

## **CSC13009 – Mobile Application Development**

### **FINAL REPORT**

#### **I. Information**

**Group ID:** KTLT-CQ-08

**Group name:** KTLT-CQ-08

**Members:**

ID	Student ID	Full name	Tasks (%)
1	23120394	Nguyễn Anh Tuấn	25%
2	21120060	Nguyễn Long Giang	25%
3	21120082	Phan Quốc Huy	50%

#### **II. Expected Point**

- 9/10

#### **III. Video links (Youtube)**

- **Video Demo Đồ Án Kỹ Thuật Lập Trình: Hệ Thống Quản Lý Sinh Viên:**  
<https://www.youtube.com/watch?v=I76txKli8D0>

#### **IV. Source code (Google drive links)**

Qt Widgets Application

- **HCMUS Course Management System:**  
[https://drive.google.com/file/d/1iHhuEyxY1zoUf\\_XqWBHoGIbd9Vc2JA3A/view](https://drive.google.com/file/d/1iHhuEyxY1zoUf_XqWBHoGIbd9Vc2JA3A/view)

## V. Screenshots

### 1. Home Page

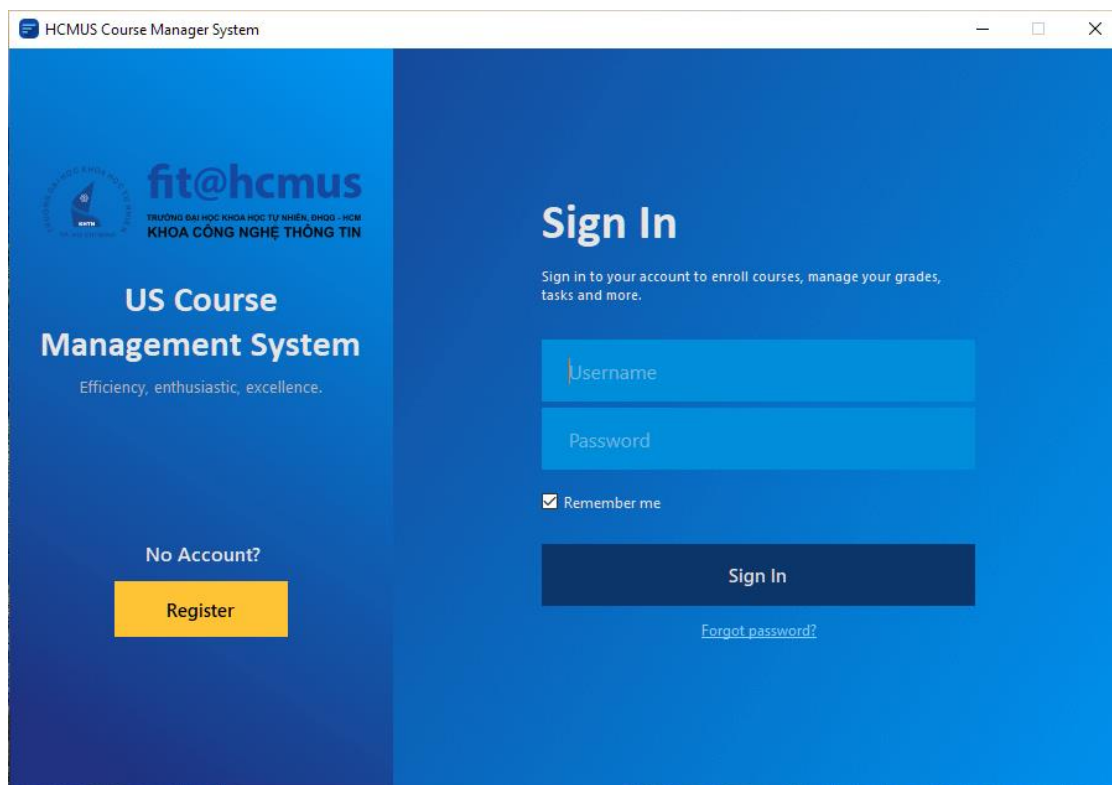


Figure 1. Home Page for Sign In function

### 2. Dashboard

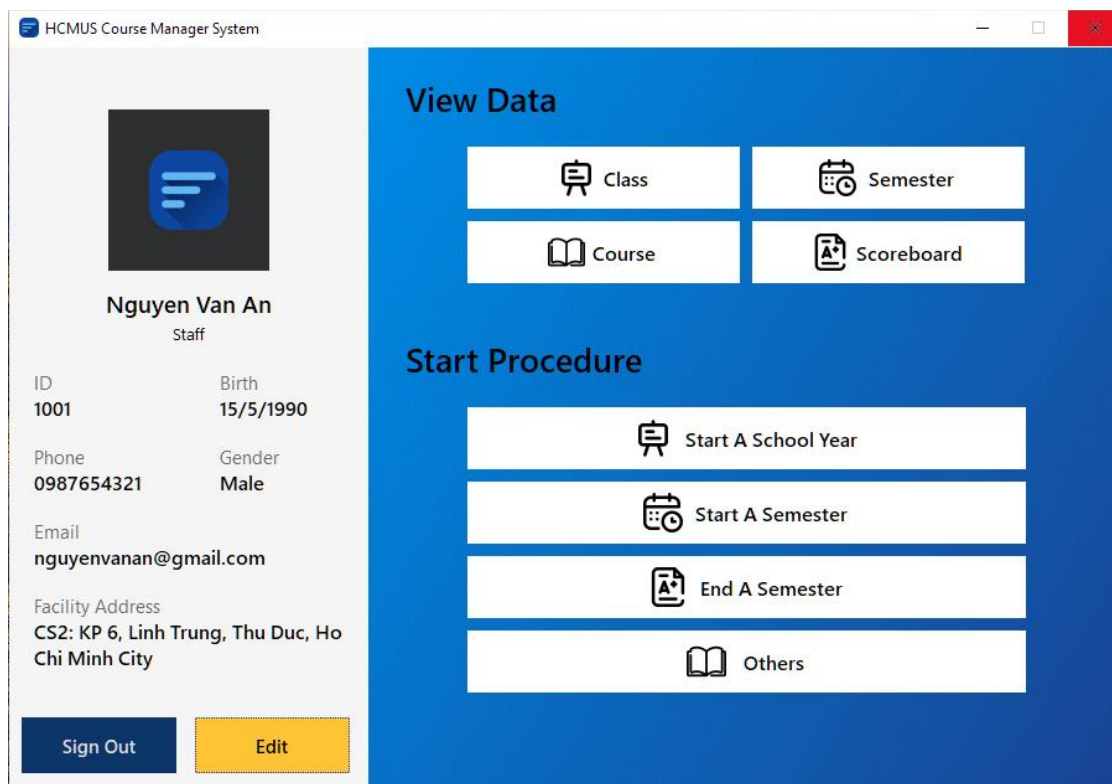


Figure 2. Dashboard view for Staff

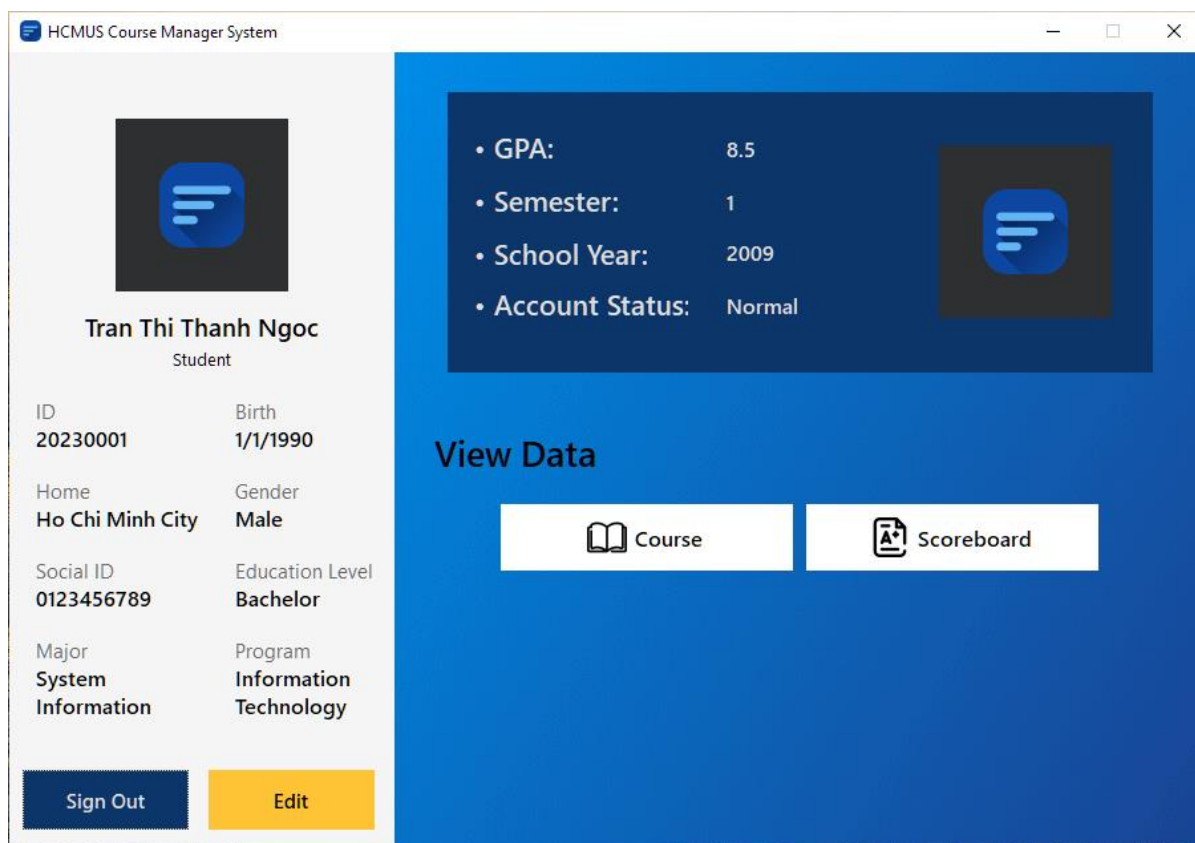


Figure 3. Dashboard view for Student

### 3. Views for Staff

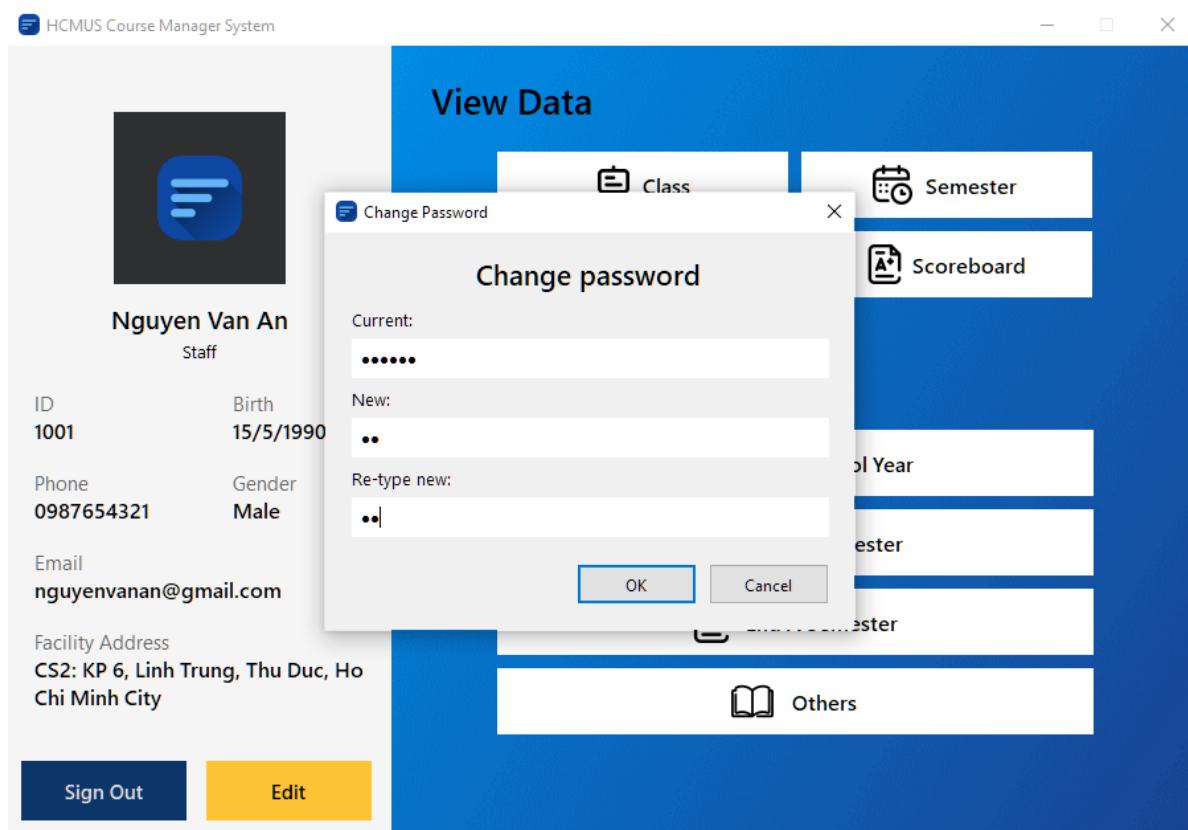


Figure 4. Change password window

HCMUS Course Manager System

## Class

	Class Name	Started Year
1	20APCS1	2020
2	20APCS2	2020
3	20APCS3	2020
4	20APCS4	2020
5	21APCS1	2021
6	21APCS2	2021
7	21APCS3	2021
8	21APCS4	2021
9	22APCS1	2022
10	22APCS2	2022

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 Students in a Class

