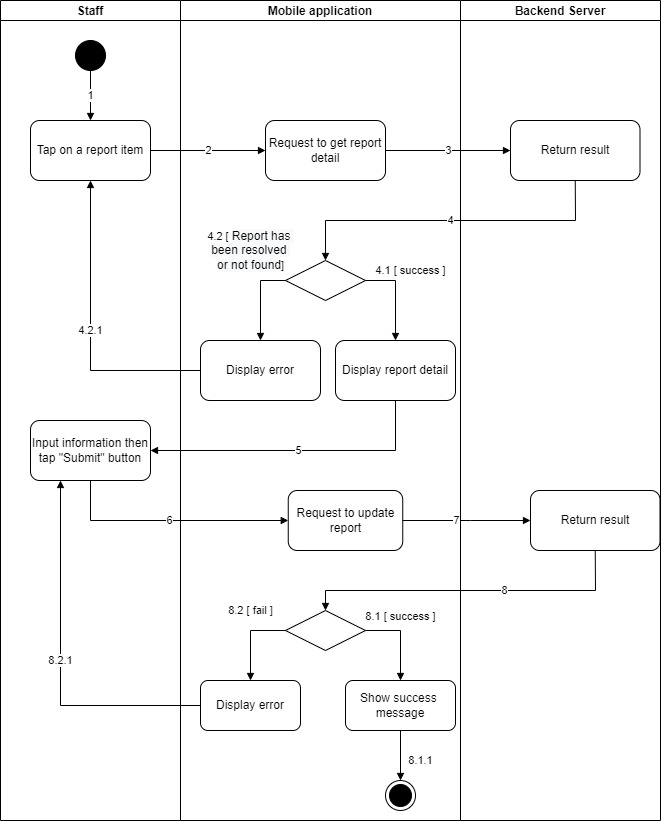


Figure . <Activity Diagram> Update report

#### 3.2.7. View own exam schedule

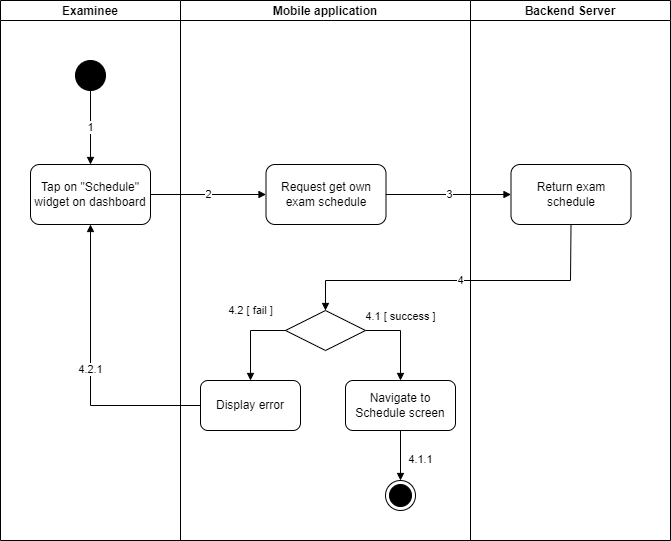


Figure . <Activity Diagram> View own exam schedule

#### 3.2.8. Check attendance

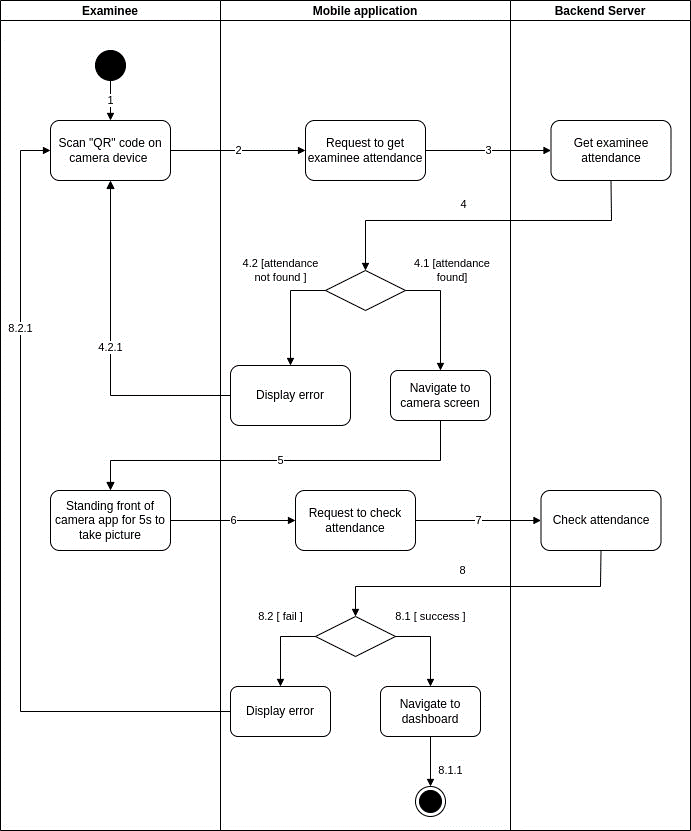


Figure . <Activity Diagram> Check attendance

### 3.3 State Diagrams

#### 3.3.1. Shift

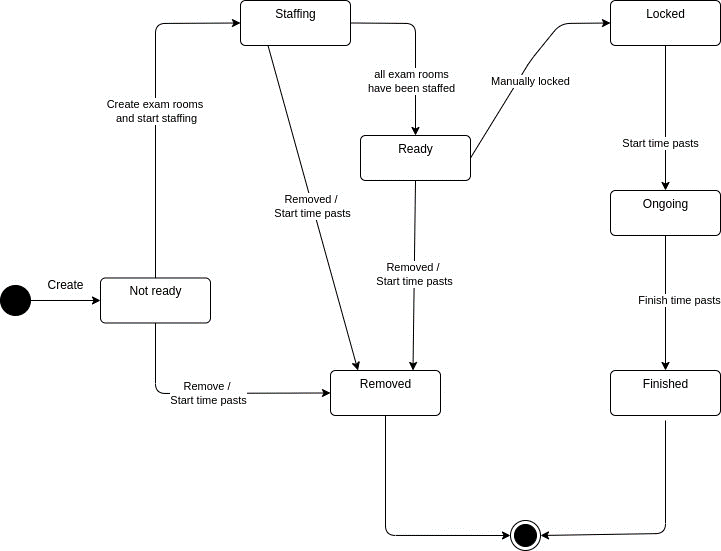


Figure . <State Diagram> Shift

#### 3.3.2. Exam room

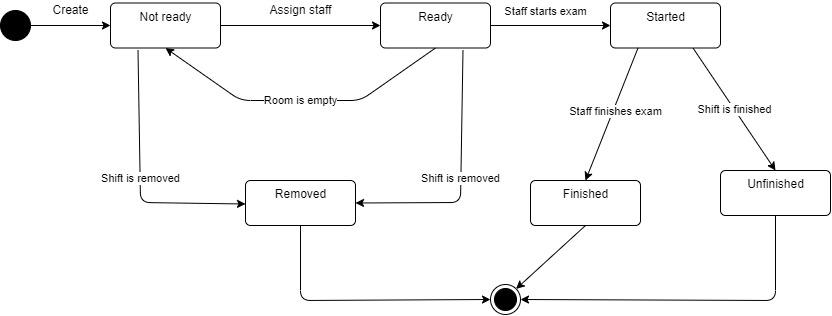


Figure . <State Diagram> Exam room

#### 3.3.3. Attendance

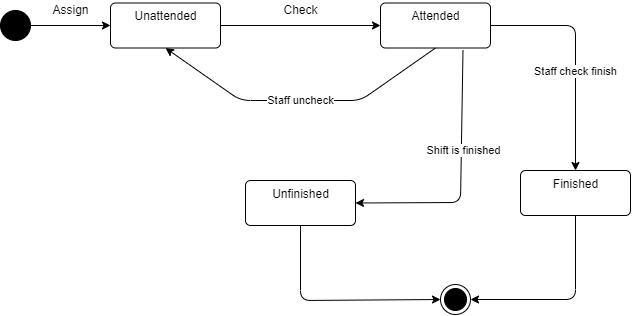


Figure . <State Diagram> Attendance

### 3.4 Class Diagrams

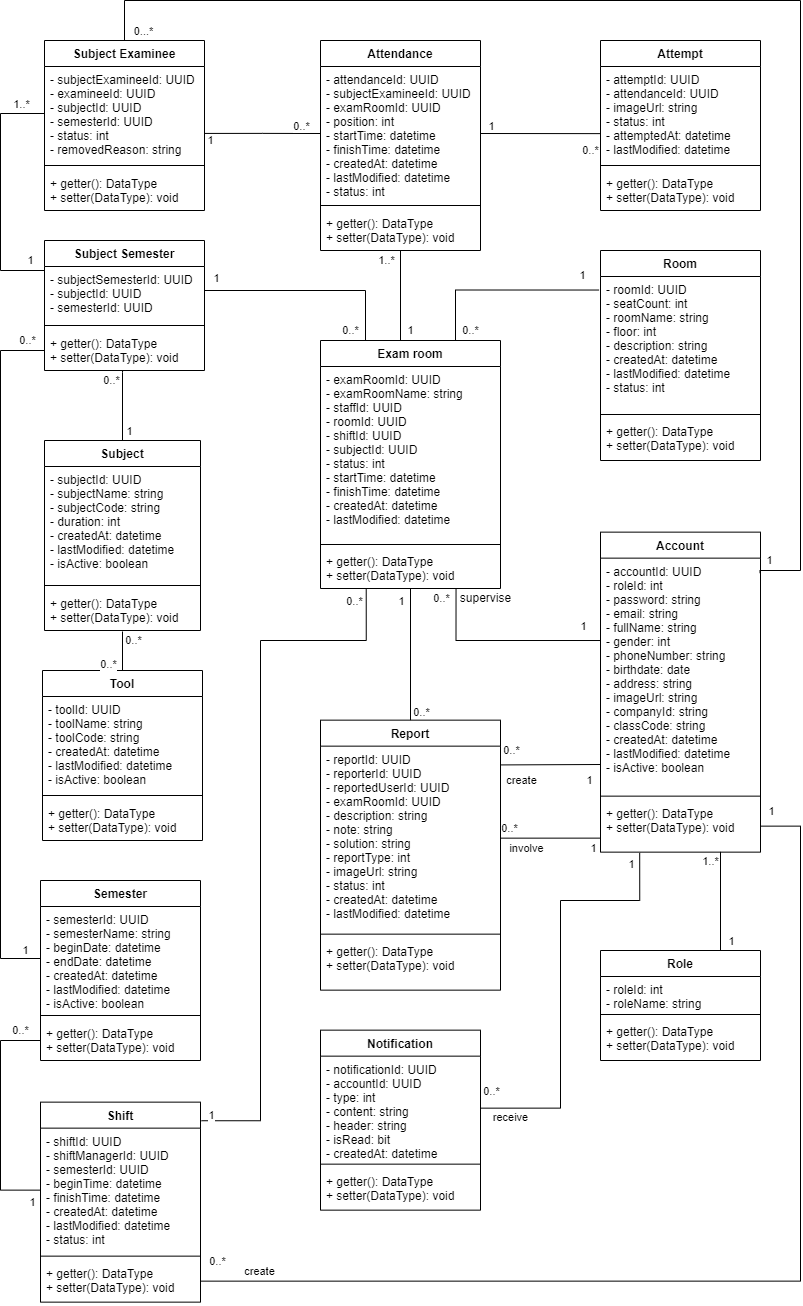


Figure . Class Diagram

## 4. Class Specifications

### 4.1. Account class

Table . <Class Specification> Account class

|  |  |  |
| --- | --- | --- |
| **Property** | **Type** | **Description** |
