**Authentic Education**

**Tuition Centre Application**

By

Phang Wai Hong

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FACULTY OF COMPUTING AND

INFORMATION TECHNOLOGY

TUNKU ABDUL RAHMAN UNIVERSITY COLLEGE

KUALA LUMPUR

ACADEMIC YEAR

2021/22

Authentic Education

Tuition Centre Application

By

Phang Wai Hong

Supervisor: Ms. Ashvini Devi A/P Krishnan

A project report submitted to the

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in partial fulfilment of the requirement for the

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**Department of Software Engineering and Technology**

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Kuala Lumpur

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# Declaration

The project submitted herewith is a result of my own efforts in totality and in every aspect of the project works. All information that has been obtained from other sources has been fully acknowledged I understand that any plagiarism, cheating or collusion or any sorts constitutes a breach of TAR University College rules and regulations and would be subjected to disciplinary actions.

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Bachelor of Computer Science (Honours) in Software Engineering

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# Abstract

***Purpose***: The main purpose of carrying out this project is to develop an application of a tuition centre system which included web-based and mobile versions for Authentic Education Tuition Centre. By using this application, can get a convenient and comfortable environment, save time and cost, improve security and work efficiency of tutors.

***Scope***: In this project, the system will be divided into 3 user roles which are admin, tutor and student. For the admin role, it includes 3 main modules and 8 sub-modules. The tutor role includes 4 main modules and 6 sub-modules. Whereas the student role includes 4 main modules and a total 8 sub-modules.

***Methodology***: Visual Studio and Visual Studio Code will be the main software for developing this system. C#, ASP.NET, HTML, CSS, JavaScript will be the main programming languages used for the development of this project. By using only web languages, PWA technique will be used to develop the mobile application. Other than that, we will also include client data inside the application which will use the database. For the database, Firebase will be used to store the data of the clients’ and users’ information at the server.

***Assessment Criteria***: Since this system is developed for 2 different platforms which are web application and mobile application, it can computerize the tuition centre’s work more efficiently and effectively. This application will allow tutors and students to do all the tasks and get information without using third party applications.

***Development phase***: The phases applied during the development of the system includes System Planning, Requirement Analysis, System Design, Programming and Software Testing.

***Result***: The whole system had successfully developed according to me and our client's expectations. All the modules can function properly and well on the performance also.

# Acknowledgement

In this project there are many people who have contributed directly and indirectly to the entire project. First of all, my supervisor, Ms. Ashvini Devi facilitated and helped us a lot in giving us guidance and advice on certain issues regarding the project. During the progress of this project, we faced a lot of challenges and technical difficulties. Therefore, we have to do self-learning and seek help when we face any problems from social media (E.g., Stack Overflow, YouTube). They provided a lot of different types of solutions there and it helped us a lot.

Besides, Tang Xiao Zu, who was my partner, provided a lot of help for me in any aspect and gave me a lot of support in the earlier stage of this project. I would also like to thank my course-mate, friends in or outside TAR College who provided a lot of ideas and helped us to complete our survey of this project.

Last but not least, I had to thank Mr. Goh Chin Keong and his tuition centre team for giving us a chance to develop the application for their tuition centre and providing a lot of information and ideas during the development of this project.

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Chapter 1

# Introduction

## 1.1 Objectives

* Showcase what we have learned throughout the course. This FYP project lets us have the opportunity to present what we have learned throughout the course such as programming and documentation skills.
* Understanding user’s or client’s needs and expectations. Well understanding of users' or clients’ requirements is a main point of doing this project and it can reduce the redundant function in the application.
* Improved users’ satisfaction. Good rating and review of our project can attract and be recommended to other people to increase our job opportunity.