Figure 5. Class view

HCMUS Course Manager System

## Students In Class - 20APCS1

	Student ID	First name	Last Name	Gender	Birth	Social ID
1	20230001	Ngoc	Tran Thi Thanh	Male	1/1/1990	0123456789
2	20230002	Hung	Nguyen Dong	Female	3/2/1991	0987654321
3	20230003	Mai	Le Truc	Male	5/3/1992	0456789123
4	20230004	Quan	Pham Tran Trung	Female	7/4/1993	0789123456
5	20230005	Hoa	Vu Dinh	Male	9/5/1994	0654321789

Back

- Average GPA: 8.83333
- Highest Score: 9.5
- Achieved By: Tran Thi Thanh Ngoc




Figure 6. Students In Class view

HCMUS Course Manager System

## Semester

	Semester	School Year	Start Date	End Date
1	1	2009	9/5/2009	1/13/2010
2	2	2009	1/16/2010	5/26/2010
3	3	2009	6/5/2010	9/15/2010
4	1	2009	9/18/2010	1/27/2011
5	2	2010	1/30/2011	6/9/2011
6	3	2010	6/12/2011	9/20/2011
7	1	2010	9/23/2011	1/31/2012
8	2	2010	2/3/2012	6/13/2012
9	3	2011	6/16/2012	9/26/2012
10	1	2011	9/29/2012	2/6/2013

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Figure 7. Semester view

HCMUS Course Manager System

## Course

	Course ID	Course Name	Class Name	Teacher Name	Credits	Max Students	Day of Week	Session
1	1001	Programming	20APCS1	Mr. Smith	3	50	MON	S2
2	1002	Mathematics	20APCS1	Mrs. Johnson	4	50	WED	S3
3	1003	Physics	20APCS1	Mr. Brown	3	50	FRI	S4
4	1004	English	20APCS1	Mrs. Williams	2	50	TUE	S1
5	1005	History	20APCS2	Ms. Jones	3	50	THU	S2
6	1006	Chemistry	20APCS2	Dr. Taylor	3	50	MON	S3
7	1007	Art	20APCS2	Mr. Davis	2	50	WED	S4