| accountId | UUID | Unique identifier of an account |
| roleId | int | Unique identifier of the user’s role |
| password | string | Password of the user |
| email | string | Email of the user |
| fullName | string | Full name of the user |
| gender | int | Gender of the user |
| phoneNumber | string | Phone number of the user |
| birthdate | date | Birthdate of the user |
| address | string | Address of the user |
| imageUrl | string | URL of the user’s profile picture |
| companyId | string | Company ID of the user |
| classCode | string | Class code of users with the “Examinee” role |
| createdAt | datetime | Created date of the user |
| lastModified | datetime | Last modified date of the user |
| isActive | boolean | Check if the account is available |
| getter() | data type | Get attribute of class |
| setter() | void | Set value of class’s attribute |

### 4.2. Role class

Table . <Class Specification> Role class

|  |  |  |
| --- | --- | --- |
| **Property** | **Type** | **Description** |
| roleId | UUID | Unique identifier of the user’s role |
| roleName | String | Name of the role |
| getter() | data type | Get attribute of class |
| setter() | void | Set value of class’s attribute |

### 4.3. Room class

Table . <Class Specification> Room class

|  |  |  |
| --- | --- | --- |
| **Property** | **Type** | **Description** |
| roomId | UUID | Unique identifier of the room |
| seatCount | int | The total seat count of a room |
| roomName | string | Name of the room |
| floor | int | The floor of the room |
| description | string | Description of the room |
| createdAt | datetime | Created date of the seat |
| lastModified | datetime | Last modified date of the seat |
| status | int | Status of the room |
| getter() | data type | Get attribute of class |
| setter() | void | Set value of class’s attribute |