## 1.2 Background

In Malaysia, the tuition centre has been one of the most focused places for student’s to improve their study ability rather than just in school. In other words, tuition centres can provide a better study environment for students because they have fewer students compared to school teachers and can focus more on their student’s academic performance. According to studies, students said that teachers at tuition centres keep in touch with their subjects with good regular practice, highly qualified and experienced training (Sahito et al., 2017). Based on our survey (Appendix A), we found that over 86.1% of students prefer to have a mobile application to support the tuition centre. From the same survey, it shows that a software or an application can improve their work efficiency if there is an application to remind them of the task. But after we did a lot of research, there are not many tuition centres that have their own application for students to use. Thus, it gives us an idea to create a mobile application for a tuition centre and let their students use it to improve their study environment. Besides, this application is able to let users do anything remotely such as payment online, submit homework through the application. It will convince the users and save time and cost. Most of the third-party applications for education are required to pay; else it will be incompatible if using multiple applications. Therefore, an idea came to me to make an application that included multiple functions which get the idea from other applications such as Google Classroom, Calendar, TARC app etc.

## 1.3 Advantages

By developing the mobile application system for this tuition centre, a few objectives are being included and stated as below:

### 1.3.1 Improve Security

In this mobile application system, a security function is being implemented in order to control the accessibility of every user. To increase the security level, it’s provided 3 different biometrics settings for users to setup which are password, fingerprint and face recognition. The reason is to ensure the users’ data will not be leaked out such as the payment information.

### 1.3.2 Convenience and comfortable environment

By using this application, students and parents can also get all the information from their smartphone instead of going to the tuition centre and asking from the counter. This system will provide the task or homework list in the application and able to notify students or parents to make sure they would not miss out to finish the task. Besides, they can get the timetable and the course information in this application also instead of recording down on paper and they can get all this information anytime and anywhere.

### 1.3.3 Cost saving

Within this application, the cost of paper and stationary spent can be avoided. By using this application, students can work on and submit their homework and examination questions directly instead of hand in one-by-one physically. For tutors, this application can assist them to do the calculation for the tuition centre. This could prevent the tuition centre from losing money as human mistakes can be avoided.

### 1.3.4 Time saving

The time cost can be reduced while making payment. This system is able to let students and parents make payment online and they do not need to spend time coming to the tuition centre to make payment physically. This proposed application is able to assist the staff of the tuition centre to do all processing and keep track of the transactions and student’s data in a shorter time compared to the previous paper-based system. Sometimes, there will be a lot of students paying the tuition fee at the same time, the staff of the tuition centre will have to receive the payment from them physically and remember who has paid and who has not. This would be very time consuming as the staff need to collect the tuition fee one by one, and the other students have to wait in a long queue. For the scheduling process, the system itself will let the staff know whether a certain day is being taken if the staff wants to have class on that certain day

### 1.3.5 Attendance Secured

Although parents have sent their children to the tuition centre, the class skip will still happen frequently due to parents not being able to track back their attendance status on time. Thus, students’ attendance can be tracked easily by using this application. Parents are able to log into the application and get to know their children’s attendance record and information.

### 1.3.6 Improve Performance

With the help of the application, the working system of the tuition centre can become more systematic and the staff can complete their tasks more efficiently. The system includes a generate report function, so with just a few clicks, all the data that the staff need will be retrieved easily from the database inside the system. This can prevent unnecessary procedures and reduce human errors. With this, the staff can increase productivity by handling several tasks in a short period of time using this system.

## 1.4 Project Plan

### 1.4.1 Project Scope

#### 1.4.1.1 Admin

Diagram

Description automatically generated

Figure 1.1: Module Chart (Admin)

|  |  |  |
| --- | --- | --- |
| Module/ Sub-module | | Functional Requirement |
| User | Registration | This module allows the admin to create a new user for every new student and staff joining the tuition centre. Every newly created user's data will be stored in the database. |
| Student Management | This module allows the admin to perform CRUD such as add, delete, edit and display the students record. |
| Staff Management | This module allows the admin to perform CRUD such as add, delete, edit and display the staff record. |
| Report | Student Fees | This module allows the admin to generate the total student fees by month or by year |
| Staff Salary | This module allows the admin to generate the total staff salary by month or by year |
| Student’s Performance | This module allows the admin to generate student’s performance such as marks, attendance and others. |
| Academic Management | Subject | This module allows the admin to perform CRUD on the subject for the tuition centre. |
| Timetable | This module allows the admin to create a fixed timetable beforehand for the tutor to select the time to conduct the class for students. |

