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Bright Kids Tuition Centre Management Information System

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Abstract: Many tuition centres or franchises still implement the manual record management system to store the personal records of their students and staffs, past examination papers, or any paper documents in their business environments. Record management, storage, and sharing issues have always been closely associated with the manual record management system that is heavily dependent on the file and paper form. This research aims to study the existing processes in Bright Kids tuition centres, design business logics and procedures for the proposed system using the structural approach and develop a web-based system that can resolve these issues. The branch manager, staff, tutor, student, parent, guardian, and guest will be the users of this system. The systems development life cycle (SDLC) model is used as the default software methodology in this project. Through this system, the upper management of Bright Kids can store and manage the employee, student, and guardian records that are shared amongst branches while the students and guardians can view the lecture participated by the students. The past students, staff, or guardians can apply for job applications electronically without visiting the branch. The functionalities or system modules will be unit-tested immediately after they are developed, and they will be integrated-tested after two or more linked modules are completely developed. The functionalities and features are evaluated in the testing phase via the construction and implementation of test cases. The results of test cases and user acceptance testing will be documented in this report. At the end of this report, the advantages, limitations, and recommendations of the developed system will be discussed in the conclusion section.

Keywords: Tuition Centre, Management Information System, Relational Database, System Development Life Cycle Model, AJAX, ASP.NET Core

1. Introduction

Bright Kids is a local chained education brand that provides excellent and guaranteed preschool education, tuition & day-care services to children from 3 to 12 years old through their franchised program. Bright Kids has been facing issues related to the management and sharing of the records due to heavily relying on the manual system using the folder and paper. They have faced an increasing number of records, physical access to the record storage, duplication of the records, lack of regular record organizations and management, and the limitation of applying a single sorting standard in each folder while adapting the existing system.

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An increasing number of records or documents is happening each year as there is a massive increase in the number of student enrolments, academic performance reports, state and school examination papers for each semester. Preparing and keeping copies of academic performance report and storing the copies of examination papers are the culture of Bright Kids. Furthermore, physical access is required to access, update, or dispose of a document in the folder. The documents and records are grouped into folders with different purposes and sorting standards and are stored in a dedicated room and space in Bright Kids compound. Some folders are stored scattered in different places in Bright Kids. Hence, the staff needs to determine the physical location of the folder, which can be held by somebody or placed somewhere before the staff could access the document. Record sharing issue also arises due to the frequent sharing of the same document among multiple tutors at the same time. This issue commonly occurs among the tutors who are teaching the students of the same education grade who need the examination papers simultaneously. Data inconsistency also happens occasionally when two or more interrelated documents are not updated synchronously. Duplicated documents with conflict values could occur as the tutors need to frequently update the academic performance report for each student until the staff or branch manager has verified and accepted.

Next, a lack of regular record organization can happen as the staff or tutors could leave the records or documents unarranged, leading to the access of the records in the folders becoming more difficult and time-consuming. There are some cases in which the tutors or the staff did not restore the documents to the proper folder and in-folder location. Lastly, the lack of correlation between the records as the records are filed into different folders. There are many records or documents in Bright Kids that are interrelated. The personal information and his/her past academic examination reports are related to the student himself/herself. However, a student's personal information is stored in the student record folder while his/her past academic performance reports are stored in the folders of different years. The retrieval of the academic report from different folders is a time-wasting and tiring process as the staff needs to determine the student's enrollment year and check through the records in the academic report folders of different years until the staff has gathered all the academic information reports for the students.

The three main objectives of this project are: to design the user requirements specification for Bright Kids Tuition Centre Management Information System, to develop a web-based system to solve the issues related to the management, storage, and sharing of the records, and to test the user acceptance and functionality of the system.

2. Literature Review

A tuition centre is a private education institution that provides tuition to the students for a charge of payment. People believe that tuition can enhance students' understanding of some specific subjects, improve students' academic performance, and cope with school examinations. [1] Subjects available in the tuition centres are often related to the fundamental subjects offered in formal education or entrance examinations. Popular subjects such as Mathematics, Science, English, and more widely provided by any tuition centre around the world.

2.1 Management information system (MIS)

According to Alter, an information system is a system that contains processes and activities responsible for processing information. These processes, such as: capturing, transmitting, storing, retrieving, manipulating, and displaying, are performed on information. [2] Thus, an information system is the collaboration of humans and machines to use resources to perform some operations on the information collected electronically or manually inputted to produce informational products and services for its customers from an internal or outside organization. [2]

Based on Laudon, the management information system (MIS) in the field of study of the information systems that are focused on its application in business and management. [3] The leadership and managers at different management levels should revisit and distribute the information stored to make long-term and short-term decision-making. MIS is the appropriate system that allows the managers to achieve their organizational goals and satisfy stakeholder requirements by making timely and effective decisions from the data collected or provided by the MIS. [4].

Web-based system provides plenty of advantages to both system users and developers, and one of them is lower development costs compared to other systems. This is due to a web-based system or application is a responsive web application that runs in a web browser and can be used across multi-device types. Since web-based systems need to be tested on different browsers only instead of multiple operating systems, it requires minimal development costs compared to other systems. Furthermore, accessibility is another advantage possessed by web-based systems as it is accessible by the user whenever internet connection and web browser are available. The web-based system is also highly deployable due to its manageability and cross-platform compatibility. The users require a website address only to access the system. Hence, deploying web applications to the end-user is far easier.

2.2 Responsive web design (RWD)

Responsive web design is the adaptability of the website to many devices with varying screen resolutions, different screen aspects, and orientations. The CSS code in the HTML page renders the web page with different displays of contents on all devices when the page is received from the server. [5] The mobile browser fits the page with desktop width and forces the users unable to view or interact with the contents on the page without performing double-tap or pinch-to-zoom. [5]

2.3 Asynchronous JavaScript and XML (AJAX)

According to Mozilla Foundation, the term Asynchronous JavaScript and XML (AJAX) is coined by Jesse James Garrett, founder of Adaptive Path in 2005 that describes the use of several existing web technologies to allow instant, quick, and incremental updates on the existing user interface of the client-side without reloading the entire browser page. [6] AJAX allows web developers to design and create dynamic web applications that support the partial page or content updating on the client-side without having to refresh the page. Any instant communication and data exchange between the server and the browser client is realizable through AJAX. [7]

2.4 Relational database

A relational database organizes the data into the table(s) of columns and rows. [8] In a relational database, a table represents an entity whose could be a person, object, location, or action. Each table has a set of records that share the same columns which represent the attributes of an entity. The rows in a table represent a set of records and each record is distinguishable by a unique key in the table. [9] The records in the tables can be associated to each other by inserting unique keys in the columns in one table as foreign keys with the same value as shown in Figure 1. [9]

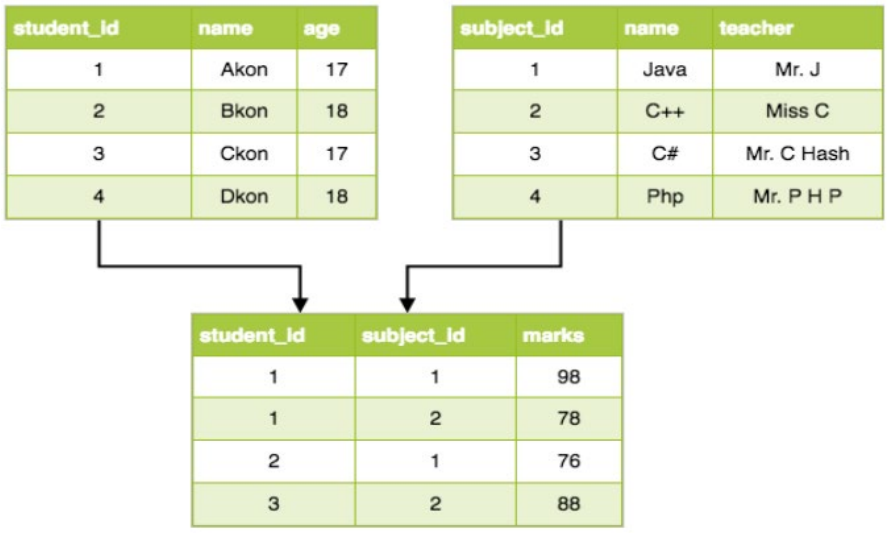

Figure 1: Relational data model [10]

Relational database management system (RDBMS) is a software designed to manage relational database. According to Mostafa et al, RDBMS became the primary choice for the data storage of the

database to store financial records, manufacturing information and more after it was created in 1980. [10] Table and relationship are the two concepts used in RDBMS. Table 1 shows the properties of relational model.

