Smart E-Tuition Information System
Final Report

Version 4.0

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GROUP: CS1104D

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Revision History

Date	Version	Description	Author
15 July, 2022	1.0	Writing about the Introduction and Project Overview	Khairul Haziq, Harith Iqbal
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18 July, 2022	3.0	Writing about the Project Organization and Database and System Design	Khairul Haziq, Harith Iqbal
19 July, 2022	4.0	Writing the conclusion and revising the appendix	Khairul Haziq, Harith Iqbal

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1. Introduction

1.1 Purpose

The purpose of this final report is to summarize the Smart E-Tuition Information System project's outcomes. Reporting on the progress and accomplishments of the project is an integral part of the management process. There are two objectives of the final report:

- Comprehending the achieved results and effectively disseminating them to a larger audience.
- Evaluating the overall success of the project by taking into account significant obstacles and lessons learned for the subsequent programming phase.

1.2 References

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2. Project Overview

2.1 Project purpose, scope, and objectives

The system's purpose is to help SPM exam-takers who are also interested in online instruction without requiring them to physically register. The students will receive assistance from knowledgeable tutors to help them perform well on the SPM examination, and they can join the class at any time they choose that works best for them. Aside from that, every piece of information can be analyzed and viewed online on each user's personalized dashboard using system-generated data and reports. In addition, an online system would strongly aid in the tuition system's becoming paperless and relevant in the current era.

The first limitation of this system is that only students who have paid their tuition will be able to use it. These students must make payment before beginning the online class with the tutor who will be allocated to them by the system. Each student's registration is free, and students may only sign up for classes if there is space available.

Secondly, only tutors who have been appointed for the tuition will be permitted to use the system. The administrator will provide each tutor with a user account so they may access the system. To ensure that the system can more effectively organise the class and timetable, the account cannot be freely created by any tutor.

Each user can only access the system using their designated role type after entering their username and password. Only the designated dashboards for each of the user roles can be accessed to obtain the information that is appropriate for them. This is done to make sure that neither instructors nor students may alter any crucial information on the administrator page or tamper with user data, class session data, or other system data.

Tutors can only see the information about their designated class and their students. To ensure that the students' data is securely protected for their security, any irrelevant information for the tutor cannot be viewed. Additionally, tutors are only permitted to alter their own class information prior to the commencement of the class session in order to suit their demands.

Several objectives need to be met in order for the system to be created. The primary goal is to make sure the online tuition handling process is well-organized and user-friendly. When users need to access information or complete a procedure, the system should have a very good user design and be simple to navigate.

The next objective is to make sure that any output the user need can be processed and obtained with ease. As the user will require the output without performing any manual calculations, the system needs this.

Thirdly, the system's objective is to provide users with clear information and efficient navigation. The user can examine all the information they require by simply navigating the system while using it. When seeing the report in a single glance, this can significantly reduce the user's time investment.

Last but not least, the objective is to guarantee that the system can safely retain vast amounts of personal data. The system must protect every piece of data, and it must be able to handle the vast amounts of data without crashing or losing any data. Each user's privacy will be effectively safeguarded as a result, and they will be able to trust the system with their personal data.

2.2 Assumptions and constraints

A few restrictions that cannot be fixed at the time the system is developed are faced during the development process. Due to time and programming skill constraints, these limitations cannot be overcome. For each restriction, there are other options available, but they fall well short of serving the intended goal of the system.

The first restriction is that the system cannot reset the subject registration for upcoming subject registration if the students have already enrolled for this year's tuition session. For the upcoming registration that they require, the admin must manually clear the student's schedule. If students change their minds about registering for a topic after registering for it, they are unable to add any further subjects. Once a student has registered for a course, they are unable to make any changes to it, including abandoning it, altering the schedule, or adding additional subjects.

Other than that, the system has only been configured to work with the timetable and maximum number of students that have been specified. The schedule and class information must be changed in the system's source code, not merely changed in the system, as the tuition online session grows in the future. The tuition will now have to pay again for our team's assistance in manipulating the data for the class, which is a nuisance.

Additionally, the user cannot manually modify their username or password from their account. If a user's password has been compromised, they are unable to change it until they log in and pretend to forget their password in order to have it sent to them by email. The team's lack of expertise in cyber security has prevented the system's security from being fully tightened. SQL injection is a method that any hacker can use to obtain user data because the system's source code lacks any security measures to stop it.

2.3 Project deliverables

Figure 1: Gantt Chart for Smart E-Tuition Information System (refer appendix A)

Every group member conducted research on the Let Us Score! Tuition throughout the planning stage to determine the tasks they needed to complete. Following the completion of the research, the team begins to identify the goals that must be reached and make plans for how to do so.

Following the completion of the planning phase, the project manager, Adib Asyraaf, gave his approval to a few suggestions made by the team and began working on the initial interface as well as the hardware and software required for the project to be successful. The entire team engages in brainstorming to create a data flow diagram throughout this process.