### 4.4. Semester class

Table . <Class Specification> Semester class

|  |  |  |
| --- | --- | --- |
| **Property** | **Type** | **Description** |
| semesterId | UUID | Unique identifier of the semester |
| semesterName | string | Name of the semester |
| beginDate | datetime | Begin date of the semester |
| endDate | datetime | End date of the semester |
| isActive | boolean | Check if semester is available |
| getter() | data type | Get attribute of class |
| setter() | void | Set value of class’s attribute |

### 4.5. Shift class

Table . <Class Specification> Shift class

|  |  |  |
| --- | --- | --- |
| **Property** | **Type** | **Description** |
| shiftId | UUID | Unique identifier of the shift |
| shiftManagerId | UUID | Unique identifier of the shift’s manager |
| semesterId | UUID | Unique identifier of the shift’ semester |
| beginTime | datetime | Begin time of the shift |
| finishTime | datetime | Finish time of the shift |
| createdAt | datetime | Created date of the shift |
| lastModified | datetime | Last modified date of the shift |
| status | int | Status of the shift |
| getter() | data type | Get attribute of class |
| setter() | void | Set value of class’s attribute |

### 4.6. Subject class

Table . <Class Specification> Subject class

|  |  |  |
| --- | --- | --- |
| **Property** | **Type** | **Description** |
| subjectId | UUID | Unique identifier of the subject |
| subjectName | string | Name of the subject |
| subjectCode | string | Code of the subject |
| duration | int | The exam’s duration of the subject |
| createdAt | datetime | Created date of the subject |
| lastModified | datetime | Last modified date of the subject |
| isActive | boolean | Check if subject is available |
| getter() | data type | Get attribute of class |
| setter() | void | Set value of class’s attribute |

### 4.7. Notification class

Table . <Class Specification> Notification class

|  |  |  |
| --- | --- | --- |
| **Property** | **Type** | **Description** |
| notificationId | UUID | Unique identifier of notification |
| accountId | string | Unique identifier of receiver |
| type | int | Type of notification |
| content | string | Content of the notification in detail |
| header | string | Text that shows in notification item list |
| createdAt | datetime | Created date of the notification |
| lastModified | datetime | Last modified date of the notification |
| isRead | boolean | Check if this notification has been displayed |
| getter() | data type | Get attribute of class |
| setter() | void | Set value of class’s attribute |

### 4.8. Tool class

Table . <Class Specification> Tool class

|  |  |  |
| --- | --- | --- |
| **Property** | **Type** | **Description** |
| toolId | UUID | Unique identifier of tool |
| toolName | string | Name of tool |
| toolCode | string | Code of the tool |
| createdAt | datetime | Created date of the tool |
| lastModified | datetime | Last modified date of the tool |
| isActive | boolean | Check if tool is available |
| getter() | data type | Get attribute of class |
| setter() | void | Set value of class’s attribute |

### 4.9. Subject Semester class

Table . <Class Specification> Subject Semester class

|  |  |  |
| --- | --- | --- |
| **Property** | **Type** | **Description** |
| subjectSemesterId | UUID | Unique identifier of the subject semester |
| subjectId | UUID | Unique identifier of the subject semester’s subject |
| semesterId | UUID | Unique identifier of the subject semester’s semester |

### 4.10. Subject Examinee class

Table . <Class Specification> Subject Examinee Class

|  |  |  |
| --- | --- | --- |
| **Property** | **Type** | **Description** |
| subjectExamineeId | UUID | Unique identifier of the subject examinee |
| examineeId | UUID | Unique identifier of the subject examinees’s examinee |
| subjectId | UUID | Unique identifier of the subject examinee’s subject |
| semesterId | UUID | Unique identifier of the subject examinee’s semester |
| status | int | Status of subject examinee |
| removedReason | string | The reason of why the examinee was removed |
| getter() | data type | Get attribute of class |
| setter() | void | Set value of class’s attribute |

### 4.11. Attendance class

Table . <Class Specification> Attendance class

|  |  |  |
| --- | --- | --- |
| **Property** | **Type** | **Description** |
| attendanceId | UUID | Unique identifier of the attendance |
| subjectExamineeId | UUID | Unique identifier of the attendance’s subject examinee |
| examRoomId | UUID | Unique identifier of the attendance’s exam room |
| position | int | Exam seat of the attendance |
| startTime | datetime | The time when attendance check in the exam room |
| finishTime | datetime | The time when attendance finish the exam |
| createdAt | datetime | Created date of the attendance |
| lastModified | datetime | Last modified date of the attendance |
| status | int | Status of the attendance |
| getter() | data type | Get attribute of class |
| setter() | void | Set value of class’s attribute |