8	1008	Biology	20APCS2	Mrs. Wilson	3	50	FRI	S1
9	1009	Geography	20APCS3	Ms. Martinez	3	50	TUE	S2
10	1010	Physical ...	20APCS3	Coach Johnson	2	50	THU	S3

Back Delete


 Students in a Course

Figure 8. Course view



HCMUS Course Manager System

### Students In Course - Programming [1001]

	Semester	School Year	Student ID	Student Name
1	1	2009	20230001	Tran Thi Thanh Ngoc
2	1	2009	20230002	Nguyen Dong Hung
3	1	2009	20230003	Le Truc Mai
4	1	2009	20230004	Pham Tran Trung Quan
5	3	2011	20230009	Nguyen Trong Thang
6	3	2011	20230010	Ly Thu Thuy
7	3	2011	20230011	Tran Dong Tan
8	3	2011	20230012	Phan Nguyen Thanh Tuan
9	1	2015	20230025	Nguyen Tran Trung Thanh
10	1	2015	20230026	Pham Gia Tri

Back Delete Export

Figure 9. Students In Course view

HCMUS Course Manager System

### Scoreboard

	Course ID	Class Name	Student ID	Student Name	Total Mark	Final Mark	Midterm Mark	Other Mark
1	1001	20APCS1	20230001	Tran Thi Thanh ...	8.5	9.5	8	7.5
2	1001	20APCS1	20230002	Nguyen Dong ...	7.8	8.5	7.5	8
3	1001	20APCS1	20230003	Le Truc Mai	8.2	8.7	7.9	7.5
4	1001	20APCS1	20230004	Pham Tran Trun...	7.6	8.3	7.2	8
5	1002	20APCS1	20230005	Vu Dinh Hoa	8.9	9.2	8.5	8.4
6	1002	20APCS1	20230006	Dinh Trung Duc	8.1	8.8	7.9	7.8
7	1002	21APCS2	20230007	Ngo Ngoc Thao	8.3	8.9	8.2	7.7
8	1003	21APCS2	20230008	Huynh Trinh Da...	8.7	9	8.6	8.5
9	1003	21APCS2	20230009	Nguyen Trong ...	7.9	8.6	7.8	7.7
10	1010	21APCS2	20230010	Ly Thu Thuy	8.4	8.7	8.3	8.2