Following the previous phase, the team's database engineer, Syahril Rumizam, intervened to create the entity relationship diagram that would be presented to the team's manager, Mr. Suhardi Hamid, until it was approved. Along with the project manager and mobile application developer, Harith Iqbal, the database engineer also started to create a functional decomposition diagram for each user.

Khairul Haziq, a full-stack developer with the help of the mobile application developer, began implementing the intended web and mobile systems during the implementation phase. This covers system coding, writing client-side and server-side code, debugging, and designing the interface. Following the system's smooth operation, the project manager finished the final draft, and the team handed the finished product to the Let Us Score! tuition after presenting it to the supervisor.

3. Project Organization

3.1 Organizational Structure

Figure 2: Organizational Structure Chart (refer appendix B)

The founder of the company of Let Us Score!, Ahmad Ikmal is sitting at the top as chief executive officer directing the company that have successfully opened multiple branches of tuition throughout the whole Kedah and is expecting to expand to whole country in helping students to score in examination. A few departments are working under him to operate the company to achieve its main goal of the company.

The department where our team was hired is part of the information technology department, which is in charge of integrating new technology into the business and creating all of its information systems. Every team member has a personal commitment to make for the department.

The tutor department, where only the greatest and most experienced tutors are chosen, is the company's core division that determines whether the organisation can accomplish its primary purpose or not. These tutors are in charge of assisting the pupils in performing well in their exams. Each successful student will contribute to the business's reputation as a dependable one, assisting other students in doing well on exams and bringing in more prospective clients.

The management department is the final division that will help the business function as a whole. This department is in charge of duties other than tutoring, where its main objectives are to broaden its customer base and strategically plan the company's operations, including its marketing and financial strategies. Before taking any action, every choice that needs to be made will also be debated within this department in order for the department to change the decision if doing so is ultimately beneficial to the business.

3.2 Roles and Responsibilities

MEMBER	JOB	DESCRIPTION
Muhamad Adib Asyraaf bin Azis	Project Leader	Responsible for managing the flow of the project and ensure it is created according to the requirements
Muhammad Khairul Haziq bin Mohamad Khairi	Full Stack Developer	In charge of working on the development procedures for both the front end and the back end.
Muhammad Harith Iqbal bin Mohd Hanizun	Mobile Application Developer	Responsible for writing, maintaining, and implementing the source code needed to produce mobile apps and platform programmes that satisfy customers' needs and specifications.
Syahril Rumizam bin Abdul Razak	Database Developer	Responsible for developing database and ensure the proper functioning of the database. He also handles the physical and logical models of the database.

4. Database and System Design

4.1 Entity Relationship Diagram

Figure 3 and 4: Entity Relationship Diagram (refer appendix C)

An entity relationship diagram (ERD) is a graphical representation that depicts relationships the objects in Smart E-Tuition Information System. The system uses Crow's Foot and there are four entities in total which are user, class, register, and feedback in the current diagram.

To begin with, there is the user entity. The primary key is the user ID, which uniquely identifies each user and automatically increments by one upon addition. The entity's attributes are the fundamental information about the user required to register for the system. There are three types of users in the system: students, tutors, and administrators. Each user type incorporates all of the user entity's attributes. However, the user level attribute is available to help differentiate between each of the user types. In the database, the administrator, tutor, and student user levels are 1, 2, and 3, respectively. User entity are all relatable with:

- Feedback entity, where students can give feedback and admin manage feedback.
- Register entity, the student's registration information. Administrators has the ability to view and manage registration verification.
- Class entity, the class selected by the student during registration. Administrators and tutors can manage classes.

Following is the class entity. The primary key is the class ID, which functions similarly to the user ID in user entity in that it uniquely identifies each class and automatically increments by one upon addition. The entity's attributes describe the details of the class, such as the topic, the location of the online meeting, and the time of the class.

Next is the register entity. Due to the many-to-many relationship between the user entity and the class entity, register entity serves as a bridge table between them. The bridge table helps properly join the data streams that exist on each side of the bridge. There are three primary and foreign keys in the same attribute: admin ID, student ID, and class ID from the user and class entities, respectively. The register entity describes the registration details, including the registration date (automatically generated), proof of payment, and register approval. There are three types of register approval: 1 (approved), 2 (declined), and 3 (pending).

Finally, we have the feedback entity. The feedback ID is the primary key, and it is automatically incremented by one for each unique piece of feedback. The feedback entity describes the information required when a student provides feedback, including the feedback's title, comment, and date. One of the foreign keys is the admin ID, which allows the administrator to manage the feedback system and is automatically updated whenever the administrator modifies particular feedback. For the student ID, it is useful to identify which student provided feedback for a given feedback ID.

4.2 Data Dictionary

A data dictionary comprises the names, definitions, and attributes of the data elements utilized or captured by a database. This information is all shown in the Smart E-Tuition Information System database tables below. Note that the yellow key icon indicates the primary key while the grey key icon indicates the foreign key.