### 4.12. Exam room class

Table . <Class Specification> Exam room class

|  |  |  |
| --- | --- | --- |
| **Property** | **Type** | **Description** |
| examRoomId | UUID | Unique identifier of the exam room |
| examRoomName | string | Name of the exam room |
| staffId | UUID | Unique identifier of the exam room’s staff |
| roomId | UUID | Unique identifier of the exam room’s room |
| shiftId | UUID | Unique identifier of the exam room’s shift |
| subjectId | UUID | Unique identifier of the exam room’s subject |
| status | int | Exam room status |
| startTime | datetime | Start time of the exam room |
| finishTime | datetime | Finish time of the exam room |
| createdAt | datetime | Created date of the exam room |
| lastModified | datetime | Last modified date of the exam room |
| status | int | Status of the exam room |
| getter() | data type | Get attribute of class |
| setter() | void | Set value of class’s attribute |

### 4.13. Report class

Table . <Class Specification> Report class

|  |  |  |
| --- | --- | --- |
| **Property** | **Type** | **Description** |
| reportId | UUID | Unique identifier of the report |
| reporterId | UUID | Unique identifier of the reporter |
| reportedUserId | UUID | Unique identifier of the report’s reported user |
| examRoomId | UUID | Unique identifier of the report’s exam room |
| description | string | Description of the report |
| note | string | Extra note of the report |
| solution | string | Solution of the report resolved by shift manager |
| reportType | int | Type of the report |
| imageUrl | string | Attached image url of the report |
| status | int | Status of the report |
| createdAt | datetime | Created date of the report |
| lastModified | datetime | Last modified date of the report |
| getter() | data type | Get attribute of class |
| setter() | void | Set value of class’s attribute |

### 4.14. Attempt class

Table . <Class Specification> Attempt class

|  |  |  |
| --- | --- | --- |
| **Property** | **Type** | **Description** |
| attemptId | UUID | Unique identifier of the attempt |
| attendanceId | UUID | Unique identifier of the attempt’s attendance |
| imageUrl | UUID | Attached image url of the attempt |
| status | UUID | Status of the attempt |
| attemptedAt | string | The time when the attempted was taken |
| lastModified | string | Last modified date of the attempt |
| getter() | data type | Get attribute of class |
| setter() | void | Set value of class’s attribute |