Table 1: Properties of relational model [10]

	Properties
Defining Standard	SQL (Structured Query Language)
Data Organization	Tables
Establishing Relationships	One to One (1:1), One to Many (1: N), and Many to Many (M: N) relationships can be implemented.
Support for Mathematical Function	Support many functions such as sqrt (), min (), max (), and sum ().
Data Integrity	• Does not suffer from any Insert eccentricity. • Free from update eccentricity. • Free from delete eccentricity.

2.5 Study of the existing system in Bright Kids

Bright Kids has been implementing a manual system like a file-based system as their default system to manage the records. The staffs create, update, access, or manage the written or printed documents in Bright Kids. They categorize and arrange the documents into files for different purposes. Due to the implementation of the manual system in managing the documents and records, the issues like an increasing number of records or documents, the necessity of physical access to the record, data inconsistency, the difficulty of record sharing, lack of regular record organization, and lack of data correlation are frequently faced by the staff and students in Bright Kids.

Furthermore, an increasing number of records or documents is happening each year as there is a massive increase in the number of student enrolments, academic performance reports, state and school examination papers for each semester. Preparing and keeping copies of academic performance report and storing the copies of examination papers are the culture of Bright Kids.

Physical access is required to access, update, or dispose of a document in the folder. The documents and records are grouped into folders with different purposes and sorting standards and are stored in a dedicated room and space in the Bright Kids compound. Some folders are stored scattered in different places in Bright Kids. Hence, the staff needs to determine the physical location of the folder, which can be held by somebody or placed somewhere before the staff could access the document.

Record sharing issue also arises due to the frequent sharing of the same document among multiple tutors at the same time. This issue commonly occurs among the tutors who are teaching the students of the same education grade who need the examination papers simultaneously. Data inconsistency also happens occasionally when two or more interrelated documents are not updated synchronously. Duplicated documents with conflict values could occur as the tutors need to frequently update the academic performance report for each student until the staff or branch manager has verified and accepted.

Next, a lack of regular record organization can happen as the staff or tutors could leave the records or documents unarranged, leading to the access of the records in the folders becoming more difficult and time-consuming. There are some cases in which the tutors or the staff did not restore the documents to the proper folder and in-folder location. Lastly, the lack of correlation between the records as the records are filed into different folders. There are many records or documents in Bright Kids that are interrelated. For example, the personal information and his/her past academic examination reports are related to the student himself/herself. However, a student's personal information is stored in the student record folder while his/her past academic performance reports are stored in the folders of different years. The retrieval of the academic report from different folders is a time-wasting and tiring process as the

staff needs to determine the student's enrollment year and check through the records in the academic report folders of different years until the staff has gathered all the academic information reports for the students.

2.6 Study of FrogVLE

The study on the existing similar system on the market is analyzed to understand the fundamental features and functionalities. The first existing system studied is FrogAsia's Virtual Learning Environment (VLE). It is released under the 1BestariNet program in 2012 by the Education Ministry of Malaysia (KPM) in collaboration with YTL Communications Sdn. Bhd (YTL). [11] This program emphasizes end-to-end solutions (E2E) and Virtual Learning Environment (VLE) networks. Frog VLE platform enables teaching, learning, collaboration, and administrative management to be carried out online and can be accessed anywhere and anytime. [11] FrogVLE focuses on online class and learning resource management. This system allows the teachers and students to interact through exercises, quizzes, forums, polls, and the sharing and access of learning resources on the Internet. The features available in FrogVLE could guide the development of the learning resources and class features for the proposed system. The study of this system provides the necessary governance and administration of the accounts of students and tutors in the proposed system for the management team in the Bright Kids branch. The staff in Bright Kids should perform the registration of the students' and tutors' accounts after the verification and validation of the personal and parents' information of the students or the personal information of the new staff.

2.7 Study of UTHM student academic system

The next existing system studied is UTHM student academic system. UTHM student academic system is currently deployed as a part of electronic online systems at *Universiti Tun Hussein Onn Malaysia* (UTHM) for their students. This system consists of two main subsystems: SMAP Online and UTHM Author for their users, active UTHM students. SMAP Online is an academic performance reporting system that provides users the reports of their past academic performance during their year of studies in UTHM, display their biodata records submitted to the university authorities, allow them to register their courses, view any announcements related to the release of the new timetable for upcoming semesters and the release of the new examination schedule. SMAP Online focuses on the student record presentation, course registration, and academic performance reporting features. The features available in SMAP Online can assist the author in developing the student record management and academic performance reporting features for the proposed system through observation of the user interfaces of both features in SMAP Online. The registration of the subject should be done by the tutors, branch manager, or the staff in Bright Kids.

UTHM Author is an online learning resource-sharing platform that allows lecturers to share their learning materials, make class announcements, conduct online quizzes and examinations, and post assignments, labs, and exercises. UTHM Author focuses on the online class, learning resource management, and forum features. This system allows the teachers and students to interact through exercises, forums, and the sharing and access of learning resources on the Internet. The features could guide the development of the learning resources and class features for the proposed system. Besides, the automation creation of classes is necessary for the proposed system as the courses in an education standard are usually taught by the same tutor each year in the culture of Bright Kids. The change of tutor in a class can be made after a class is being created and assigned a tutor. The sharing of the same resources among the different classes of the same standard should be reduced to avoid different versions of the same learning materials in different classes.

2.8 Study of myCampusSquare

myCampusSquare is an educational institution management system that was developed by a local development team based in *Petaling Jaya*, *Selangor*, and has four other branches in India, Bangladesh, Bhutan, and Somalia. myCampusSquare provides university, college, school, tuition centre & kindergarten management systems in a single system. The education institution management system developed by myCampusSquare is available in core, pro (incl. core module), pro plus (incl. pro module),

enterprise (incl. pro plus module), and LMS modules. The features available in a module depending on the module purchased. There are over 30 educational institutions currently deploying this system around the world as their institution management systems. [12] This system contains a wide variety of features for a tuition centre management system that encompasses the setup and management of program/course, subject, education year/level, student admission, class, timetable, examination system, and more. The reference of this system during the development can gain a view of the features that can be implemented in the proposed system. Table 2 shows the comparison of the existing electronic system of Bright Kids and similar systems on the market.

Table 2: Comparison of the existing electronic system of Bright Kids and similar systems on the market

Features	The existing electronic system (Bright Kids)	Frog VLE	UTHM student academic system (SMAP Online & UTHM Author)	myCampusSquare Tuition Management & Multibranch Management
User login	No	Yes	Yes	Yes
Target user	All	Active teachers, students, and their parents from the elementary and secondary government schools	Registered and active UTHM students and lecturers	Registered and active staff, tutors, students, parents. (In Pro Plus module)
Account requirement	No	Yes (except webpage or functions for all-users)	Yes	Yes
The ability to register your account	Account registration is not available	No (student account must be registered by FrogAsia and the students' identity must be verified by KPM)	No (student account must be registered by UTHM authority and the students' identity must be verified by UTHM)	No (account must be registered by the institution)
Academic result reporting	No	No	Yes	Yes (In Core module)
Teacher & student online interaction	No	Full (including sharing embed video media)	Full (through external standalone UTHM Author system)	Yes. Online forum & study material upload and access (in LMS module)
Class member management	No	Yes (performed by teachers)	Yes (through external standalone UTHM Author system)	Yes (in Core module)
Web responsiveness	Yes	Yes	Yes	Yes
Programming language used	HTML, CSS, JavaScript/JQuery	HTML, CSS, JavaScript/JQuery, PHP and unknown query language	HTML, CSS, JavaScript/JQuery, unknown server-side scripting language, and query language	Unknown
Platform support	Web	Web	Web	Web, Android, iOS
Subscription	-	No	No	Yes (available as subscription basis)
Owner	Bright Kids Management Sdn. Bhd.	FrogAsia Sdn Bhd, YTL Corporation Berhad	UTHM Global Online Learning, *Universiti Tun Hussein Onn Malaysia*	myCampusSquare
The source of information	[13]	[14]	[15][16]	[12]