User Table

	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
☐	1	**userID** 🔑	int(4)			No	*None*		AUTO_INCREMENT	Change Drop More
☐	2	**userLevel**	int(1)			No	3			Change Drop More
☐	3	**userUname**	varchar(100)	utf8mb4_general_ci		Yes	*NULL*			Change Drop More
☐	4	**userPassw**	varchar(100)	utf8mb4_general_ci		Yes	*NULL*			Change Drop More
☐	5	**userName**	varchar(100)	utf8mb4_general_ci		Yes	*NULL*			Change Drop More
☐	6	**userPhone**	varchar(11)	utf8mb4_general_ci		Yes	*NULL*			Change Drop More
☐	7	**userEmail**	varchar(100)	utf8mb4_general_ci		Yes	*NULL*			Change Drop More
☐	8	**userGender**	int(2)			Yes	*NULL*			Change Drop More
☐	9	**userBirthdate**	date			Yes	*NULL*			Change Drop More
☐	10	**userAddress**	varchar(100)	utf8mb4_general_ci		Yes	*NULL*			Change Drop More
☐	11	**userCode**	int(10)			Yes	*NULL*			Change Drop More

Class Table

	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
☐	1	classID	int(4)			No	None		AUTO_INCREMENT	Change Drop More
☐	2	classSubject	varchar(50)	utf8mb4_general_ci		Yes	NULL			Change Drop More
☐	3	classLink	varchar(100)	utf8mb4_general_ci		Yes	NULL			Change Drop More
☐	4	classDay	varchar(50)	utf8mb4_general_ci		Yes	NULL			Change Drop More
☐	5	classTime	time			Yes	NULL			Change Drop More
☐	6	classFee	int(3)			No	50			Change Drop More
☐	7	totalStudent	int(10)			No	0			Change Drop More
☐	8	adminID	int(4)			No	None			Change Drop More
☐	9	tutorID	int(4)			No	None			Change Drop More

Register Table

	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
☐	1	classID	int(4)			No	None			Change Drop More
☐	2	stuID	int(4)			No	None			Change Drop More
☐	3	adminID	int(4)			No	None			Change Drop More
☐	4	registerDate	timestamp			Yes	current_timestamp()			Change Drop More
☐	5	proofPayment	varchar(200)	utf8mb4_general_ci		Yes	NULL			Change Drop More
☐	6	registerApproval	int(2)			Yes	NULL			Change Drop More

Feedback Table

	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
☐	1	fbID	int(4)			No	None		AUTO_INCREMENT	Change Drop More
☐	2	fbTitle	varchar(200)	utf8mb4_general_ci		Yes	NULL			Change Drop More
☐	3	fbComment	varchar(2000)	utf8mb4_general_ci		Yes	NULL			Change Drop More
☐	4	fbDate	timestamp			Yes	current_timestamp()			Change Drop More
☐	5	adminID	int(11)			Yes	NULL			Change Drop More
☐	6	stuID	int(11)			No	None			Change Drop More

4.3 Data Flow Diagram

4.3.1 Context Diagram

Figure 5: Context Diagram (refer appendix D)

An internal software system's interaction with external entities is depicted in a context diagram. Below are the descriptions of the context diagram of the Smart E-Tuition Information System in the table:

Entity	Data	Description
Student	username and password	Students are required to register their username and password on the system. Their username and password will be used to log into the student dashboard.
	registration details	Students are required to register themselves by filling up the registration form.
	personal data	Students are able to view and update their personal data if they notice any errors that have been submitted.
	student feedback	Students are able to give feedback.
	class details	Students are able to view their class details once they have registered for any subject.
Admin	username and password	Admins have their own username and password that they can use to log in to the admin dashboard.
	register verification and class details	Admins are able to verify and update student registration and class details.
	tutor and student data	Admins are able to update tutor and student data if they notice any errors that have been submitted.
	report on feedback	Admins are able to view and delete student feedback.
Tutor	username and password	Tutors are given their own username and password to log into the tutor dashboard.
	personal data	Tutors are able to view and update their personal data if they notice any errors that have been submitted.
	class details	Tutors are able to view and update class details.

Table 1: Context diagram descriptions

4.3.2 Diagram 0

Figure 6: Diagram 0 (refer appendix D)

A diagram 0 provides a fundamental overview of the entire system or process being analyzed or modeled. It is intended to provide a quick overview of the system as a single, high-level process with its connections to external entities.

There are eight processes represented in the system in diagram 0 overall. Register, login, manage personal data, manage classes, register for classes, view classes, submit feedback, and view feedback are some of the processes. The system uses four databases, as depicted in the diagram. The user can subsequently view the data that is stored in the database. Every piece of personal information is stored in the user information database, and when a user tries to log in to the system, the same information is used.

Once logged in, a user can control their personal data. Administrators, tutors, and students are the three different user types who have the ability to update their data. Managing the class is the next step. Every class detail is saved in the database so that students can access it afterwards. To prevent students from abusing the system to alter the class session, only the administrator and tutors are permitted to make changes to the class information.