## 5. Data & Database Design

### 5.1. Database Design

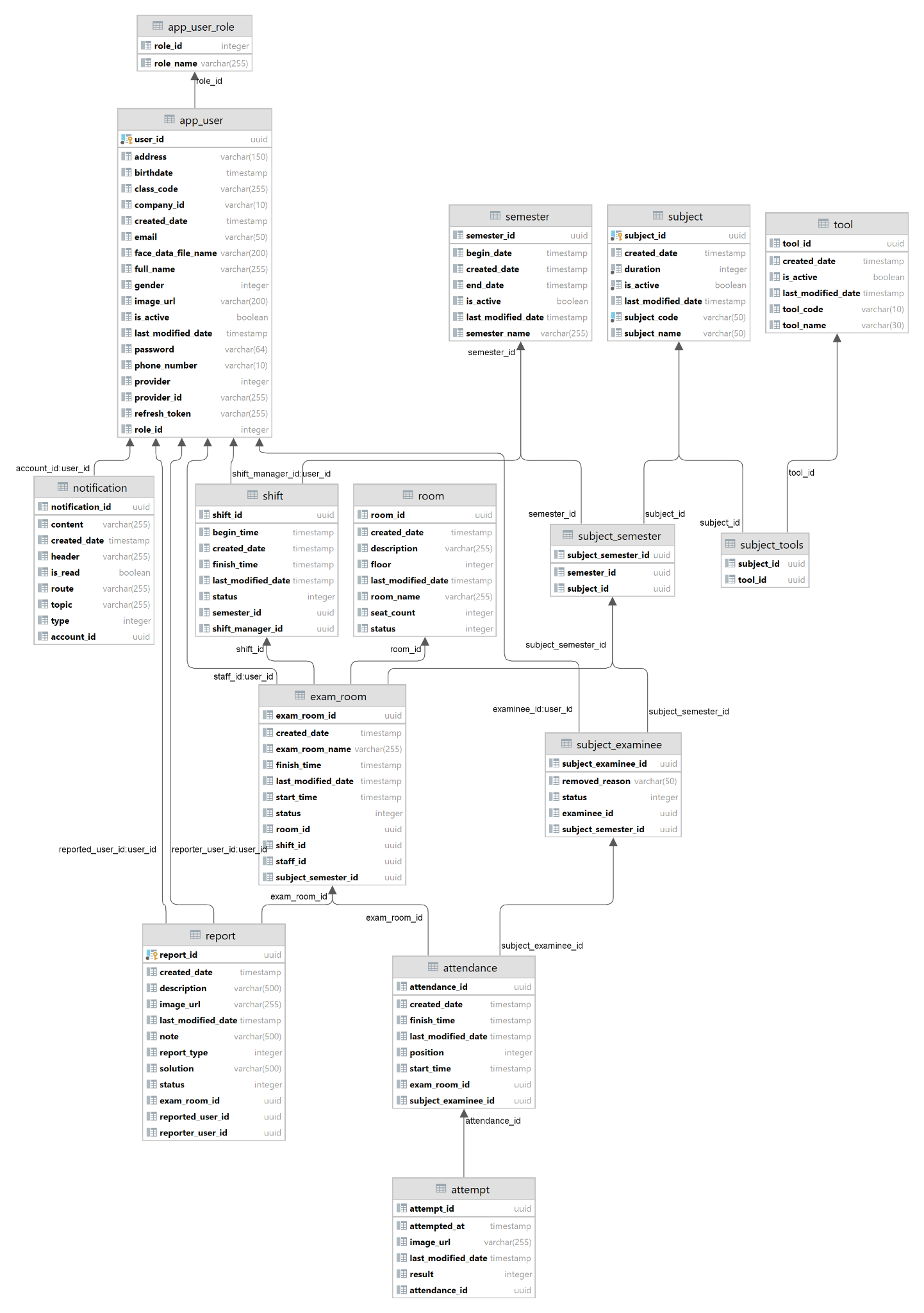


Figure . Database design

### 5.2. Data Dictionary

#### 5.2.1. App user table

Table . <Database Design> App user table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Field name** | **Type** | **Size** | **Unique** | **Not Null** | **PK/FK** | **Notes** |
| user\_id | uuid |  | Yes | Yes | PK | Unique identifier of the user |
| address | varchar | 150 | No | Yes |  | Address of the user |
| birthdate | timestamp |  | No | Yes |  | Birthdate of the user |
| class\_code | varchar | 20 | No | No |  | Class code of a user with role of “Examinee” |
| company\_id | varchar | 10 | Yes | Yes |  | Company ID of the user |
| created\_date | timestamp |  | No | No |  | Created date of the user |
| email | varchar | 50 | Yes | Yes |  | Email address of the user |
| face\_data\_file\_name | varchar | 200 | No | No |  | Face data file name of the user |
| full\_name | varchar | 255 | No | Yes |  | Full name of the user |
| gender | int4 |  | No | Yes |  | Gender of the user (1 for male, 0 for female) |
| image\_url | varchar | 200 | No | No |  | URL to the profile picture of the user |
| is\_active | bool |  | No | Yes |  | Check if the user is available |
| last\_modified\_date | timestamp |  | No | No |  | Last modified date of the user |
| password | varchar | 64 | No | Yes |  | Encrypted password of the user |
| phone\_number | varchar | 10 | Yes | No |  | Phone number of the user (for Vietnamese phone numbers) |
| provider | int4 |  | No | No |  | Identifier of the user’s OAuth2 provider |
| provider\_id | varchar | 255 | No | No |  | Unique string identifier for this provider type |
| refresh\_token | varchar | 255 | Yes | No |  | Refresh token of the user |
| role\_id | int4 |  | No | No |  | Unique identifier of the user’s role |

#### 5.2.2. App user role table

Table . <Database Design> App user role table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Field name** | **Type** | **Size** | **Unique** | **Not Null** | **PK/FK** | **Notes** |
| role\_id | int4 |  | Yes | Yes | PK | Unique identifier of role |
| role\_name | varchar | 256 | No | Yes |  | Name of role |

#### 5.2.3. Attempt table

Table . <Database Design> Attempt table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Field name** | **Type** | **Size** | **Unique** | **Not Null** | **PK/FK** | **Notes** |
| attempt\_id | uuid |  | Yes | Yes | PK | Unique identifier of the shift |
| attempt\_at | timestamp |  | No | No |  | The time when the attempted was take |
| image\_url | varchar | 255 | No | Yes |  | URL to the image url of the attempt |
| last\_modified\_date | timestamp |  | No | No |  | Last modified date of the attempt |
| result | int4 |  | No | No |  | Check if the attempt was successful or not |
| attendance\_id | uuid |  | No | Yes | FK | Unique identifier of the attempt’s attendance |