#### 1.4.1.2 Staff

Diagram

Description automatically generated

Figure 1.2: Module Chart (Staff)

|  |  |  |
| --- | --- | --- |
| Module/ Sub-module | | Functional Requirement |
| User | Login/ Logout | This module allows the staff to perform login to their own account and logout from their account. |
| Profile | This module allows the staff to manage their profile such as, email address and phone number. |
| Scheduling | Timetable | This module allows the staff to choose a timetable set by the admin for their own class. As there will be a few fixed time slots provided for the tutor to choose. |
| Classroom | Announcement | This module allows the staff to make any important announcement so that they can let the students know without calling them one by one. |
| Student Management | Attendance | This module allows the staff to mark and keep track of the attendance of every student in every class during the class starts. Students who are absent in the class will also be recorded down. |
| Marks | This module allows the staff to note down every student's academic mark such as their exam marks, homework marks and others. This allows the tutor to keep track of the student’s mark so they can know which student needs more help in their studies. |

#### 1.4.1.2 Student

Diagram

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Figure 1.3: Module Chart (Student)

|  |  |  |
| --- | --- | --- |
| Module | | Functional Requirement |
| Main | Sub-module |
| User | Login/Logout | This module allows users to login their account created by admin. Users have to login to their account then only can access the function of the mobile application. |
| Profile | This module allows users to manage their own account and logout from their account. |
| Academic | Attendance | This module allows students to register their attendance so their parents can make sure their children are attending the tuition class. |
| Timetable | This module allows students to get their registered tuition class time slot. |
| Task | This module allows students to get notifications about the task or homework assigned by their tutors. It will remind them about their tasks to make sure students would not miss or forget it. |
| Examination | This module allows students to get the examination schedule and results. This allows students and their parents to track back their exam results. |
| Payment | Tuition Fee | This module allows students and parents to do payment online instead of face-to-face physical payment. The tuition fee will be based on the tuition class they registered, and it will notify students and parents monthly. |
| Classroom | Announcement | This module allows students to get important announcements posted by tutors. |

1.4.2 Development Environment

|  |  |  |
| --- | --- | --- |
| Software Requirement | Icon  Description automatically generated | Android Studio |
| A picture containing text, monitor, screen, electronics  Description automatically generated | Windows 10 or later |
| Icon  Description automatically generated | Android version 9.0 or later |
| Logo  Description automatically generated | MySQL |
| Icon  Description automatically generated | Android SDK 6.0+ |
| Icon  Description automatically generated | Visual Studio Code |
| A stack of white plates  Description automatically generated with medium confidence | SQLite |
| Icon  Description automatically generated | Google Chrome |
| Hardware | Shape  Description automatically generated with low confidence | Server |
| A picture containing white  Description automatically generated | Desktop or Laptop |
| A picture containing white  Description automatically generated | Mobile phone(Android) |
| Shape  Description automatically generated with low confidence | Router or Modem |
| Programming language | Logo  Description automatically generated | Java |
| Background pattern  Description automatically generated with medium confidence | Kotlin |
| Shape, icon  Description automatically generated | Flutter |
| Database Development tools | Logo  Description automatically generated | MySQL |