The students will register for classes, and the information will then be entered into a database. Every level of user has access to the class information for their own use. Both the tutors and the students have access to the class information, which they may use to confirm that everyone showed up for class. The administrator can access the specifics of each class to change and analyse the data. The students can add feedback and store it in the database as a final step. The administrator will then have access to the database for analysis purposes.

5. Conclusion and Recommendation

5.1 Conclusion

Despite the fact that the system is far from perfect, the project has successfully met all of the system's requirements. Each user is able to quickly access the required data and operate the system in accordance with their position. Since the system is so simple to use, no tutorial or other instructions are required. Other programmers will have ample room and flexibility to add new features or capabilities to the system as a result of future development.

Each user receives system-generated reports via their own dashboard, which they can then analyze for their own benefit. Additionally, the user has the ability to modify their information and data without any hassle including accessing the database or the source code. The registration, payment, and subject registration processes for the online tuition can now be initiated without any issues.

Reading student feedback that is also accessible through the system can provide the administrator with ideas for expanding the system. These comments are crucial because they demonstrate how satisfied users are with the system developed by the development team. Thus, this project's objective has also been achieved, as students can now begin online class tutoring with the assistance of qualified instructors.

5.2 Recommendation

Recommendations for this project are to focus on potential future upgrades, especially those that cannot be addressed during development. A few recommendations are provided for any developer who will carry on this project's development in the future.

First of all, is to enhance the security strength of the user's password. This includes implementing the use of mixed characters. The more mixed-up letters (upper-case and lower-case), numbers, and symbols, the more potent the password is, and the harder it is for a brute force attack to crack it. In addition, using hashing algorithms such as Message Digest (MDx) algorithms, such as MD5, and Secure Hash Algorithms (SHA), such as SHA-1 and SHA-2, adds another layer of security. Hashing enables the storage of passwords in a format that a hacker cannot reverse in a reasonable amount of time or at a reasonable cost.

Additionally, more specific registration fields can be added based on the student's high school level. For example, as the system is set up for SPM students, if a student wanted to enroll in the form four portion, they would only register for form four classes. This will allow form four and form five students to receive a more individualized education in terms of the subjects covered in class.

In addition, a more reliable payment gateway is required to facilitate the student registration process. Using FPX payments, which enable real-time debiting of a customer's internet banking account at multiple banks, is the most convenient and secure online payment option for this. Therefore, students will only be required to pay for the subjects they select using FPX. The FPX payment system has already verified the payment in its own way, so administrators do not need to worry about any fraudulent proof of payment or re-verify the payment.

6. Appendix

6.1 Company Profile

Company	Let Us Score!
CEO	Ahmad Akmal
Mission	To organize the students' information and make it useful in its own way.
Vision	To make sure education in Malaysia keep striving forward globally.
About Us	In 2014, Let Us Score! Sdn. Bhd. was established. Operating ten tuition centres throughout Kedah, with over 4,000 students enrolled annually. In 2020, the pandemic struck. We are one of the few brands that has successfully converted approximately one hundred students to online learning using the Smart E-Tuition System. Compared to offline operations, online operations are superior in terms of their utility and efficacy. The Smart E-Tuition System is the future at this time.
Our Products	Mobile applications and web-based information systems. Both contain all the necessary features from the student, tutor, and admin dashboards, where each role has distinct duties.