3. Methodology/Framework

Systems development life cycle (SDLC) is the process of understanding how an information system (IS) can support business needs, designing the system, building it, and delivering it to users. [17] According to Ibrahim (2020), the development of a system is normally depending on the phases in SDLC. An information system will be developed based on the information collected relating to the proposed system during the development of an information system. [18] Most SDLCs share a similar set of 4 fundamental phases: planning, analysis, design, and implementation. [17]

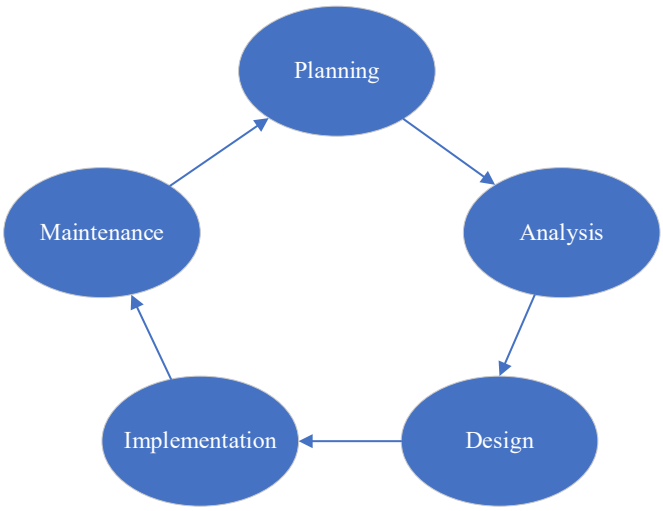

Figure 2: System development life cycle (SDLC) model [18] [19]

Based on Figure 2, there are 5 fundamental phases which are: planning, analysis, design, implementation, and maintenance phases in SDLC. Ibrahim (2008) states that the predecessor phase must be executed before conducting next phase. [18] For example, the planning phase must be executed before its next phase, analysis phase can start. In addition, another life cycle of SDLC can be started if previous phase is executed and the maintenance phase is completed. Each phase composed a series of steps, or activities that have dependency amongst themselves. These steps rely on the techniques to produce deliverables. Deliverables can be software products, designed documents, files, or plans that can provide understanding about the project. [17]

3.1 Software Requirements Specification

The software required for the system development are listed as below:

- Microsoft Visual Studio Community 2019, as source-code editor to develop a system.
- Microsoft Project, as tools to prepare Gantt Chart.
- Microsoft Visio, as a tool to develop chart & diagram.
- Microsoft SQL Server Management System 2019, to manage database.

3.2 Hardware Requirements Specification

The software required for the system development are listed as below:

- Central Processing Unit (CPU) with Intel ® Core® i5-8250U
- Random Access Memory (RAM) with 12 Gigabyte
- Secondary storage with 256GB Kingston A1000 SSD

4. Results and Discussion

4.1 System Requirement

Table 3 displays 18 modules of the proposed system while Table 4 shows the non-functional requirements of the proposed system.

Table 3: List of modules

Module	Functionality
User Login	This module focuses on the login of the user account.
Account Registration	This module focuses on user account registration.
Account Management	This module focuses on managing the user account.
The program, subject, and available subject management	This module focuses on the management of program and subject records.
Exam structure and exam result	This module focuses on the management of exam structure and result records.
Education	This module focuses on managing the education grade.
Relationship	This module focuses on managing the relationship between the student and the parent/guardian/staff.
Study history	This module focuses on managing the study history for a student in the same or other branches in the franchise.
Employment history	This module focuses on managing the employment history for a staff/tutor in the same or other branches in the franchise.
Teaching history	This module focuses on managing the teaching history for a tutor in the same or other branches in the franchise.
Branch	This module focuses on managing the branch records.
Lecture	This module focuses on the management of the lecture conducted in the branch.
Class program involvement	This module focuses on managing the students' involvement in each class conducted in the branch.
Learning Resource	This module focuses on managing the learning resource shared in the system.
Exam structure and exam result management	This module focuses on managing the structure of the examination for each subject and managing the examination result of each subject for each student each semester.
Document	This module focuses on managing the document that is uploaded by the staff.
Job application	This module focuses on managing the electronic job application that is received through this system.

Table 4: Non-functional requirements

No.	Modules	Functionalities
1	Performance	• The system response time should be less than 1.2 seconds. • The system shall be available for 24/7.
2	Usability	• The system interface shall be able to adapt various devices of different screen resolutions and sizes. • The font family, size, and colour shall be eye-friendly to the users. • The system interface shall be easy to learn, effective to use.
3	Scalability	• The system shall be easy to expand to support future demand for new features. • The infrastructure shall be easy to expand on-demand.

4.2 User Requirement

User requirements generally describe the system functionalities, and features demanded or expected by the system stakeholders and clients to meet the business objectives. The table 5 shows the list of user requirements collected and analysed through the interview sessions and observation.

Table 5: User requirements for Bright Kids Tuition Centre Management Information System

No.	Functionalities
1	The users can log in to the system with a valid username and password.
2	The privileged users can view, create, edit, or delete the user records in the branch.
3	The privileged users cannot view, edit, or delete the user records of privileged users from other branches.
4	The privileged users can add employment history on the staff that has no active employment history.
5	The privileged users can add teaching history on any staff that has active employment history in the branch.
6	The privileged users can view, create, edit, or delete the lecture records in the branch and attach documents to the lecture records
7	The privileged users can view, create, edit, or delete the branch, subject, available subject, program, education grade, and examination structure records.
8	Any user cannot submit a student enrolment form if a student become the guardian or staff OR an existing study history is linked to the birth certificate number/passport number
9	The past students, guardians, or staff can apply for job applications if no existing study history or employment history in any branch is found.

4.3 Context Diagram

A context diagram is a diagram that uses some symbols and notations to represent the flow of data between the processes of the systems or between the systems and the external entities in its environments. Based on the context diagram for Bright Kids Tuition Centre Management Information System as shown in Figure 3 of **Appendix A**, there are 8 stakeholders in the proposed system which are Student, Parent/Guardian, Tutor, Staff, Branch Manager, Privileged Staff, Super Privileged Staff, and Guest.

4.4 Use Case Diagram

From Figure 4 in **Appendix A**, this diagram displays the use case diagram of Bright Kids Tuition Centre Management Information System while Table 6 below lists all 7 use cases based on the use case diagram.

Table 6: List of use cases in Bright Kids Tuition Cent

Use cases	Actor	Purpose
Login	Admin, Super Privileged Staff, Brand Manager, Privileged Staff, Staff, Tutor, Student, Guardian	Allow the actor to login the system.
Request Account	Staff, Tutor, Student, Guardian	Allow the actor to send a request for account registration.
Manage User Record and Account	Admin, Super Privileged Staff, Brand Manager, Privileged Staff	Authorize the actor to manage the user record and account information.
Manage Subject, Education, Programme, Branch	Admin, Super Privileged Staff	Allow the actor to manage and manipulate the information related to subjects, education, programme, and branches.
Manage Lecture, Study, Employment and Teaching History	Admin, Super Privileged Staff, Brand Manager, Privileged Staff, Staff, Tutor	Allow the actor to manage and manipulate the information related to lectures, and study, employment, and teaching histories.
Manage Exam Structure, Exam Result	Admin, Super Privileged Staff, Brand Manager, Privileged Staff, tutor	Allow the actor to manage and manipulate the information related to exam structures and exam results.
Manage Job, Enrollment, Dayoff Application	Admin, Super Privileged Staff, Brand Manager, Privileged Staff	Allow the actor to manage and manipulate the information related to jobs, enrolment, and day off application.

4.5 Class Diagram

Figure 5 in **Appendix A** illustrates the class diagrams of the proposed system.

4.6 Functional Testing Result

Before any testing activity is performed on the proposed system, the system must be constructed and implemented. There are some examples of user interfaces for the developed system in **Appendix B**. In functional testing, there is a total of 18 modules to be tested as shown in Table 7.