### 1.4.3 Project Schedule

|  |  |  |  |
| --- | --- | --- | --- |
| Task Name | Duration (Days) | Start Date | End Date |
| Project Proposal | 22 | 21-06-2021 | 12-07-2021 |
| Project Kick-off | 5 | 21-06-2021 | 25-06-2021 |
| Analysis and determine system issues | 5 | 26-06-2021 | 30-06-2021 |
| Discuss appropriate solutions | 9 | 01-07-2021 | 09-07-2021 |
| Prepare project proposal | 3 | 10-07-2021 | 12-07-2021 |
| Project I - Documentation | 54 | 13-07-2021 | 22-11-2021 |
| Chapter 1 - Introduction | 35 | 13-07-2021 | 16-08-2021 |
| Conduct project specification | 19 | 13-07-2021 | 31-07-2021 |
| Conduct research area | 11 | 01-08-2021 | 11-08-2021 |
| Complete documentation | 5 | 12-08-2021 | 16-08-2021 |
| Chapter 2 - Research Background | 14 | 17-08-2021 | 30-08-2021 |
| Identify theoretical consideration and literature review | 5 | 17-08-2021 | 21-08-2021 |
| Conduct feasibility study | 6 | 22-08-2021 | 27-08-2021 |
| Complete documentation | 3 | 28-08-2021 | 30-08-2021 |
| Chapter 3 - Methodology and Requirement Analysis | 14 | 31-08-2021 | 13-09-2021 |
| Identify research approaches | 6 | 31-08-2021 | 05-09-2021 |
| Determine development model | 5 | 06-09-2021 | 10-09-2021 |
| Complete documentation | 3 | 11-09-2021 | 13-09-2021 |
| Chapter 4 - System Design | 8 | 1-11-2021 | 08-11-2021 |
| Conduct system design specification | 3 | 01-08-2021 | 03-08-2021 |
| Design diagram | 3 | 04-08-2021 | 06-08-2021 |
| Complete documentation | 2 | 07-11-2021 | 08-11-2021 |
| Project 1 - Portfolio | 14 | 09-11-2021 | 22-11-2021 |
| Prepare portfolio | 9 | 09-11-2021 | 17-11-2021 |
| Submission of Project 1 portfolio | 5 | 18-11-2021 | 22-11-2021 |
| Project II - Coding | 53 | 23-11-2021 | 14-01-2022 |
| Chapter 5 - Testing and Results | 14 | 15-01-2022 | 28-01-2022 |
| Final Testing | 21 | 29-01-2022 | 18-02-2022 |
| Submission of Final Thesis | 38 | 19-02-2022 | 28-03-2022 |

## 1.5 Project Team & Organization

|  |  |  |  |
| --- | --- | --- | --- |
| Roles | Modules / Sub-modules | Phang Wai Hong | |
| Front-end | Back-end |
| Admin | User |  |  |
| Registration | X | X |
| Student Management | X | X |
| Tutor Management | X | X |
| Report |  |  |
| Student’s Fee | X | X |
| Staff Salary | X | X |
| Student’s Performance | X | X |
| Academic Management |  |  |
| Subject | X | X |
| Timetable | X | X |
| Staff | User |  |  |
| Login/ Logout | X | X |
| Profile | X | X |
| Scheduling |  |  |
| Timetable | X | X |
| Classroom |  |  |
| Announcement | X | X |
| Student Manager |  |  |
| Attendance | X | X |
| Marks | X | X |
| Student | User |  |  |
| Login/ Logout | X | X |
| Profile | X | X |
| Academic |  |  |
| Attendance | X | X |
| Timetable | X | X |
| Task | X | X |
| Examination | X | X |
| Payment |  |  |
| Tuition Fee | X | X |
| Classroom |  |  |
| Announcement | X | X |

## 1.6 Chapter Summary & Evaluation

After this chapter has been done, I have learned about the importance of system planning, which is that good planning and design of a project will increase the productivity and efficiency of a project. I understand what to include in the system and how to produce a better quality system and reduce the risk of system failure. In preparing this chapter, we faced some problems, which is a longer time spent in the project plan where we needed to decide on what function should be included in the application due to not much tuition centre application can be a reference to develop.