6.2 Appendix A

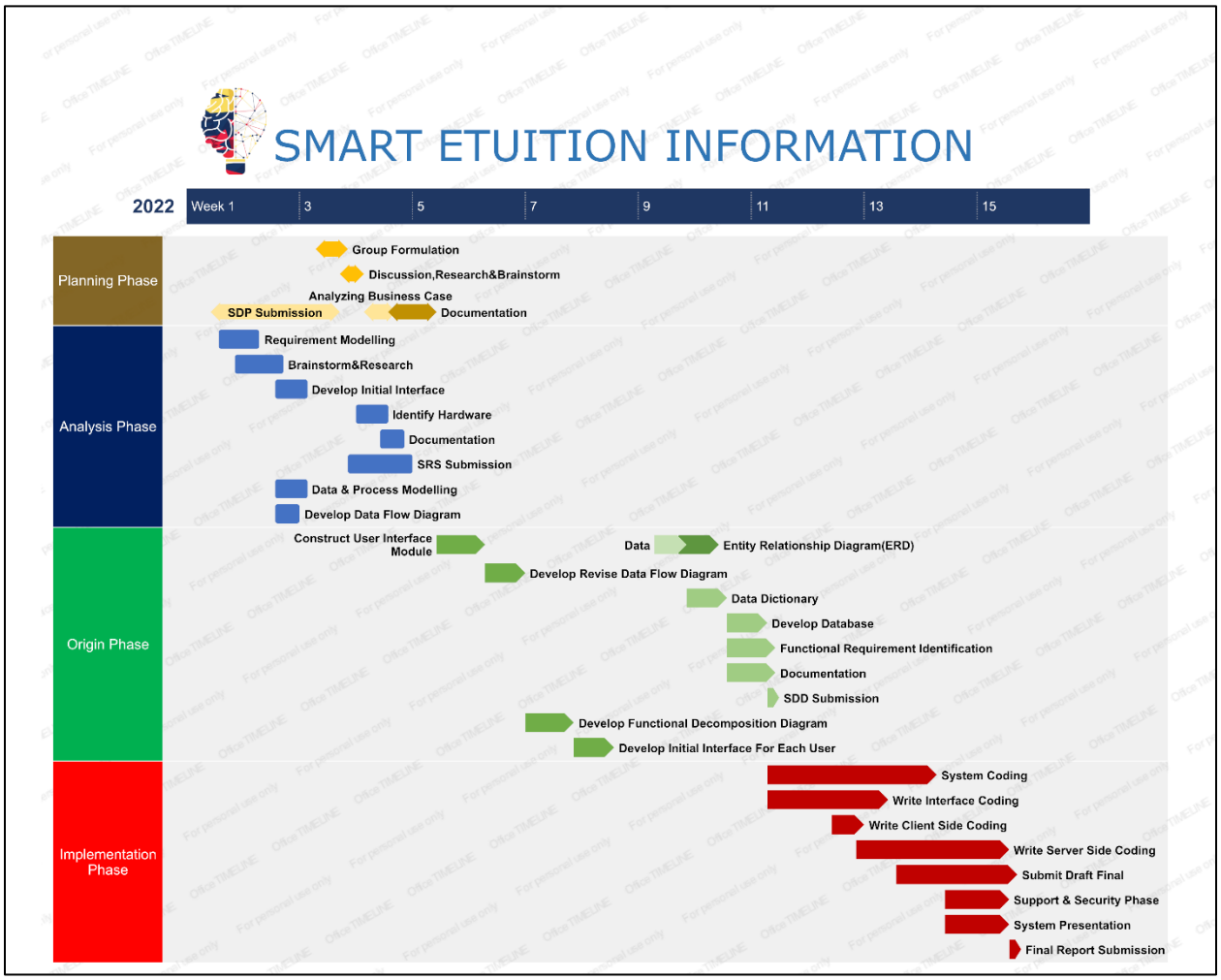

Figure 1: Gantt Chart for Smart E-Tuition Information System

6.3 Appendix B

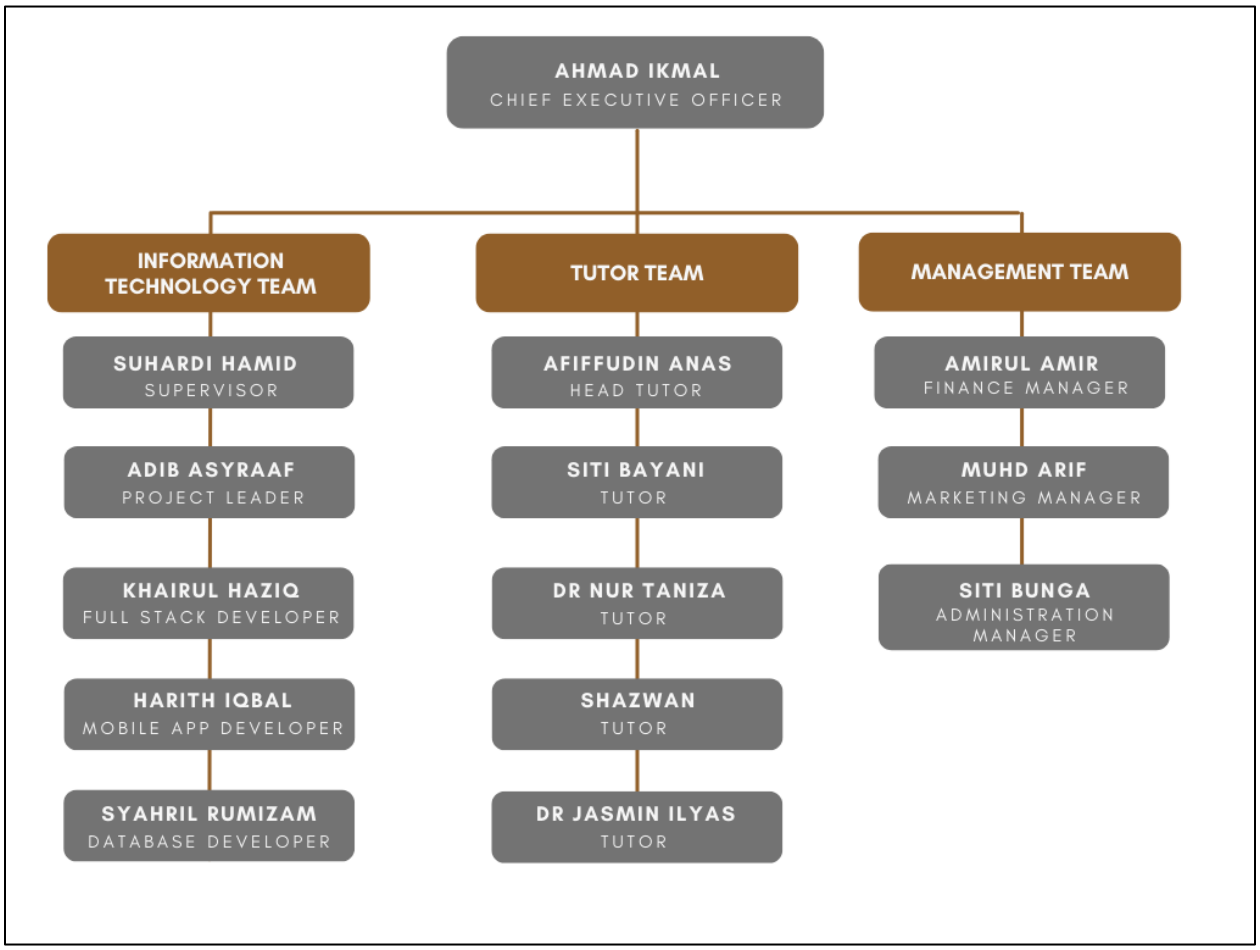