Back Import

Scoreboard of a Class  
Scoreboard of a Course

Figure 10. Scoreboard view

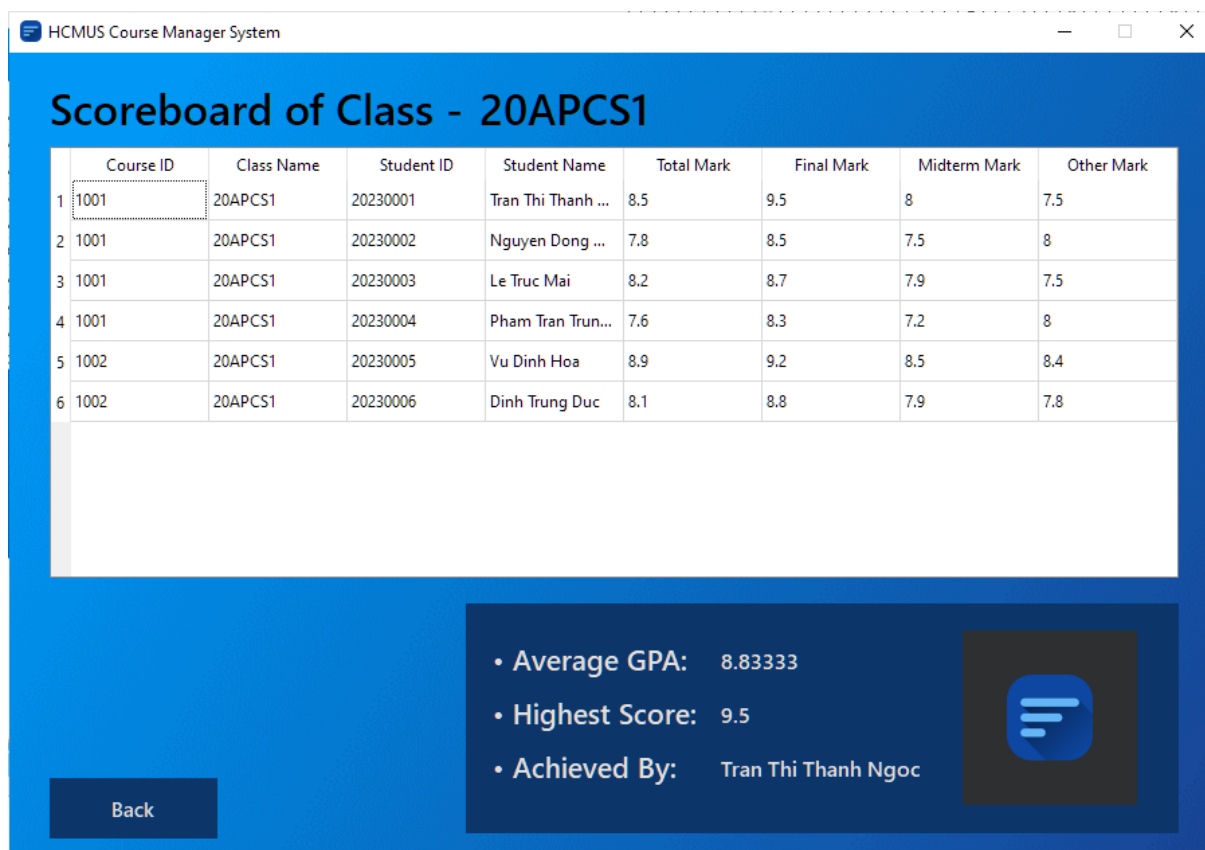


Figure 11. Scoreboard Of Class view

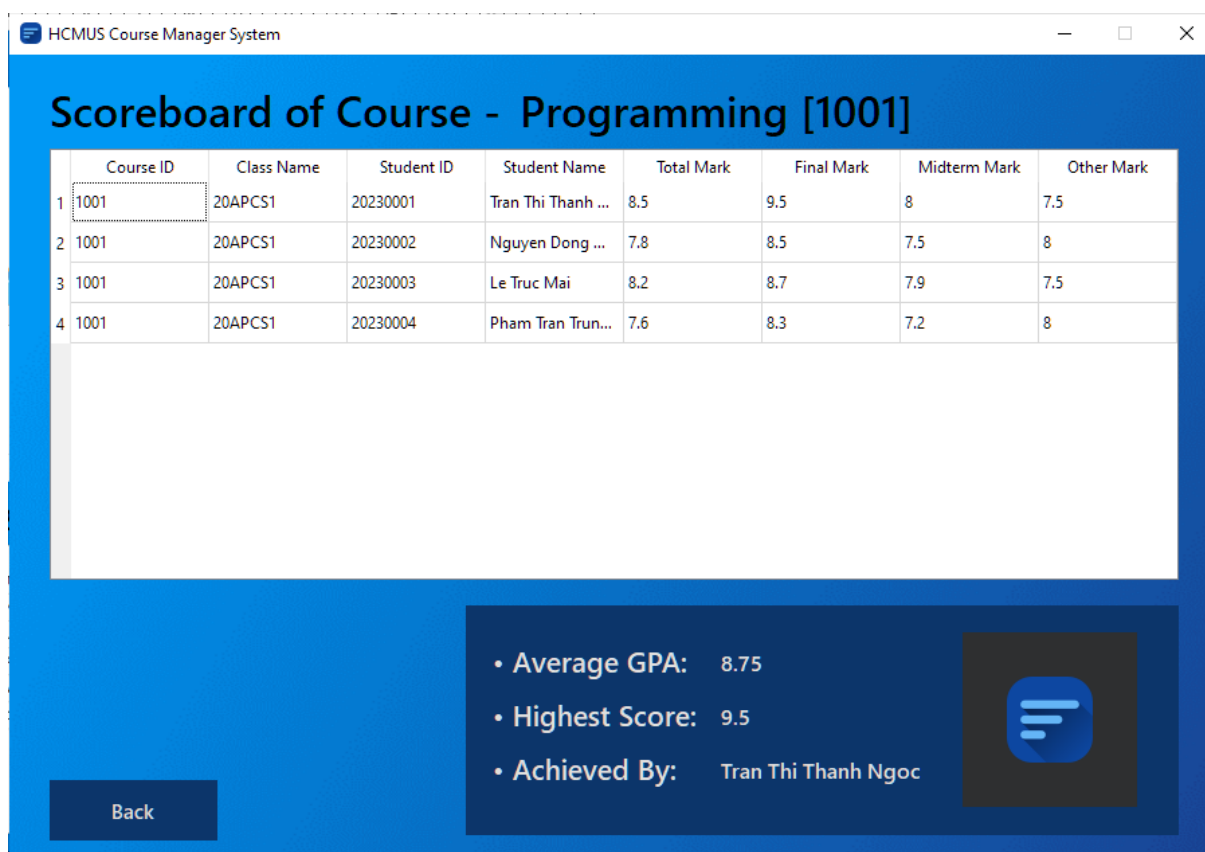


Figure 12. Scoreboard Of Course view

## 4. Procedures for Staff

### a. Start A School Year

HCMUS Course Manager System

## Start A School Year

Select school year: 2024

Create new class: 24VP Add

New class will be enrolled in the selected school year:

- 24CTT2
- 24CTT3
- 24CLC

Remove All Remove

Back Next

Figure 13. Start A School Year procedure - Page 1

HCMUS Course Manager System

## Add Students To New Class

Select class: 24CLC

Enter Student CSV file: ger-system/data/student.csv Upload File

New students will be added in the selected class:

	Student ID	First name	Last Name	Gender	Birth	Social ID
1	20230001	Ngoc	Tran Thi ...	Male	1/1/1990	0123456...
2	20230002	Hung	Nguyen...	Female	3/2/1991	0987654...
3	20230003	Mai	Le Truc	Male	5/3/1992	0456789...
4	20230004	Quan	Pham ...	Female	7/4/1993	0789123...
5	20230005	Hoa	Vu Dinh	Male	9/5/1994	0654321...

Remove All Remove

Back Finish All Save

Figure 14. Start A School Year procedure - Page 2



## b. Start A Semester

HCMUS Course Manager System

### Start A Semester

Select school year:

Select semester number:

Select start date:

Select end date:

[Back](#) [Next](#)

Figure 15. Start A Semester procedure - Page 1

HCMUS Course Manager System

### Add Courses To New Semester

Current semester:

Enter course CSV file:  [Upload File](#)

New courses will be added in the current semester:

	Course ID	Course Name	Ass Name	Teacher Name	Credits	Max Student	Day of Week	Session
1	1001	Progr...	20AP...	Mr. ...	3	50	MON	S2
2	1002	Math...	20AP...	Mrs. ...	4	50	WED	S3
3	1003	Physics	20AP...	Mr. ...	3	50	FRI	S4
4	1004	English	20AP...	Mrs. ...	2	50	TUE	S1
5	1005	History	20AP...	Ms. ...	3	50	THU	S2

[Remove All](#) [Remove](#)

[Back](#) [Next](#)

Figure 16. Start A Semester procedure - Page 2

HCMUS Course Manager System