# Research Background and Related Work

Chapter 2

**Research Background**

**and**

**Related Work**

## 2.1 Company Background

The company chosen for our final year project is a tuition centre, which is Authentic Education Centre, and this tuition centre is located at Air Itam, Penang. The Authentic Education Centre was established in 2017. The object of the centre is not just about learning, but also hand in hand with parents on the path of children’s growth. In addition to attaching importance to the care and schoolwork of the children, the team of this centre also acts as a bridge for the children to communicate and coordinate with the school and parents and update the children's situation to the parents on time. Besides that, cultivate children's independent thinking ability, positive attitude towards life, rich creativity, good interpersonal relationships, etc.

The centre has set up a comfortable platform to provide various equipment: TV sets, game consoles, story books, sofas, various puzzle games and so on. The tuition centre has 24-hour CCTV surveillance, and all corners, including staircase entrances, can be monitored via mobile phones or the Internet. Currently, the employees in the centre are 4 Managers and 13 tutors. They have their own responsibilities for their own position. All the tutors hired are full of experience in the subject they taught.

The main service in the centre is teaching and giving revision for students based on school syllabus. The academic level provided primary which is Standard 1 to 6 and secondary which is Form 1 to 5. Where the subjects provided for primary such as Bahasa Malaysia, Bahasa Inggeris, Bahasa Cina, Mathematics and Science. Subjects for secondary are Bahasa Malaysia, Bahasa Inggeris, Bahasa Cina, Mathematics, Science, Sejarah, Geography, Chemistry, Physic, Biology, Mathematics, Additional Mathematics and Account. Besides tuition classes, this centre also provided other services such as Cambridge, Robotic, Karangan Class, Making Sentence Class etc.

Tuition fee is based on the number of subjects subscribed and it is monthly basic. This centre provides tuition packages for every level which means the package includes all compulsory subjects but students also can choose a single subject. The current working hours of this tuition centre are from Monday to Saturday from 7.30 am to 10.00 pm.

## 2.2 Literature Review

### 2.2.1 Introduction

An Integrated Development Environment (IDE) is a programming environment typically consisting of a code editor, a compiler, a debugger, and a graphical user interface (GUI) builder. The IDE may be a standalone application or may be included as part of one or more existing and compatible applications (Integrated Development Environment, 2005). Major innovation cycles over the 30-year history of IDEs have generally addressed improvements in performance as measured by the product’s ability to increase the productivity of programmers who use such tools (Integrated Development Environment, 2005).

#### 2.2.1.1 Android Studio

Android Studio is an IDE and designed for Android to accelerate users development and help users to build a quality application for Android’s devices. Android Studio offers a number of tools custom-tailored for android developers such as rich code editing, debugging, testing, and profiling tools.

Graphical user interface, text

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Figure 2.1: Android Studio home page (version 2020.3.1)

A screenshot of a computer

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Figure 2.2: Interface of Android Studio

##### 2.2.1.1.1 Advantage and features

As an Android developer, Android Studio is the best choice for them. Below are some advantages and features that Android Studio offer to developers: -

* Android Studio is available on many platforms such as Windows, Mac, Linux etc. Developers can develop their android applications with most of the operating system.
* For most of the IDE, if users restart the application it will restart or rebuild the project and it will take some time to load. Where Android Studio has an auto-save function feature and resource changes to running apps. This will increase the efficiency and effectiveness when developing applications .
* Android Studio also has a feature to allow users to use the virtual Android devices to display the output, called Android Virtual Device (AVD). AVD is able to simulate in the Android Emulator. The AVD manager is an interface that allows users to create and manage AVDs.
* Android Studio is also an intelligent code editor. The code editor helps you write better code, work faster, and be more productive by offering advanced code completion, refactoring, and code analysis. As you type, Android Studio provides suggestions in a dropdown list. Simply press Tab to insert the code.