Table 7: The test coverage of system modules

Module	Req. ID covered	Functional testing result/Failed Test Case
User Login	REQ_100	6 out of 6 test cases passed
Account Registration	REQ_200 REQ_400	13 out of 14 test cases passed and other 1 test case is not implemented. Failed test case: - Privileged Staff and Super Privileged Staff can view the list of pending account registration requests from the staff, parent, guardian, or student in the branch. (REQ_401)
Program, subject, and available subject management	REQ_600 REQ_700	11 out of 12 test cases passed and other 1 test case are not implemented. Failed test case: - The student and guardian/staff can view the subjects and programme available at the student's current education grade. (REQ_708)
Account Management	REQ_300 REQ_500	14 out 16 test cases passed. Failed test case: - The student, parent/guardian, staff, tutor, branch manager, Privileged Staff, and Super Privileged Staff can view his/her user record. (REQ_307) - Any user can change his/her account password. (REQ_501)
Education	REQ_800	3 out of 3 test cases passed.
Relationship	REQ_900	2 out of 2 test cases passed.
Study history	REQ_1000	6 out of 8 test cases passed and other 2 test cases are not implemented. Failed test case: - The student can view his/her study history in the branch or other branches in the franchise. (REQ_1004) - The parent/guardian/staff can view his/her supervised child's study history in the branch or other branches in the franchise. (REQ_1005)
Employment history	REQ_1100	8 out of 8 test cases passed.
Teaching history	REQ_1200	6 out of 7 test cases passed and other 1 test case are not implemented. Failed test case: - The parent/guardian/staff can view the lecture's teaching history who taught their supervised child currently or in the past. (REQ_1206)
Branch	REQ_1300	4 out of 4 test cases passed.
Lecture	REQ_1400	4 out of 7 test cases passed. Failed test case: - Privileged Staff shall not be able to update the information of a lecture conducted in the past. (REQ_1403) - The student can view a lecture class and the information he/she has participated in currently or in the past. (REQ_1406) - The parent/guardian/staff can view a lecture class and the information that his/her supervised child has participated in currently or in the past. (REQ_1407)
Class program involvement	REQ_1500	All 6 test cases are not implemented.
Learning Resource	REQ_1600	All 11 test cases are not implemented.

Exam structure and exam result management	REQ_1700 REQ_1800	5 out of 10 test cases passed and other 5 test cases associated with REQ_1800 are not implemented.

Table 7: (Continued)

Document	REQ_1900	All 3 test cases are not implemented.
Job application	REQ_2000	7 out of 7 test cases passed.
Enrollment application	REQ_2100	6 out of 6 test cases passed.
Day-off application	REQ_2200	All 3 test cases are not implemented.
Feedback	REQ_2300	All 3 test cases are not implemented.

4.7 User Acceptance Testing Result

The user acceptance testing was conducted online using Google Form as the electronic form to collect the feedbacks and perspectives from the selected group of users. The user group that participates in this process is the staff in any branch. The upper management of Bright Kids are a part of this user group and some of them will participate in this survey. There are a total of 15 staff who took the user acceptance test via the survey form.

Table 8 shows that the user acceptance test result of Section A User Interface. The questions related to the font, background, UI and content responsiveness, icon, language and more. Most of the respondents agree that the user interfaces are comfortable to them. Table 9 shows the user acceptance test result related to the functionality and non-functionality requirements.

Table 8: User acceptance test result of Section A User Interface

Question	1 (Strongly Disagree)	2 (Disagree)	3 (Neither/ Nor Disagree)	4 (Agree)	5 (Strongly Agree)	Mean
The font family chosen is suitable for UI.	1	3	1	2	8	3.87
The font size of UI is comfortable to read, and no extra text enlargement is required.	1	2	1	2	9	4.07
The background colour is not distracting and eye friendly.	1	2	1	6	5	3.80
The UI is supported on the PC and mobile devices.	0	3	2	4	6	3.87
The contents are well organized and easy to distinguish.	0	3	1	5	6	3.93
The contents are flexible and responsive to the width and height of the devices.	0	2	1	2	10	4.33
The UI is easy to learn and requires low effort of learning and adaptability.	0	1	0	1	13	4.73
The UI is effective to use and supportive to the daily operation of the target users.	0	1	3	5	6	4.07
The icons chosen for the actions are suitable and easy to understand.	1	1	1	4	8	4.13
The instructions in the UI are easy to understand and described precisely.	0	1	1	6	7	4.27
The language used in UI is appropriate and inoffensive to anyone.	0	0	1	3	11	4.67
The language is free from vulgar or inappropriate words.	0	0	1	3	11	4.67

Most of respondents satisfy with all statements in the Section A. Some UI elements such as font, background colour, UI responsiveness and content organization are nearly accomplished 4 out of 5.

Table 9: User acceptance test result of Section B Functionalities

Question	1 (Strongly Disagree)	2 (Disagree)	3 (Neither/ Nor Disagree)	4 (Agree)	5 (Strongly Agree)	Mean
The system provides a complete set of functionalities and features.	1	2	6	2	4	3.40
The system functions are easy to use, and no additional training or guidance is required.	1	1	1	5	7	4.07
The system functions are supportive to meet the daily operations of target users.	0	0	2	5	8	4.40
The system functions are accessible and always available when needed.	0	0	3	5	7	4.27
No extra installation of the external software or hardware are needed.	0	0	0	4	11	4.73
The system facilitates the instant sharing and access of information.	0	1	2	2	10	4.40
The system functions provide timely supports and assistances to the target user.	0	2	3	5	6	4.20
The system functions have met your demands and expectations in term of functionality.	0	2	3	4	6	3.93
The system can accomplish the tasks demanded by the target users. The system functions have met the performance and reliability requirements.	0	0	3	3	9	4.40
The system functions have met the performance and reliability requirements.	0	1	2	5	7	4.20

Based on Table 9, many respondents (6) have no opinion that the system provides a complete set of functionalities and features while the number of respondents agree with this statement (6) doubled the number of respondents disagree. One-third of respondents did not agree that the statement 10 “The system functions have met your demands and expectations in term of functionality”. 3 respondents from them neither agree nor disagree with the statement. In the end of user acceptance test, the enhanced and expansion of the system is necessary to improve the degree of expectation for the developed system.

6. Conclusion

Bright Kids is an education franchise that has adapted a manual approach to store and manage the records in each branch. This project aims to design the user requirements specification for the proposed system, develop a web-based system to solve the issues related to the management, storage, and sharing of the records, and test the user acceptance and functionality of the system. In the future, the researcher will build up the functionality and interface to fulfil the requirements specified in SRS and the design in DFD and ERD.

The main advantage of this system is the user can access the system from anywhere and anytime if they have an active Internet connection and have received the authorized accounts from accounts from

any branch in the franchise. Next, sharing of records amongst the branches reduces the duplication and redundancy of the user records to allow the record always up to date. The content transmissions between the server and clients are encrypted by HTTPS (Hypertext Transfer Protocol: Secure). Furthermore, the system requires fewer system resources to run as the system implements a limited number of client-side verification. Moreover, the data inputted by the users are checked at the server-side against the regular expression rule after the users submit the form. Any invalid input will be checked before further processing in other functions or saving in the database.

However, the major concern of this system is the lack of consideration of advanced security requirements in the system design. The system can be vulnerable to any potential risks or threats that would cause fatal system security vulnerabilities on the system or data. Next, no stronger and advanced security mechanism was implemented to encrypt the data or information passed between the server and clients. The middlemen could capture the information during the transaction and modify or destroy the information before the clients receive the messages. Furthermore, most of the data verification works are conducted on the server side, including the regular expression checks on each input. Moreover, sharing the same database connection can cause the normal users to provoke the privilege right and made the modification that is limited to the privileged users only.

The first recommendation of this system is to re-consider the security requirements during the planning and analysis phase to adhere to the privacy acts and laws in the nation, between nations, or across different continents. The data or information shall be encrypted using a cryptographic or encryption algorithm. More security measures like DDNS protection, firewall, secure sockets layer (SSL), intrusion detection and prevention system (IDPs), access control systems, and multi-factor authentication can be implemented to improve the security of the system.