#### 5.2.4. Attendance table

Table . <Database Design> Attendance table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Field name** | **Type** | **Size** | **Unique** | **Not Null** | **PK/FK** | **Notes** |
| attendance\_id | uuid |  | Yes | Yes | PK | Unique identifier of the attendance |
| created\_date | timestamp |  | No | No |  | Created date of the attendance |
| finish\_time | timestamp |  | No | No |  | The time when the attendance has been finished |
| last\_modified\_date | timestamp |  | No | No |  | Last modified date of the attendance |
| position | int4 |  | No | No |  | Exam seat of the attendance |
| start\_time | timestamp |  | No | No |  | The time the attendance has been started |
| exam\_room\_id | uuid |  | No | No | FK | Unique identifier of the attendance’s exam room |
| subject\_exaxminee\_id | uuid |  | No | Yes | FK | Unique identifier of the attendance’s subject examinee |

#### 5.2.5. Exam room table

Table . <Database Design> Exam room table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Field name** | **Type** | **Size** | **Unique** | **Not Null** | **PK/FK** | **Notes** |
| exam\_room\_id | uuid |  | Yes | Yes | PK | Unique identifier of the exam room |
| created\_date | timestamp |  | No | No |  | Created date of the exam room |
| exam\_room\_name | varchar | 255 | No | Yes |  | Name of the exam room |
| finish\_time | timestamp |  | No | No |  | Finish time of the exam room |
| last\_modified\_date | int4 |  | No | No |  | Last modified date of the exam room |
| start\_time | timestamp |  | No | No |  | Start time of the exam room |
| status | int4 |  | No | Yes |  | Status of the exam room (Not ready, Ready, Started, Finished) |
| room\_id | uuid |  | No | Yes | FK | Unique identifier of the exam room’s room |
| shift\_id | uuid |  | No | Yes | FK | Unique identifier of the exam room’s shift |
| staff\_id | uuid |  | No | No | FK | Unique identifier of the exam room’s staff |
| subject\_semester\_id | uuid |  | No | Yes | FK | Unique identifier of the exam room’s subject semester |

#### 5.2.6. Notification table

Table . <Database Design> Notification table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Field name** | **Type** | **Size** | **Unique** | **Not Null** | **PK/FK** | **Notes** |
| notification\_id | uuid |  | Yes | Yes | PK | Unique identifier of the notification |
| content | varchar | 255 | No | No |  | Content of the notification |
| created\_date | timestamp | 255 | No | No |  | Created date of the notification |
| header | varchar | 255 | No | No |  | Header title of notification |
| is\_read | bool |  | No | No |  | Check if notification has been read |
| route | varchar | 255 | No | No |  | Route to navigate to when notification is clicked |
| topic | varchar | 255 | No | No |  | The topic that users subscribe to receive notification |
| type | int4 |  | No | Yes |  | Type of notification |
| account\_id | uuid |  | No | Yes | FK | Unique identifier of the notification’s account receiver |

#### 5.2.7. Report table

Table . <Database Design> Report table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Field name** | **Type** | **Size** | **Unique** | **Not Null** | **PK/FK** | **Notes** |
| report\_id | uuid |  | Yes | Yes | PK | Unique identifier of the report |
| created\_date | timestamp |  | No | No |  | Created date of the report |
| description | varchar | 500 | No | Yes |  | Description of the report |
| image\_url | varchar | 255 | No | No |  | Attached image url of the report |
| last\_modified\_date | timestamp |  | No | No |  | Last modified date of the report |
| note | varchar | 500 | No | No |  | Extra note of the report |
| report\_type | int4 |  | No | Yes |  | Type of the report |
| solution | varchar | 500 | No | No |  | Solution of the report resolved by shift manager |
| status | int4 |  | No | Yes |  | Status of the report (Pending, Resolved) |
| exam\_room\_id | uuid |  | No | Yes | FK | Unique identifier of the report’s exam room |
| reported\_user\_id | uuid |  | No | No | FK | Unique identifier of the report’s reported user |
| reporter\_user\_id | uuid |  | No | Yes | FK | Unique identifier of the report’s reporter |

#### 5.2.8. Room table

Table . <Database Design> Room table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Field name** | **Type** | **Size** | **Unique** | **Not Null** | **PK/FK** | **Notes** |
| room\_id | uuid |  | Yes | Yes | PK | Unique identifier of the room |
| created\_date | timestamp |  | No | No |  | Created date of the room |
| description | varchar | 255 | No | No |  | Description of the room |
| floor | int4 |  | No | No |  | Floor of the room |
| last\_modified\_date | timestamp |  | No | No |  | Last modified date of the room |
| room\_name | varchar | 255 | Yes | No |  | Name of the room |
| seat\_count | int4 |  | No | No |  | The total seat count of a room |
| status | int4 |  | No | Yes |  | Status of the room (Available and Unavailable) |