##### 2.2.1.1.2 Android Developer

Android Developer is a website under Android. It provides a lot of services and guidelines to android developers. On this website, any information about Android can be obtained here. In this website, sample code and guidelines are provided for beginner Android developers. Therefore, this website is pretty useful for users to learn to develop Android apps.

##### 2.2.1.2 Visual Studio Code

Visual Studio Code (VS Code) is a free open source code editor for development in different programming languages. It is available on many platforms such as Windows, Linux, MacOs. By doing some setup, users can even use it on their mobile phone. VS Code is an editor under Microsoft.

##### 2.2.1.2.1 Features

As a programmer, we can do any programming compile in this IDE with some setup. For serious coding, developers often need to work with code as more than just text. VS Code includes built-in support for always-on IntelliSense code completion, richer semantic code understanding and navigation, and code refactoring (Documentation for Visual Studio Code, 2016). Users can install multiple extensions to improve their efficiency and effectiveness while developing.

VS Code also provided a function called “Command Palette to control Visual Studio Code by pressing “Ctrl + P”. Besides, users can run the command “Changed Language Mode” to make the VS Code recognize the programming language for almost all the programming languages. As mentioned above, Android Studio has a feature of instant run or auto save, VS Code also supports this feature. When users close the VS Code without saving, the VS Code will auto save the files (Documentation for Visual Studio Code, 2016).

##### 2.2.1.2.2 Environment

On install, Visual Studio Code is being added to the environment variable PATH so that users can start it from the console simply by typing code. This comes in handy, among other examples, when users need to open code created by other programs. Just typing code results in an empty VS Code editor launching, though. The following lists available parameters to the call. First of all, VS Code looks at any parameters as paths to files and folders. They are being opened in a new window of VS Code. Specifying multiple folders will result in multiple instances of VS Code. Users can include specific options before, within or after path parameters. To be able to launch Visual Studio Code from a console in Linux users will need to create a symbolic link from /usr/local/bin/code to the VS Code executable. Users can achieve this using the following command: “sudo ln -s /path/to/vscode/Code /usr/local/bin/code” (Documentation for Visual Studio Code, 2016).

##### 2.2.1.2.3 Git

When working with a Git repository, VS Code offers a neat way of comparing the version users are working on with the current one in the repository using Git Compare View. VS Code even shows code changes when simply editing a file that is under Git source control. At the left hand side of the editor, right between row numbers and code, users can find indicators for changed, deleted and new rows. Visual Studio Code makes use of the external program Git to track changes in a public Git directory. Sometimes users will face a view that’s not entirely up-to-date or even cluttered. To refresh a messy view, use the refresh icons located at the Git header or at the status bar. Having Visual Studio Code display changes in a file as compared to the current Git version opens a view which displays the changes side-by-side. But Visual Studio also offers a way to display all the changes in a single code window: Use the sub menu Switch to Inline View from the header’s “…” menu to get to the Git inline comparison (Documentation for Visual Studio Code, 2016).

### 2.2.2 User Interface

#### 2.2.2.1 Colour

Colours are very important to connect with the target user or even strengthen their trust. Studying colour psychology is a need to build a strong image of a brand. Appeal of colour is a cause of satisfaction and confidence across cultures. Higher level of trust in the particular website will lead to a higher level of loyalty. In a variety of cultures, colour appeal is a major cause of trust and pleasure of people (D. Cyr, M. Head, and H. Larios, 2010). It could be shown in a laboratory experiment that a higher level of trust on the website resulted in higher levels of e-loyalty (D. Cyr, 2008).