Figure 2: Organizational Structure Chart for Let Us Score Sdn. Bhd.

6.4 Appendix C

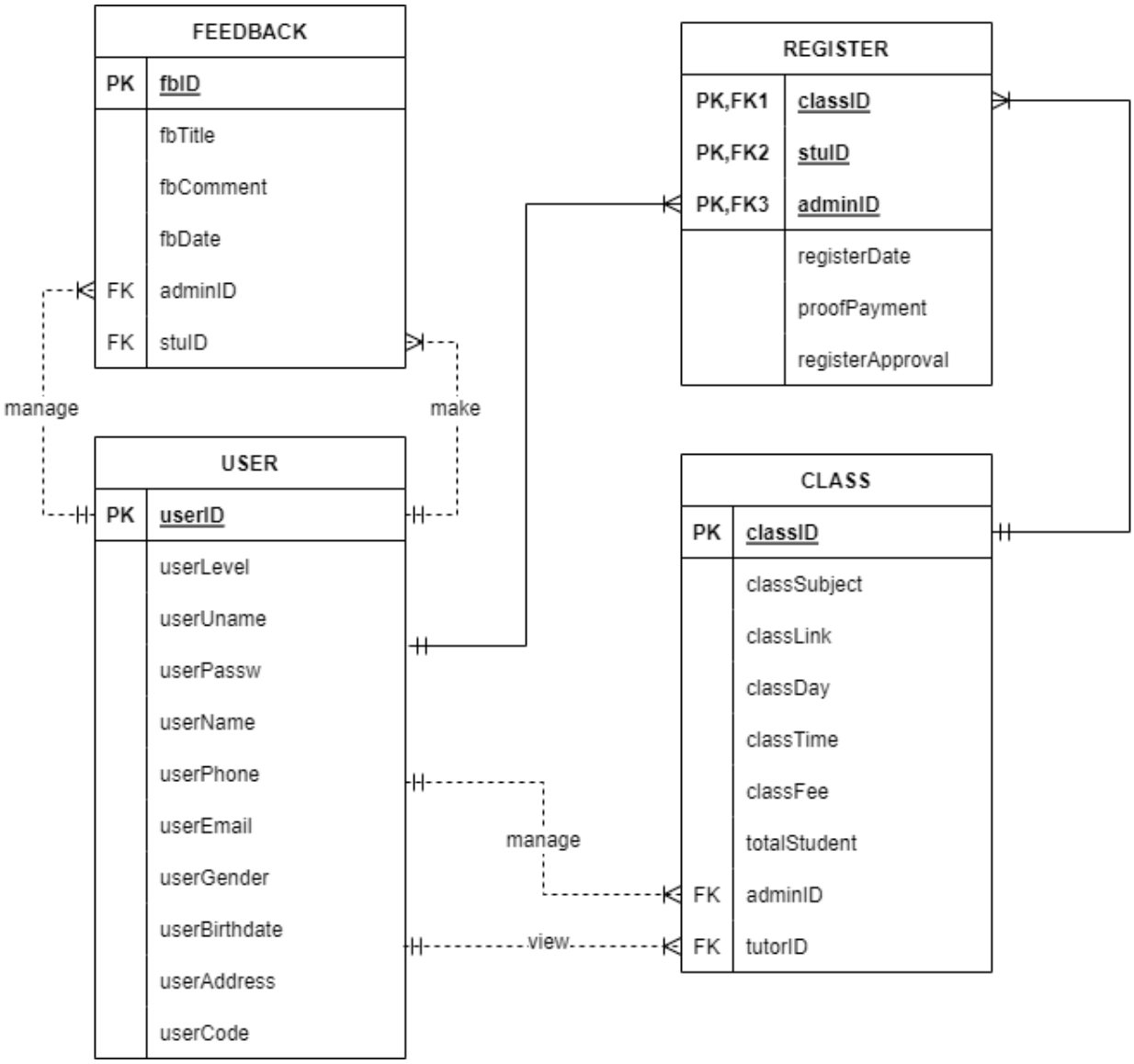

Figure 3: Entity Relationship Diagram for Smart E-Tuition Information System (Crow's Foot)