Appendix A (Context diagram, Use case diagram and Class diagram)

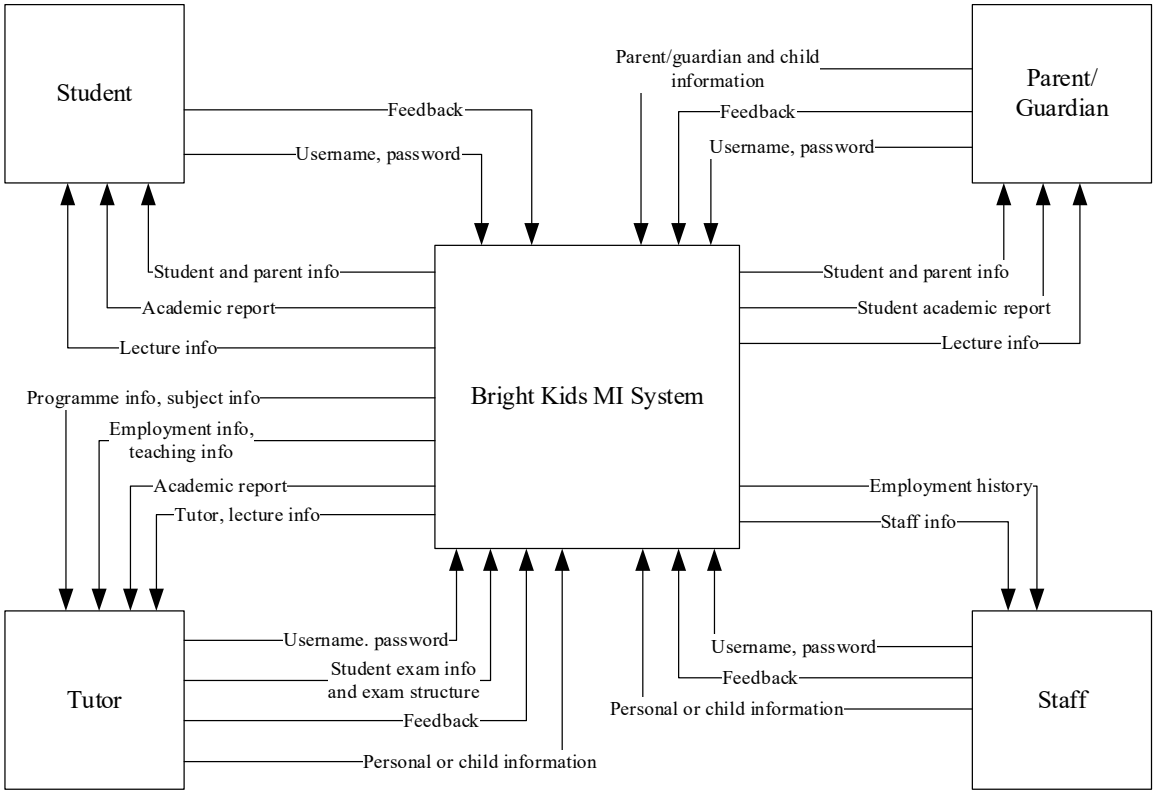

Figure 3: The context diagram for the Bright Kids Tuition Centre Management Information System

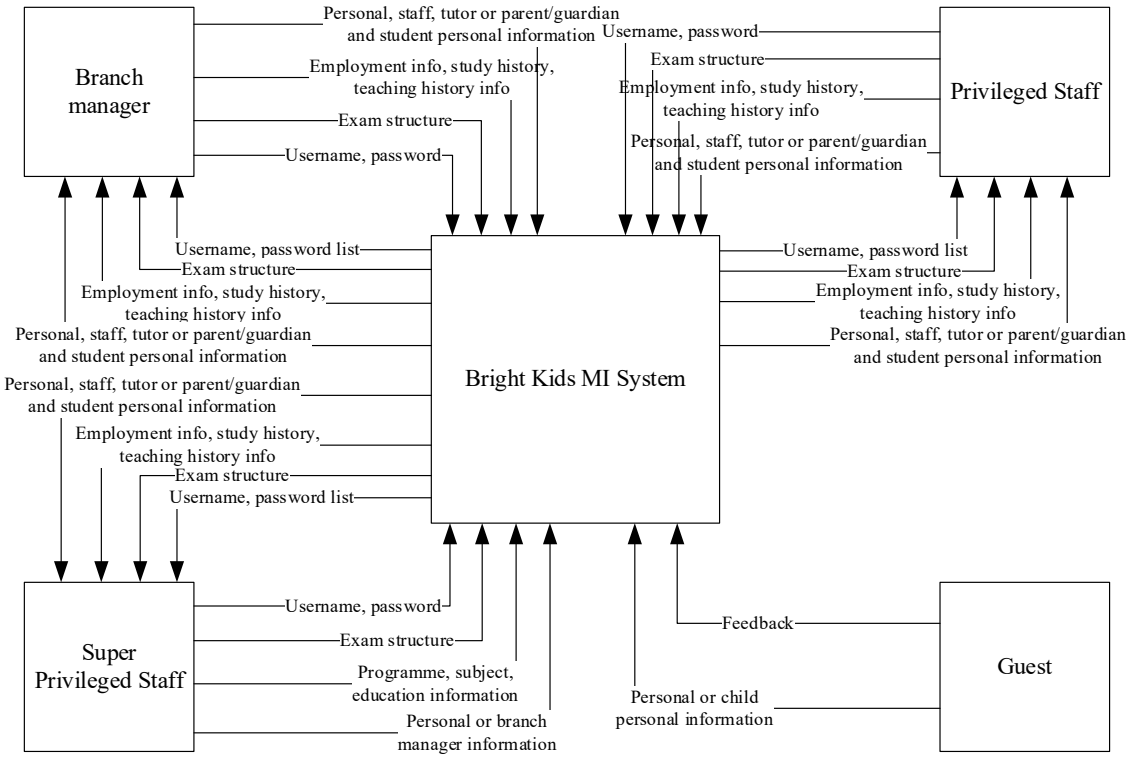

Figure 3: The context diagram for the Bright Kids Tuition Centre Management Information System (Continued)

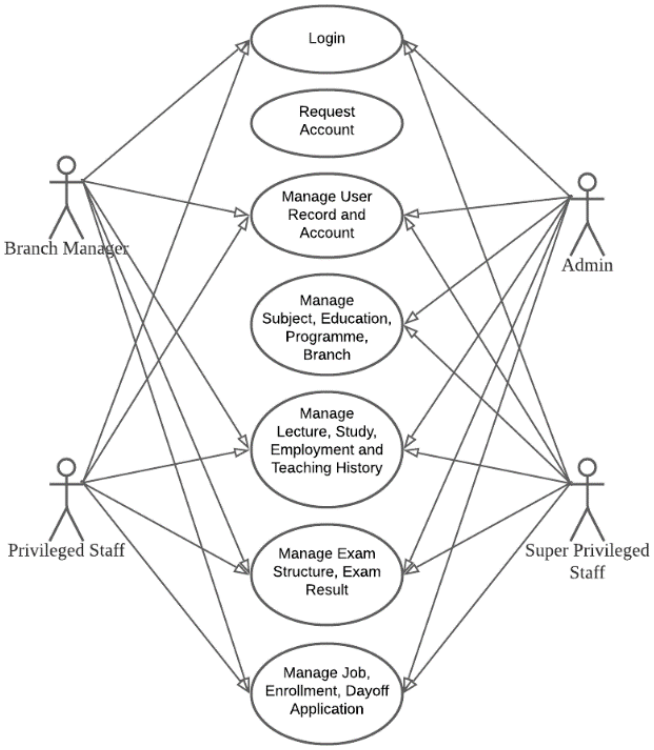

Figure 4: The use case diagram for the Bright Kids Tuition Centre Management Information System