Research on human-computer communication has shown the impact of colour on interface design (Moshagen, M., & Thielsch, M. T. , 2010).There are many methods used to characterize colour space, such as hue, contrast, and saturation. Colourfulness is the degree of the various colours (Fedorovskaya, E. A., de Ridder, H., & Blommaert, F. J. , 1997). Colourfulness may clarify the initial reaction of a client to a website was found out by the research of Reinecke et al. Not just that, Apple has mentioned that icons with a vibrant texture should be designed to create an aesthetic experience for users (Byrne, M.D. , 1993). Icon design of an app is very important to attract the attention of users. To stand out and get much attention from among the other apps, high colourfulness is one of the methods.

There is a statement of Bargh, Shalev and Cuddy et al. state about “warm” individuals regarded as trustworthy, compassionate, polite and genuine while “cold” character regards to the opposite of “warm” which are egocentric, aggressive and untrustworthy. According to the research of Kim and Moon (J. Kim and J. Y. Moon, 1998), it was proved that trustworthiness may be affected by colours. Not just that, the authors also suggest applying cool colours rather than warm colours in the layout interface of the site of cyber banking. Meanwhile, the dominant colours in the layout have to be in low brightness colours and medium pastel but not high laminated hues because bright colours will bring the feel of untrustworthiness. Nonetheless, the favoured colours that represent a cheerful atmosphere should be in bright colours (W.Y.Wu, C.L. Lee, C.S.Fu, and H.C.Wang, 2013). Not just that, the overall atmosphere and the layout design will lead to a positive effect on peoples’ attitude towards a site and tends to affect the purchase decisions.The reason for this is because the atmosphere of a site will affect the emotions of people which also will direct renates to their attitude towards a site (W.Y.Wu, C.L. Lee, C.S.Fu, and H.C.Wang, 2013).

Besides, the choosing of colours also needs to depend on the colour abilities of humans. Designers can practice on empathy and view things from different perspectives through the process of designing for users with visual problems. According to the statistics from an online article, it is estimated that 4.5% of people in the world are facing the problem of colour blindness, 4% of the population have low vision and 0.6% of people are blind. There is not only one type of colour blindness in the world but it all is about the particular person and cannot differentiate between some of the certain colours. So, designers need to avoid colours as the only visual means of transmitting information.

#### 2.2.2.2 Typeface

Typography can be seen everywhere in human daily life. Typography is basically used for procut designs, newspapers, websites and so on. Different types of typeface will give different feelings to the people. For the interface design, font family, font size and contrast with the background are very important because it will affect the user experience. According to one of the statements of Erdogan (Erdogan, 2008), Times New Roman which is a serif font is the best font to use for printing pages since it is easy for people to read. Although serif fonts are good to read on printing materials, but, it is not suitable to read on a screen because the font is too tiny and the stroke is also thin and the words are hard to read on a screen. Sans- serif fonts such as Verdana and Arial are easier to read from a screen (Erdogan 2008, 73; Ivory 2003,193). Selecting on typeface is very important to communicate with people. Font that is easy to read should be used. For example, the font that is used for Apple iOS is San Francisco font and Android is Roboto (Nick Babich, 2018).

Logo

Description automatically generated

Figure 2.3: Font types

To make sure the words are easy to read, most of the fonts for the websites are in black colour on a light background because the type is about contrast. According to the statement of Nelson, the ideal average font size for san-serif fonts is 12 points (Nielsen & Tahir 2002, 51). A statement about “Typography design is a dynamic contrast device” stated in the research of Kahn & Lenk (Kahn & Lenk, 1998). The contrast between typeface and background can make the words readable by people's eyes. An old German expression exists: "Typography is the practice of revealing whiteness by using black." To transfer or communicate information, people place black ink on white paper. When people look at the page, they will assume they are reading black type but the truth is because of the whiteness exposed below it. To make sure the words are readable, designers must avoid using all caps because it is heavy for users to read. Not just that, limiting the length of text lines and adding space between text will also enhance the user experience on reading the content (Nick Babich, 2018).