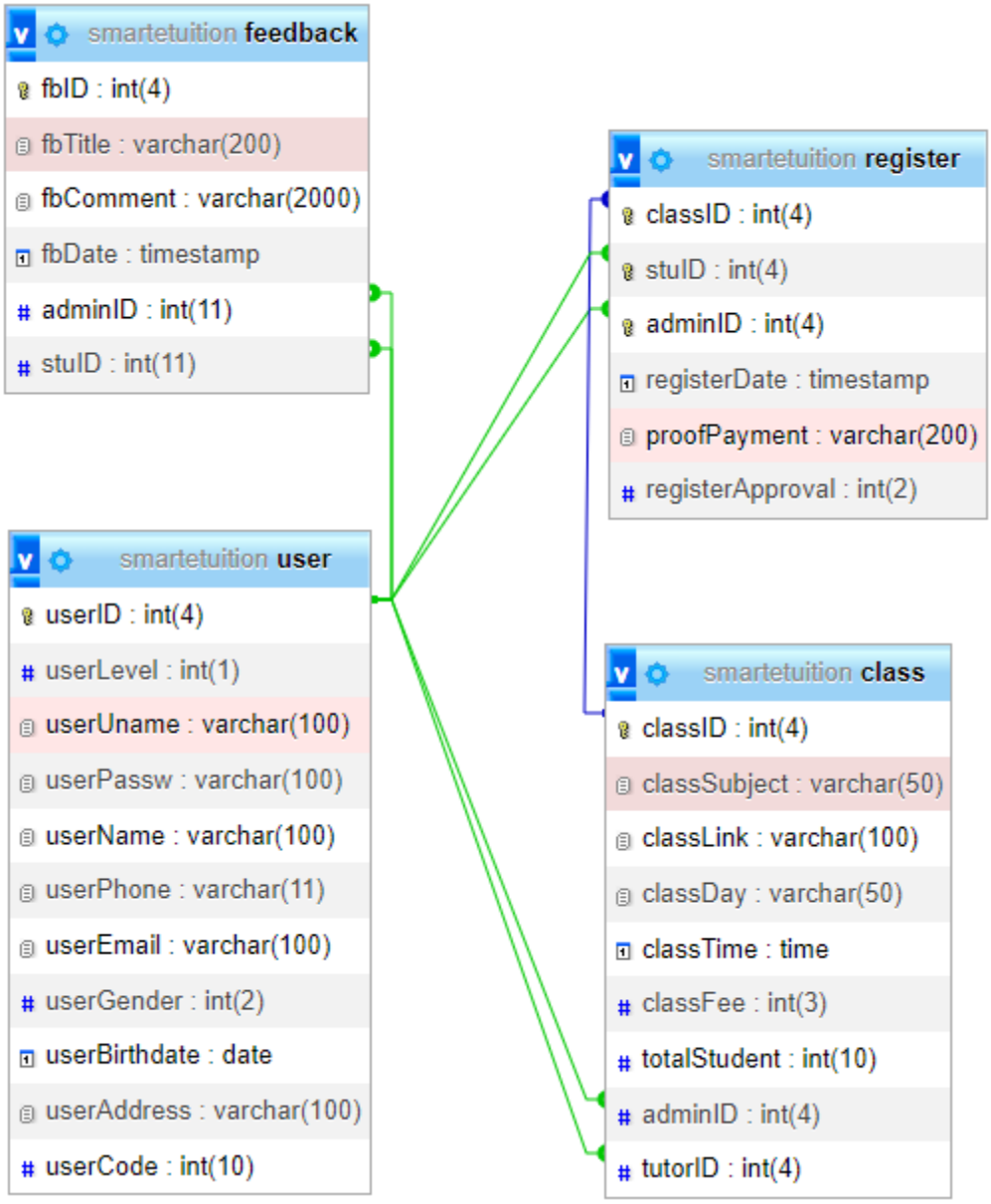

Figure 4: Entity Relationship Diagram for Smart E-Tuition Information System (From the physical database of phpMyAdmin)