#### 5.2.9. Semester table

Table . <Database Design> Semester table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Field name** | **Type** | **Size** | **Unique** | **Not Null** | **PK/FK** | **Notes** |
| semester\_id | uuid |  | Yes | Yes | PK | Unique identifier of the semester |
| begin\_date | timestamp |  | No | No |  | Begin date of the semester |
| created\_date | timestamp |  | No | No |  | Created date of the semester |
| end\_date | timestamp |  | No | No |  | End date of the semester |
| is\_active | bool |  | No | Yes |  | Check if semester is available |
| last\_modified\_date | timestamp |  | No | No |  | Last modified date of the semester |
| semester\_name | varchar | 255 | Yes | Yes |  | Name of the semester |

#### 5.2.10. Shift table

Table . <Database Design> Shift table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Field name** | **Type** | **Size** | **Unique** | **Not Null** | **PK/FK** | **Notes** |
| shift\_id | uuid |  | Yes | Yes | PK | Unique identifier of the shift |
| begin\_time | timestamp |  | No | No |  | Begin time of the shift |
| created\_date | timestamp |  | No | No |  | Created date of the shift |
| finish\_time | timestamp |  | No | No |  | Finish time of the shift |
| last\_modified\_date | timestamp |  | No | No |  | Last modified date of the shift |
| status | int4 |  | No | Yes |  | Status of the shift (Removed, Finished, Locked, Ready, Not-ready, Staffing, Ongoing) |
| semester\_id | uuid |  | No | Yes | FK | Unique identifier of the shift’s semester |
| shift\_manager\_id | uuid |  | No | Yes | FK | Unique identifier of the shift’s shift manager |

#### 5.2.11. Subject table

Table . <Database Design> Subject table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Field name** | **Type** | **Size** | **Unique** | **Not Null** | **PK/FK** | **Notes** |
| subject\_id | uuid |  | Yes | Yes | PK | Unique identifier of the subject |
| created\_date | timestamp |  | No | No |  | Created date of the subject |
| duration | int4 |  | No | Yes |  | The exam’s duration of the subject |
| is\_active | bool |  | No | Yes |  | Check if subject is available |
| last\_modified\_date | timestamp |  | No | No |  | Last modified date of the subject |
| subject\_code | varchar | 50 | Yes | Yes |  | Code of the subject |
| subject\_name | varchar | 50 | Yes | Yes |  | Name of the subject |

#### 5.2.12. Subject examinee table

Table . <Database Design> Subject examinee table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Field name** | **Type** | **Size** | **Unique** | **Not Null** | **PK/FK** | **Notes** |
| subject\_examinee\_id | uuid |  | Yes | Yes | PK | Unique identifier of the subject examinee |
| removed\_reason | varchar | 50 | No | Yes |  | The reason why the examinee was removed |
| status | int4 |  | No | Yes |  | Status of subject examinee (Assigned, Unassigned, Exempted) |
| examinee\_id | uuid |  | No | Yes | FK | Unique identifier of the examinee |
| subject\_semester\_id | uuid |  | No | Yes | FK | Unique identifier of the subject examinee’s subject semester |

#### 5.2.13. Subject semester table

Table . <Database Design> Subject semester table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Field name** | **Type** | **Size** | **Unique** | **Not Null** | **PK/FK** | **Notes** |
| subject\_semester\_id | uuid |  | Yes | Yes | PK | Unique identifier of the subject semester |
| semester\_id | uuid |  | No | Yes | FK | Unique identifier of the subject semester’s semester |
| subject\_id | uuid |  | No | Yes | FK | Unique identifier of the subject semester’s subject |

#### 5.2.14. Subject tool table

Table . <Database Design> Subject tool table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Field name** | **Type** | **Size** | **Unique** | **Not Null** | **PK/FK** | **Notes** |
| subject\_id | uuid |  | Yes | Yes | PK | Unique identifier of the subject |
| tool\_id | uuid |  | No | Yes | FK | Unique identifier of the tool |

#### 5.2.15. Tool table

Table . <Database Design> Tool table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Field name** | **Type** | **Size** | **Unique** | **Not Null** | **PK/FK** | **Notes** |
| tool\_id | uuid |  | Yes | Yes | PK | Unique identifier of the tool |
| created\_date | timestamp |  | No | No |  | Created date of the tool |
| is\_active | bool |  | No | Yes |  | Check if tool is available |
| last\_modified\_date | timestamp |  | No | No |  | Last modified date of the tool |
| tool\_code | varchar | 10 | Yes | Yes |  | Code of the tool |
| tool\_name | varchar | 30 | Yes | Yes |  | Name of the tool |