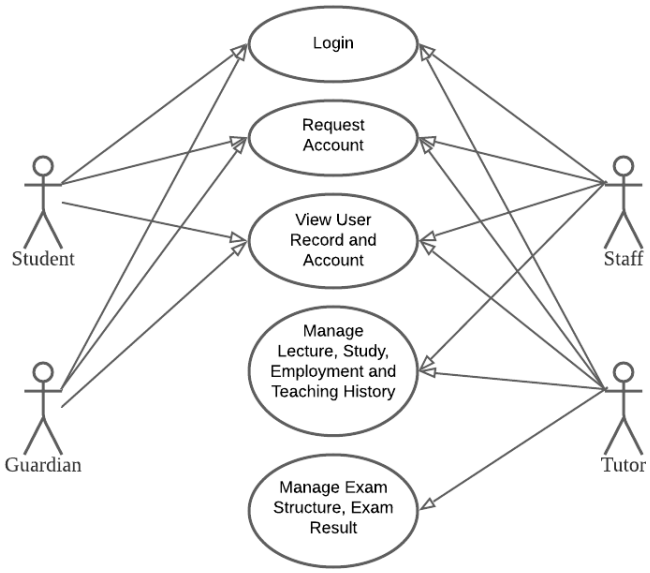

Figure 4: The use case diagram for the Bright Kids Tuition Centre Management Information System (Continued)

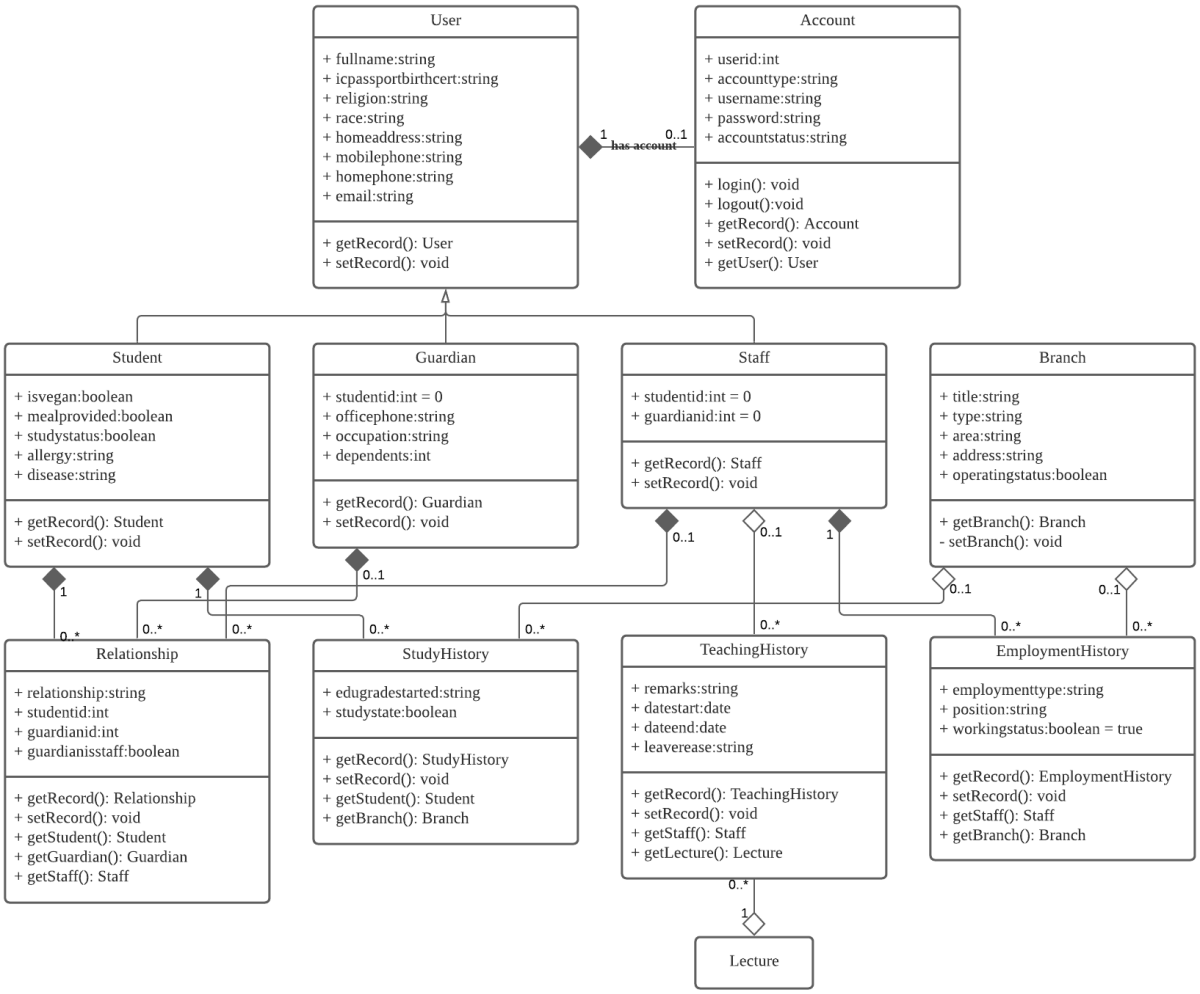

Figure 5: The class diagram for Bright Kids Tuition Centre Management Information System

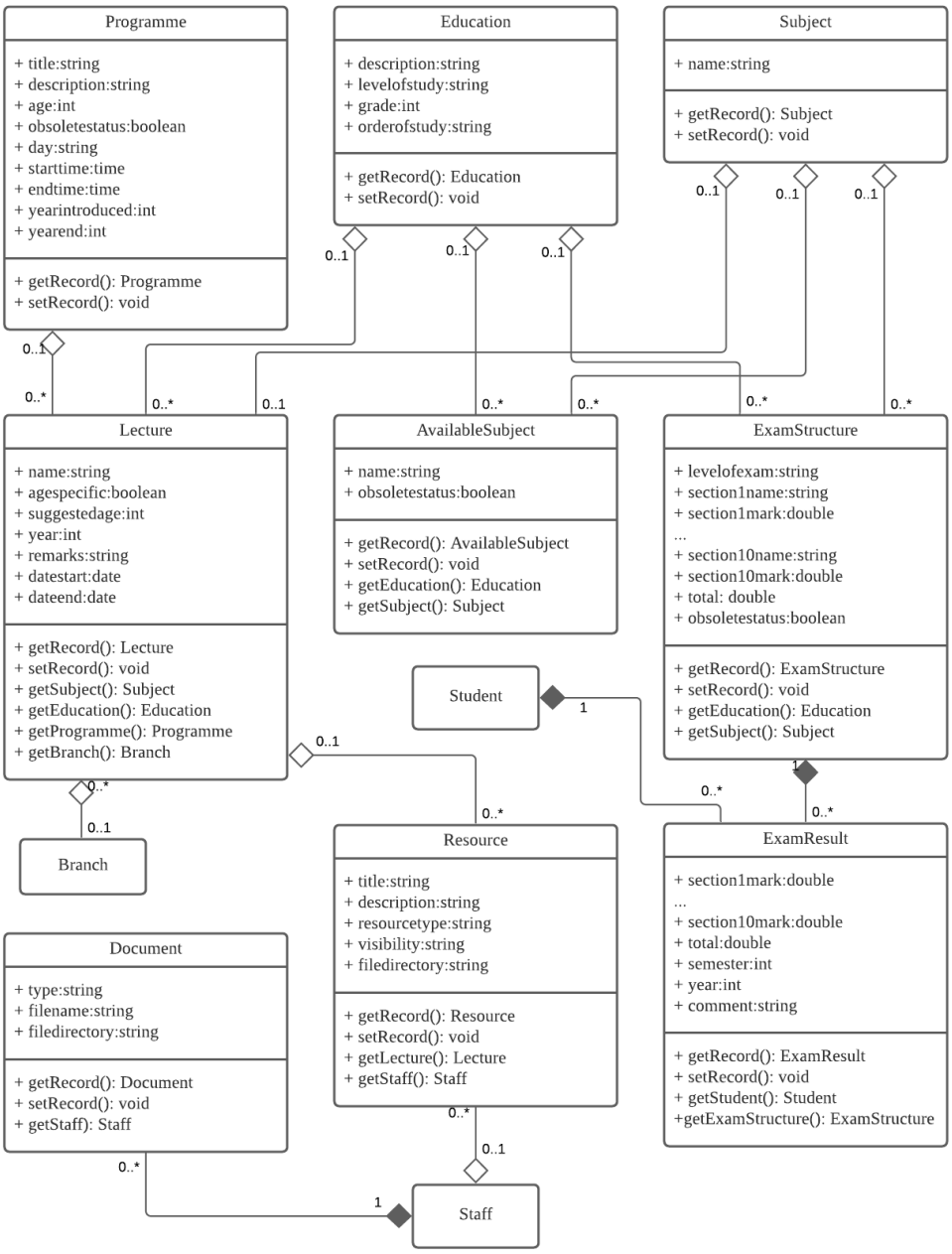

Figure 5: The class diagram for Bright Kids Tuition Centre Management Information System (Continued)