## Add Students To New Course

Select course: 1100 - Information Technology - 22APCS3

Enter student CSV file: ger-system/data/student.csv Upload File

New students will be added in the selected course:

	Student ID	First name	Last Name	Gender	Birth	Social ID
1	20230001	Ngoc	Tran Thi ...	Male	1/1/1990	0123456...
2	20230002	Hung	Nguyen...	Female	3/2/1991	0987654...
3	20230003	Mai	Le Truc	Male	5/3/1992	0456789...
4	20230004	Quan	Pham ...	Female	7/4/1993	0789123...
5	20230005	Hoa	Vu Dinh	Male	9/5/1994	0654321...

Remove All Remove

Back Finish All Save

Figure 17. Start A Semester procedure - Page 3

### c. End A Semester

HCMUS Course Manager System

## Scoreboard

	Course ID	Class Name	Student ID	Student Name	Total Mark	Final Mark	Midterm Mark	Other Mark
1	1001	20APCS1	20230001	Tran Thi Thanh ...	8.5	9.5	8	7.5
2	1001	20APCS1	20230002	Nguyen Dong ...	7.8	8.5	7.5	8
3	1001	20APCS1	20230003	Le Truc Mai	8.2	8.7	7.9	7.5
4	1001	20APCS1	20230004	Pham Tran Trun...	7.6	8.3	7.2	8
5	1002	20APCS1	20230005	Vu Dinh Hoa	8.9	9.2	8.5	8.4
6	1002	20APCS1	20230006	Dinh Trung Duc	8.1	8.8	7.9	7.8
7	1002	21APCS2	20230007	Ngo Ngoc Thao	8.3	8.9	8.2	7.7
8	1003	21APCS2	20230008	Huynh Trinh Da...	8.7	9	8.6	8.5
9	1003	21APCS2	20230009	Nguyen Trong ...	7.9	8.6	7.8	7.7
10	1010	21APCS2	20230010	Ly Thu Thuy	8.4	8.7	8.3	8.2

Back Import

Scoreboard of a Class

Scoreboard of a Course

Figure 18. End A Semester - Main page

## Scoreboard

	Course ID	Class Name	Student ID	Student Name	Total Mark	Final Mark	Midterm Mark	Other Mark
1	1001	20APCS1	20230001	Tran Thi Thanh ...	8.5	10	8.6	7.5
2	1001	20APCS1	20230002	Nguyen Dong ...	7.8	8.5	7.5	8
3	1001	20APCS1	20230003	Le Truc Mai	8.2	8.7	7.9	7.5
4	1001	20APCS1	20230004	Pham Tran Trun...	7.6	8.3	7.2	8
5	1002	20APCS1	20230005			9.2	8.5	8.4
6	1002	20APCS1	20230006			8.8	7.9	7.8
7	1002	21APCS2	20230007			8.9	8.2	7.7
8	1003	21APCS2	20230008			9	8.6	8.5
9	1003	21APCS2	20230009	Nguyen Trong ...	7.9	8.6	7.8	7.7
10	1010	21APCS2	20230010	Ly Thu Thuy	8.4	8.7	8.3	8.2

Update Scoreboard

Scoreboard has been updated!