6.5 Appendix D

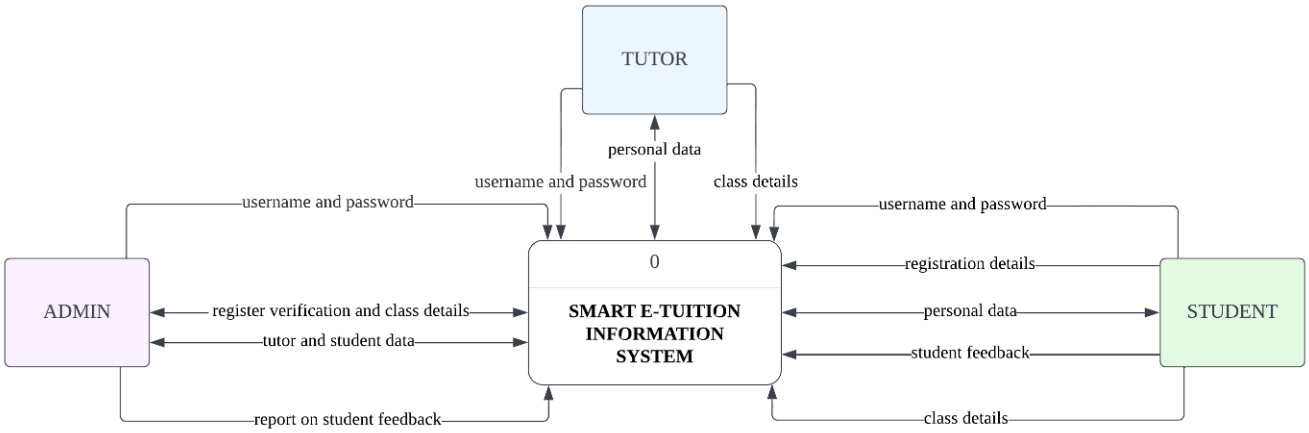

Figure 5: Context Diagram for Smart E-Tuition Information System

6.6 Appendix E

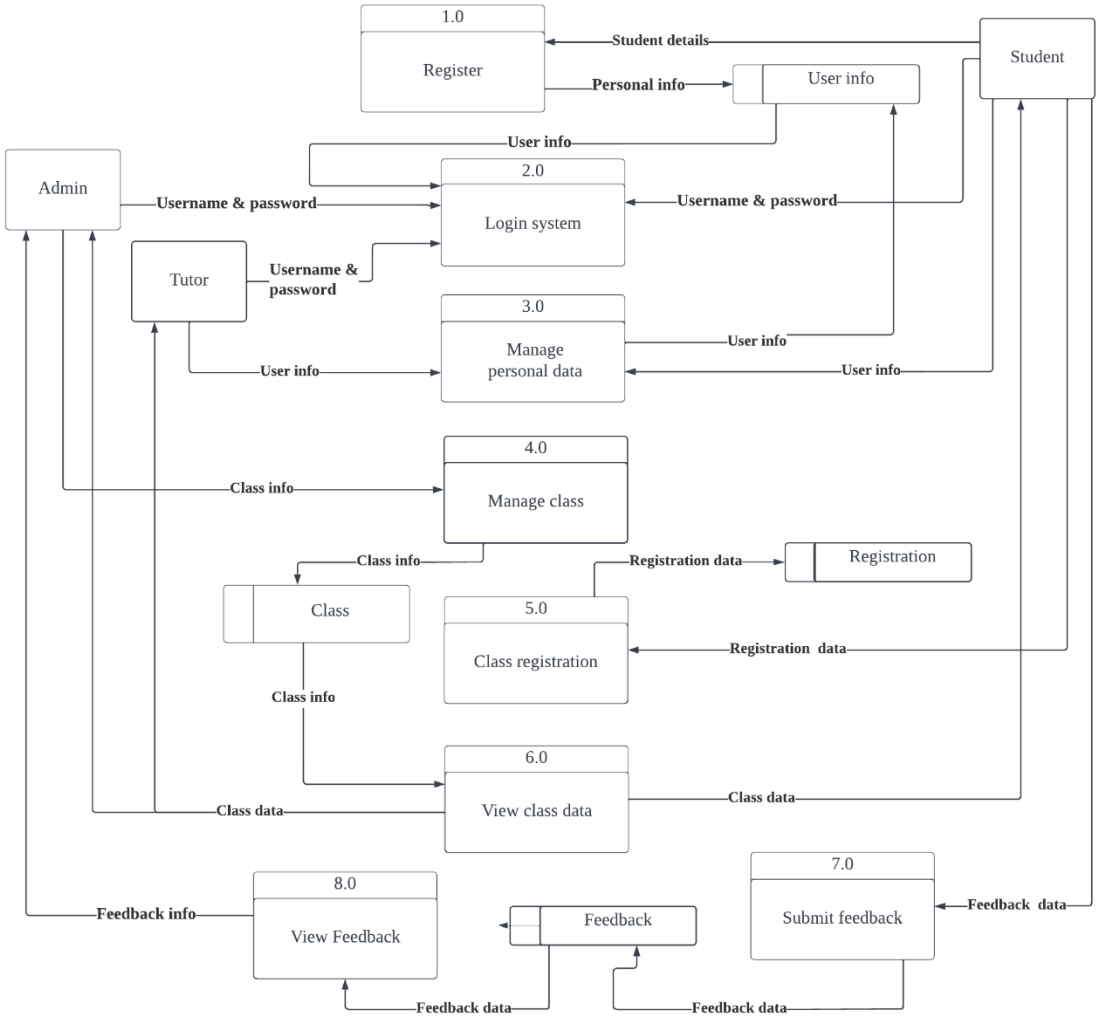

Figure 6: Diagram 0 for Smart E-Tuition Information System