Appendix B (The user interfaces of the system)

Figure 6: The interface of main page of the system

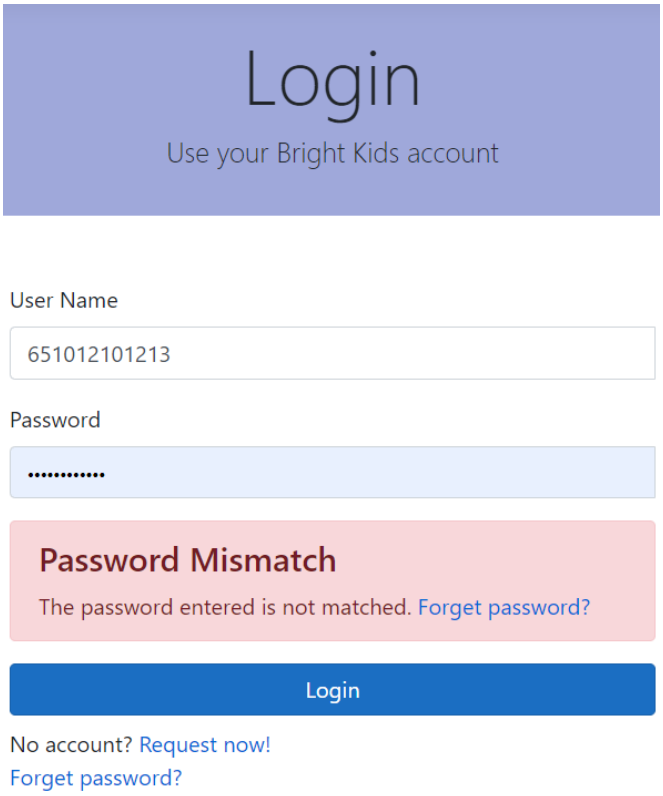

Figure 7: The interface of login page with error message

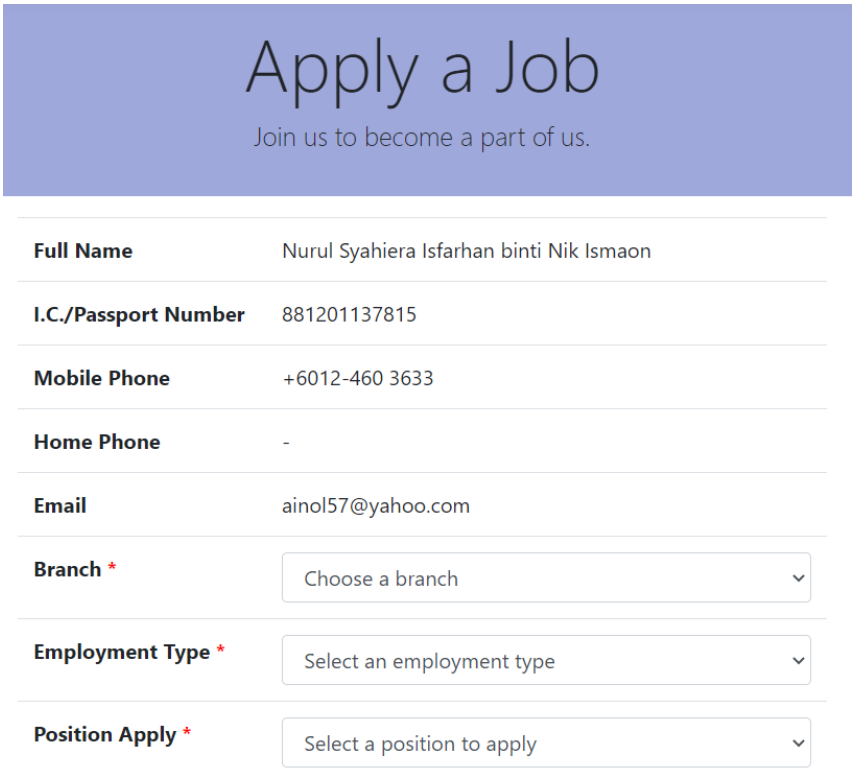

Figure 8: The interface of job application form with existing user record

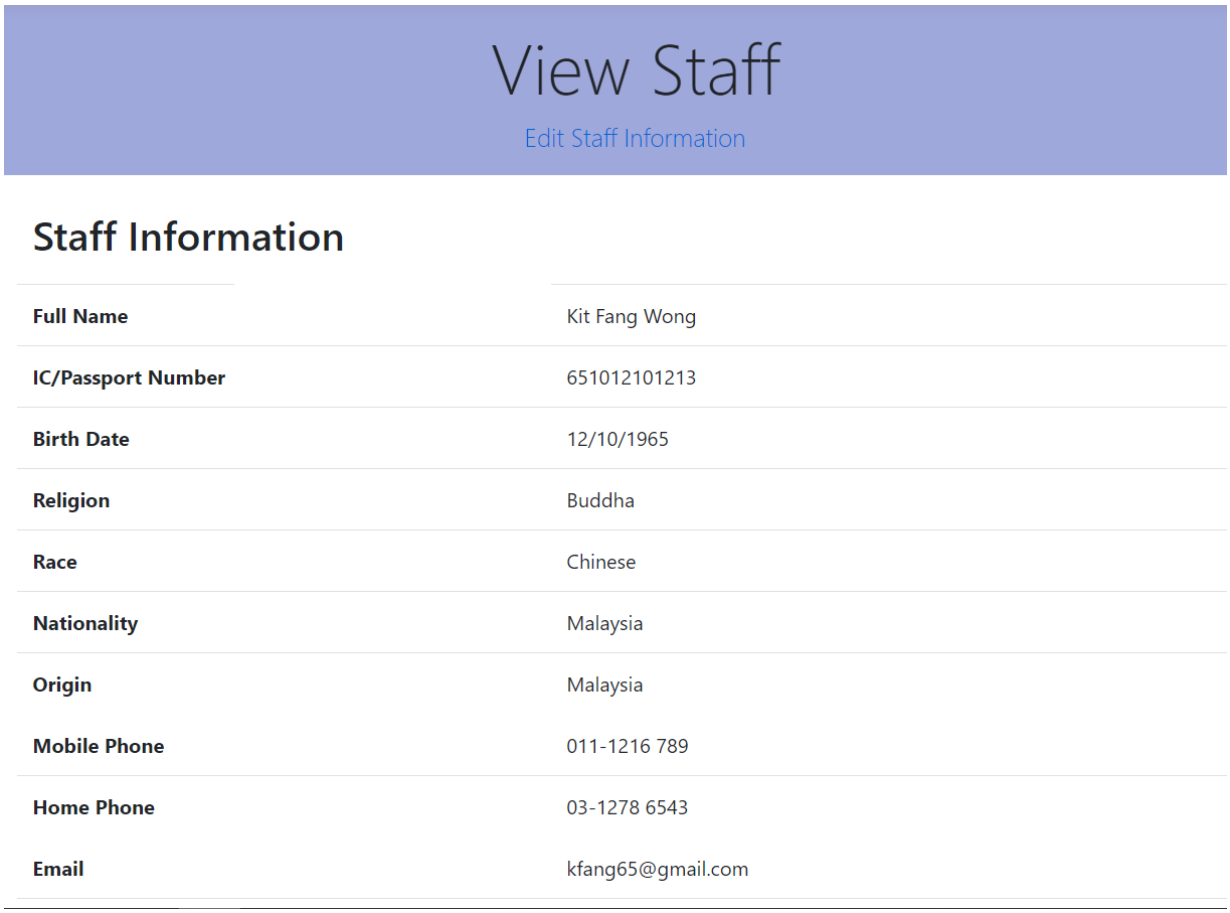

Figure 9: The interface of staff record

Employment History

Branch	Emp. Type	Position	Work. St.	Emp. Start	Emp. End	Action
Bright Kids Desa Jaya	Full Time	Principal	True	24/06/2008	-	

Click here to add an **Employment History** record.