OK



Scoreboard of a Class



Scoreboard of a Course

Back

Import

Figure 19. End A Semester - Update marks

## Scoreboard of Class - 20APCS1

	Course ID	Class Name	Student ID	Student Name	Total Mark	Final Mark	Midterm Mark	Other Mark
1	1001	20APCS1	20230001	Tran Thi Thanh ...	8.5	10	8.6	7.5
2	1001	20APCS1	20230002	Nguyen Dong ...	7.8	8.5	7.5	8
3	1001	20APCS1	20230003	Le Truc Mai	8.2	8.7	7.9	7.5
4	1001	20APCS1	20230004	Pham Tran Trun...	7.6	8.3	7.2	8
5	1002	20APCS1	20230005	Vu Dinh Hoa	8.9	9.2	8.5	8.4
6	1002	20APCS1	20230006	Dinh Trung Duc	8.1	8.8	7.9	7.8

- Average GPA: 8.91667
- Highest Score: 10
- Achieved By: Tran Thi Thanh Ngoc



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Figure 20. End A Semester - Scoreboard of Class view



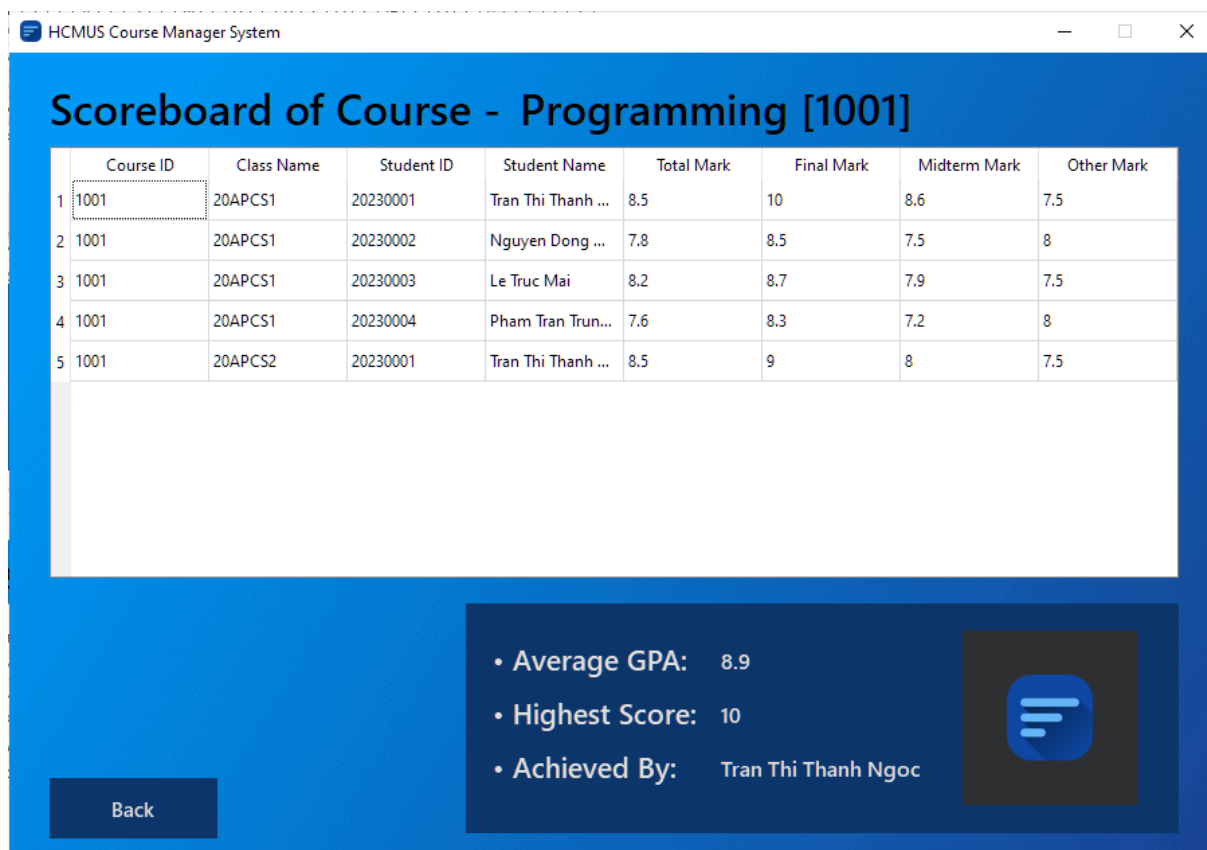


Figure 21. End A Semester - Scoreboard of Course view

#### d. Others

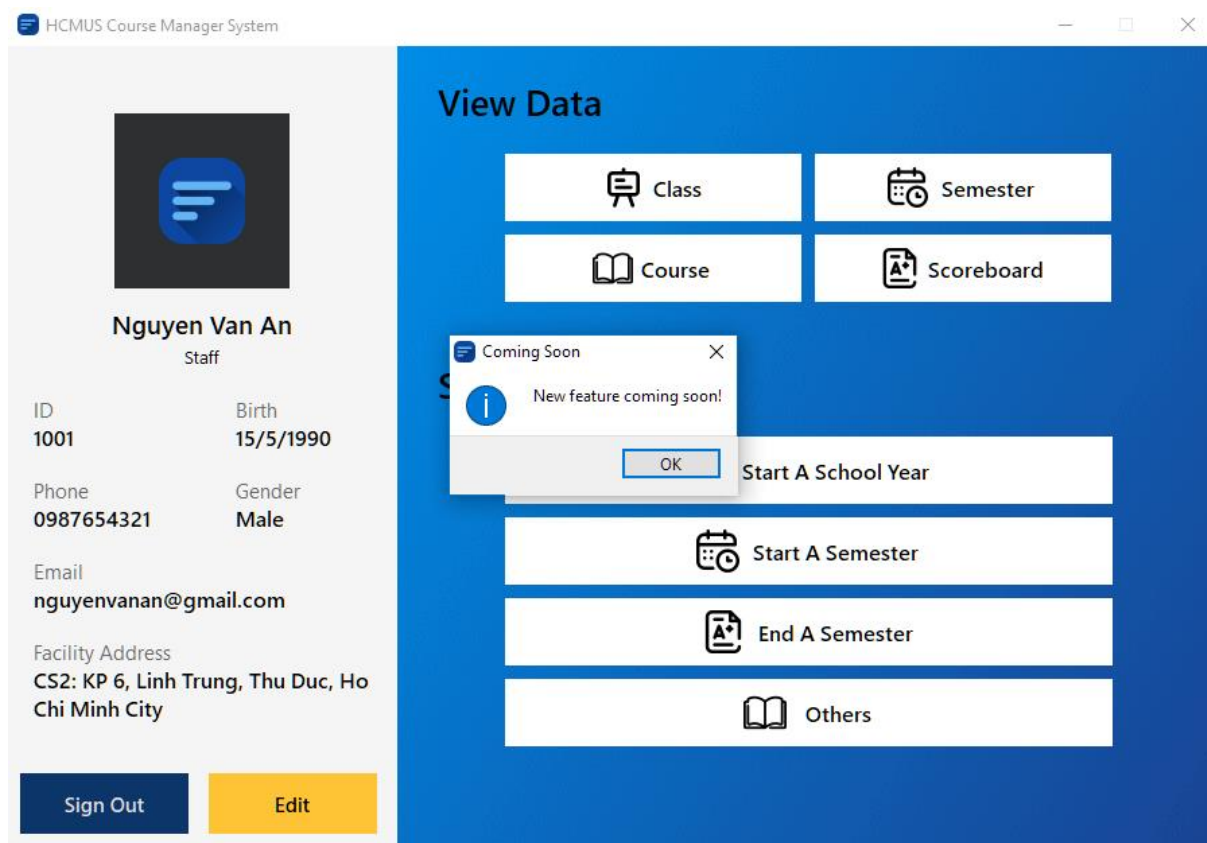


Figure 22. Others - Upcoming features



## 5. Views for Student

HCMUS Course Manager System

### Course

	Course ID	Course Name	Class Name	Teacher Name	Credits	Max Students	Day of Week	Session
1	1001	Programming	20APCS1	Mr. Smith	4	50	MON	S2
2	1002	Mathematics	20APCS1	Mrs. Johnson	4	50	WED	S3
3	1003	Physics	20APCS1	Mr. Brown	3	50	FRI	S4
4	1004	English	20APCS1	Mrs. Williams	1	52	TUE	S1
5	1005	History	20APCS2	Ms. Jones	3	50	THU	S2
6	1006	Chemistry	20APCS2	Dr. Taylors	3	50	MON	S3
7	1007	Art	20APCS2	Mr. Davis	2	50	WED	S4
8	1008	Biology	20APCS2	Mrs. Wilson	3	50	FRI	S1
9	1009	Geography	20APCS3	Ms. Martinez	3	50	TUE	S2
10	1010	Physical ...	20APCS3	Coach Johnson	2	50	THU	S3

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Figure 23. Student's Course view

HCMUS Course Manager System

### Scoreboard

	Course ID	Class Name	Student ID	Student Name	Total Mark	Final Mark	Midterm Mark	Other Mark
1	1001	20APCS1	20230001	Tran Thi Thanh ...	8.5	10	8.6	7.5
2	1001	20APCS2	20230001	Tran Thi Thanh ...	8.5	9	8	7.5

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Figure 24. Student's Scoreboard view

## VI. Specific techniques

### 1. Structure of data files

Data files are saved as Comma-separated values (CSV) files, with the first line in the file used as the header. The file header describes the data field names separated by commas.

The following is a description of the structure of data files:

- **STUDENT (Student ID, First Name, Last Name, Gender, Date of Birth, Phone Number)**

STUDENT (saved as student.csv) stores data about all student objects in the department. Each student has a unique code consisting of 8 numeric characters (Student ID), first name (First Name), last name (Last Name), gender (Gender), date of birth (Date of Birth), phone number (Phone Number).

- **STAFF (Staff ID, Full Name, Gender, Date of Birth, Phone Number, Email, Facility Address)**

STAFF (saved as staff.csv) stores data about all academic subjects in the department. Each position has a unique code consisting of 4 numeric characters (Staff ID), full name (Full Name), gender (Gender), date of birth (Date of Birth), phone number (Phone Number), email address (Email) and work facility address (Facility Address).

- **ACCOUNT (Account ID, Staff/Student ID, Username, Password)**

ACCOUNT (saved as account.csv) stores data about all user accounts including faculty and students in the department. Each account has a unique account code (Account ID), a staff or student code (Staff/Student ID), a username to log in (Username) and a password (Password).

- **CLASS (Class ID, Class Name, Started School Year)**

CLASS (saved as class.csv) stores data about all classes. Each class has a unique class code (Class ID), class name with course (Class Name) and school year in which the class was established (Started School Year).

- **SEMESTER (Semester ID, Semester No, School Year, Start Date, End Date)**

SEMESTER (saved as semester.csv) stores data about all semesters of each school year. Each semester has a unique semester code (Semester ID), which semester (Semester No), school year (School Year), start date (Start Date) and end date (End Date).

- **COURSE (Course ID, Course Name, Class Name, Instructor Name, Credit, Max Students, Day, Session)**

COURSE (saved as course.csv) stores data about all courses. Each course has a unique course code (Course ID), course name (Course Name), class name (Class Name), instructor (Instructor Name), number of credits (Credit), number of students. Maximum students (Max students), class day of the week (Day), session opening times (Session).

- **STUDENT\_IN\_CLASS (Class Name, Student ID)**

STUDENT\_IN\_CLASS (saved as student-in-class.csv) stores all students of a class including class name (Class Name) and student ID (Student ID).

- **STUDENT\_IN\_COURSE (Semester ID, Course ID, Student ID)**

STUDENT\_IN\_COURSE (saved as student-in-course.csv) stores all students of a course including semester (Semester ID), course ID (Course ID) and student ID (Student ID).

- **SCOREBOARD (Course ID, Class Name, Student ID, Student Full Name, Total Mark, Final Mark, Midterm Mark, Other Mark)**

SCOREBOARD (save as scoreboard) stores the scoreboard of all students of each course. Each transcript includes the course code (Course ID), class name (Class Name), student ID number (Student ID), student full name (Student Full Name), total course score (Total Mark), final mark (Final Mark), midterm mark (Midterm Mark), other component marks (Other Mark).

## 2. Source code structure

The source code of this application is object-oriented. comprising various structures:

### a. UI Forms written as XML.

As the core of the application's GUI, these files integrate various functional components, managing state, and interacting with the Database class for comprehensive data operations. Including 'changePassword' and 'mainWindow' .ui files.

### i. **The ChangePassword class:** derived from QDialog, handles user interactions for changing passwords.

#### • **Private Members:**

- 'QString currentPassword': Stores the current password for validation.

#### • **Signals:**

- 'passwordChanged(const QString &newPassword)': Emitted when the password is successfully changed.

#### • **Private Slots:**

- 'on\_btnOK\_clicked()': Triggered when the OK button is clicked, likely to validate and change the password.
- 'on\_btnCancel\_clicked()': Triggered when the Cancel button is clicked, probably to close the dialog without changes.

### ii. **The MainWindow class:** derived from QMainWindow, manages the main interface of the application, handling user interactions across various pages.

#### • **enum class Page:** Defines the indices for different pages in a stack widget, enhancing navigation and readability.

#### • **Private Members:**

- 'Database \*db': Pointer to the Database instance for data operations.
- 'QShortcut \*shortcut': Manages keyboard shortcuts.
- 'Account \*currentAccount, Student \*currentStudent, Staff \*currentStaff': Store current user data for session management.
- Various sets (Set<StudentInCourse>, Set<Course>, etc.): Manage lists of data relevant to specific operations like course management, semester procedures, and student data handling.

#### • **Constructor and Destructor:** Initializes the main window components; Cleans up resources upon destruction.



- **Private Slots:**
  - Various slots for handling button click and item changes, enabling navigation and data manipulation within the interface (e.g., sign-in, profile editing, course management).
- **Private Methods:**
  - `loadPage...()`, `clearPageProfileInfo_Staff()`, etc.: Manage the loading and clearing of specific pages or tables, organizing data presentation.

#### **b. Structural classes to represent data of an object**

- **Private Members:** Store the essential data attributes.
- **Constructor & Destructor:** Default constructor, parameterized constructor, copy constructor, and destructor manage the creation and cleanup of object
- **Setters and Getters:** Methods to set and retrieve the private attributes, ensuring encapsulation.
- **Operator Overloading:**
  - Input/Output operators (`>>`, `<<`) for easy reading and displaying of data from streams.
  - Equality operator (`==`) to compare objects based on unique ID.

Including these classes with separated header (.h) and implementation source (.cpp) below:

- DateClass
- StaffClass
- StudentClass
- AccountClass
- CourseClass
- ClassClass
- SemesterClass
- ScoreboardClass
- StudentInClass
- StudentInCourse

#### **c. Class manages and manipulates data of all objects**

The 'Database.h' file defines a Database class responsible for managing and processing data from various other classes. This class centralizes operations such as importing, exporting, updating, deleting,

and searching data, working with different object types as mentioned above.

- **Data Lists as Public Members:**
  - Utilizes sets (Set) to store data for each type of object.
- **Constructors and Destructor:**
  - Database(): Initializes the database object and import data from CSV files to Data Lists above.
  - ~Database(): Frees memory when the application is shut down.
- **Data Import/Export:**
  - 'import...List(QString filename, Set<...>& list)': Imports data from CSV files, where filename is the path to the file, and list is the set to store imported data.
  - 'export...List(QString filename, Set<...>& list)': Exports data to CSV files, where filename is the path to the file, and list is the set containing data to be exported.
- **Loading Data to UI's table widgets:**
  - 'load...List(QTableWidget\* table, Set<...>& list)': Loads data into a QTableWidget, where table is the widget to display data, and list is the data source
- **Updating Data:**
  - 'update...List(... obj, Set<...>& list)': Updates information in the data sets, where obj is the object containing updated data, and list is the set to be modified.
- **Deleting Data:**
  - 'deleteFrom...List(... obj, Set<...>& list)': Removes data from the sets, where obj is the object to be deleted, and list is the set from which data is removed.
- **Searching Data:**
  - 'get...ByID(int id)': Searches for objects by ID, where id is the identifier for the specific object.

## VII. References

1. The Qt Company Ltd. Documentation, Qt Style Sheets Examples, <https://doc.qt.io/qt-6/stylesheets-examples.html>
2. Wanderson, Qt Designer - Custom Buttons - Time Lapse Video [Stylesheet / Modern GUI] Qt for Python and C++, [https://www.youtube.com/watch?v=NqaEQT\\_F-8Q](https://www.youtube.com/watch?v=NqaEQT_F-8Q)
3. The Qt Company Ltd. Documentation, Signals & Slots, <https://doc.qt.io/qt-6/signalsandslots.html>
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6. Learning about Electronics, How to Create a Message Box in a Qt Widget Application in C++, <https://www.learningaboutelectronics.com/Articles/How-to-create-a-message-box-qt-widget-C++.php>
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9. GeeksforGeeks, Set in C++ Standard Template Library (STL), <https://www.geeksforgeeks.org/set-in-cpp-stl/>
10. GeeksforGeeks, Map in C++ Standard Template Library (STL), <https://www.geeksforgeeks.org/map-associative-containers-the-c-standard-template-library-stl/>
11. GeeksforGeeks, Vector in C++ STL, <https://www.geeksforgeeks.org/vector-in-cpp-stl/>