Teaching History

Branch	Lecture	Subject	E. Grade	Work. St.	Start	End	Action
Bright Kids Desa Jaya	Pre 1 Chinese A	Chinese	Pre 1	PENDING TO ADD	01/03/2021	-	View More
Bright Kids Desa Jaya	UNDEFINED LECTURE NAME	UNDEFINED	UNDEFINED	PENDING TO ADD	14/05/2021	-	View More
Bright Kids Desa Jaya	2021 Super ESP	UNDEFINED	UNDEFINED	PENDING TO ADD	16/05/2021	-	View More

Click here to add a **Teaching History** record or create a new **Lecture** record with this employee.

Edit Delete Back to List

Figure 9 (Continued): Employment and teaching history of a staff

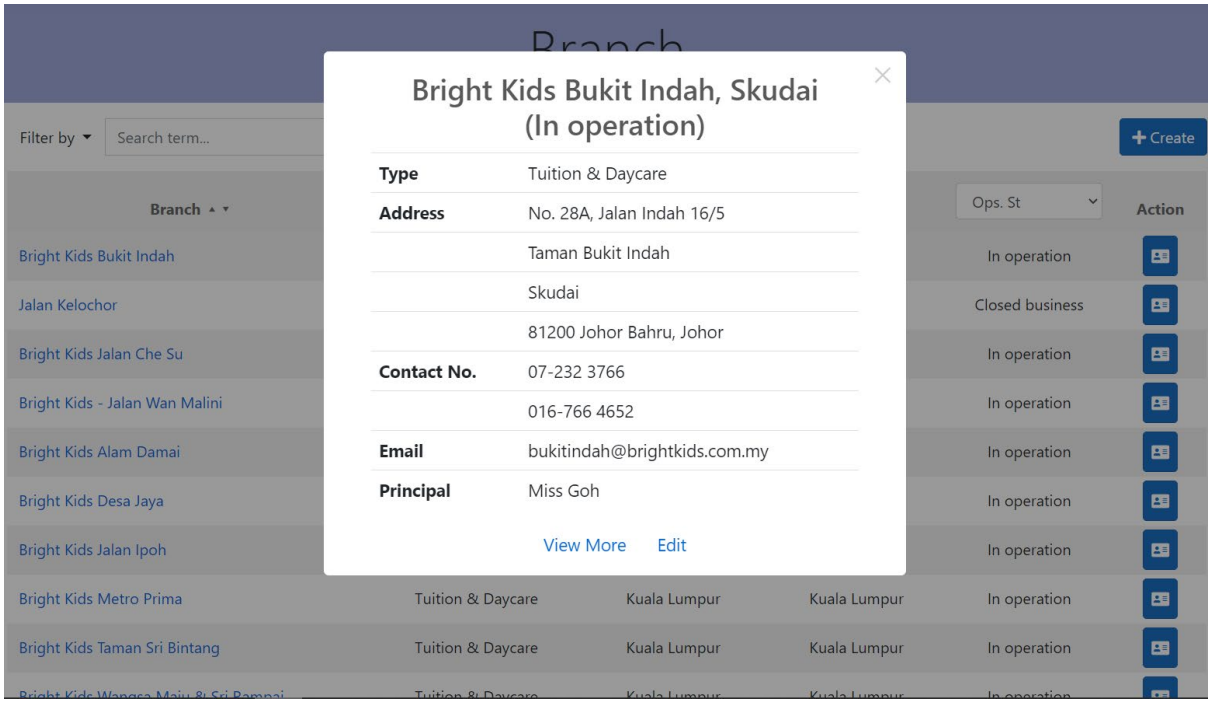

Figure 10: Preview of branch record

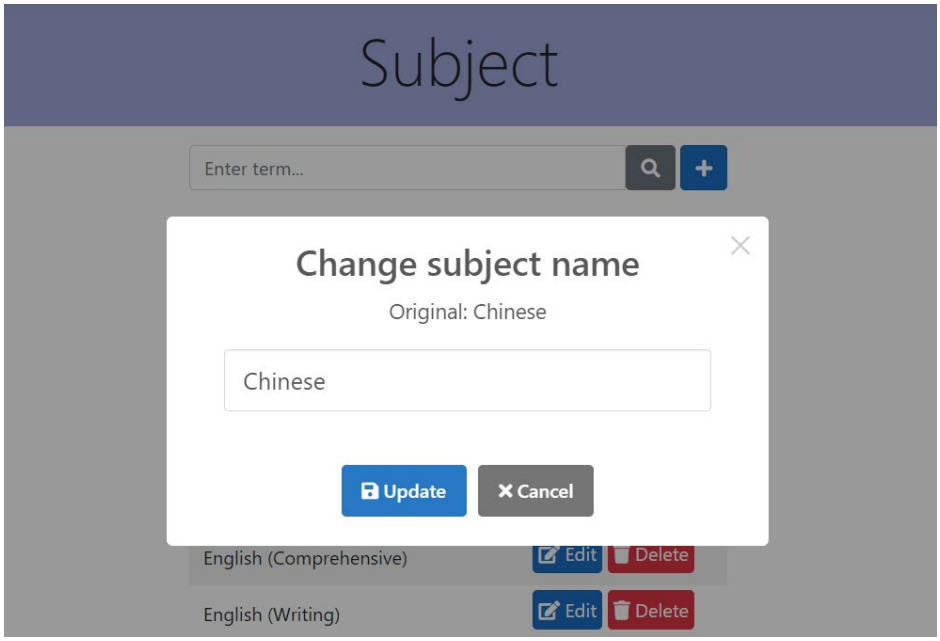

Figure 11: The interface of modal box using Sweetalert2

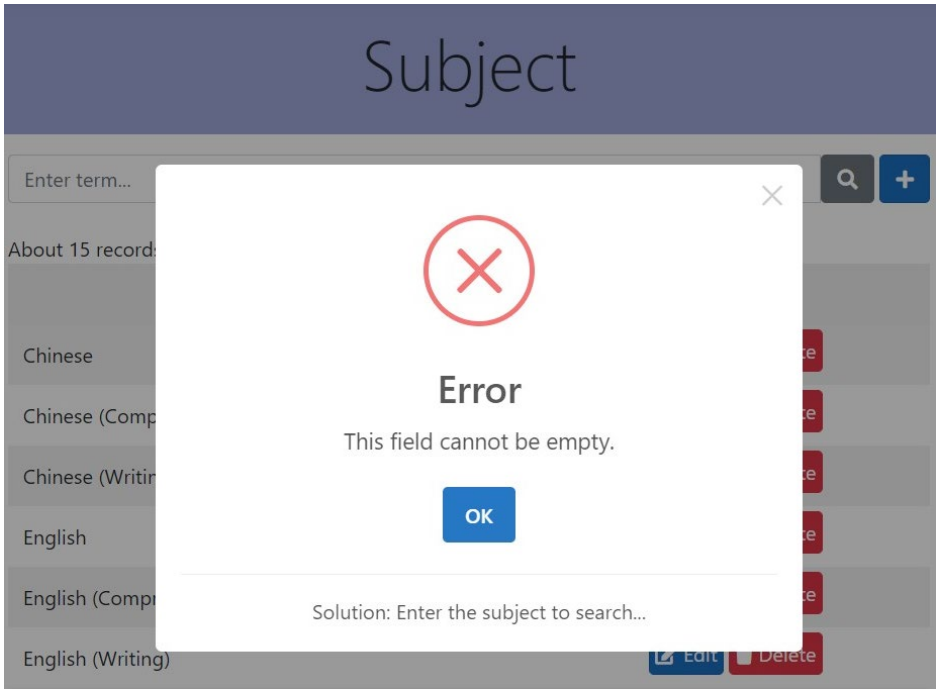

Figure 12: The interface of warning modal box using Sweetalert2

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