Besides, there is research about the use of typeface to improve the positive effects of a product and even a company. There were two researchers who did research about the typeface affecting the impression of users. People believe design and typeface are the important elements in marketing something (Henderson et al. 2004, 60). A researcher called Henderson et al. (2004) stated a statement about the importance of finding out the responses and impressions caused by typeface such as user browsing behaviour, attitudes of brands, retention of customers, purchasing behaviour of customers and also business identity. Not just that, the researcher listed the need to describe impression variables as dimensions for further study, including: pleasant / displeasing, enjoyed, hot and desirable, reassuring / unsettling, cool, formal, truthful, common, frustration packing, creative, prominent / subtle, powerful and masculine. Kahn and Lenk (1998, 15) also investigated typography principles for the design of user interface. They believed the main things to consider in user interface are the colours, rhythm, form and the typeface which have relation to the background (Kahn & Lenk 1998,15).

### 2.2.3 Image Processing

Image processing is an image analysis system that obtains digital image through sensors or thermal wavelengths. It provides visual information to the robots, which act as the brain and eyes of human beings when we inspect the surroundings around us. The first step of image processing is to ‘see’. In this case, the robots use cameras, sensors, or other equipment to capture the two-dimensional signals from its surroundings. Next, the images received might be degraded by noise. Therefore, a filter is required to filter out the noises and enhance the quality of the image. After the filtering process, segmentation is a process that divides the image into numbers of regions. Segmentation is one of the major processes in image processing in which the entities of interest are extracted from the image. For example, an aerial image is taken with land and ocean. Segmentation process will separate ocean and land into appropriate segments, therefore the object on the land part can be easily classified on the next process. The next process is the features extraction process. Unlike segmentation, feature extraction only extracts meaningful information from the segmented images. Finally, the last step is to classify all the extracted features into different classes. Based on the sample mentioned above, ships or small boats might appear on the ocean image, hence the expert system will detect the appearance of these objects and the robot will obtain the information on the image. (Acharya, T., 2006).

Diagram

Description automatically generated

Figure 2.4: Image retrieval system

## 2.3 Chapter Summary & Evaluation

There are many reasons why people choose to trust or do not trust on a mobile application. People nowadays are more concerned about privacy. So, the privacy and security factors need to be considered when designing a mobile application. Instead of the security issue, people also will be affected by online reviews. Normally, people will check the experience from another person before they make the decision. For this application, reviews might be important because users can view the comments to help them make decisions. According to some researchers, people from different backgrounds will have different levels of trust. For example, younger people believe more in online stuff compared to elderly. Meanwhile, women have a higher level of trust in something compared to men. Next, trust on a mobile application can be affected by the design itself. First impressions are very important. If the interface of a mobile application looks suspicious, people might not continue to use it especially when it relates to the money issue. For mobile applications, icon design is important because an attractive icon will make the mobile application stand out from others. Design factors will affect the trust of users. According to the research, blue is the ideal colour to bring out the meaning of trust. Not just the colour, the structure design is also very important because it will affect the user experience. If users have a bad experience when using a mobile application, they will end up will stop using or uninstall the apps. For the typeface, sans-serif fonts are suitable to be used for the user interface of mobile applications and the words must have contrast with the background. Besides, the font size also needs to be considered because it has relation to the user experience. Usability of a mobile app is the key to make users continue to use the apps. Design based on user experience is a need. So, the trust of users might be influenced by the interface design because a good interface design will show the professionality of a mobile application. A professional looking interface will give a good impression for the users and tends to trust it. In order to make users trust more on the mobile application, the authority will also help on it because people tend to believe the things that might help them in making judgements.

Chapter 3

**Methodology**

**and**

**Requirements Analysis**

# Methodology and Requirements Analysis

## 3.1 Methodology

Incremental model is a method of software development and it is a modified version of the traditional waterfall model. This huge system can be subdivided into smaller components, so the main functionality can be delivered at first, then implement other functionality at next iterations until the system development is completed. In this situation, there will be a repetition of these processes (analysis, design, code and test) in each of the increments. Example, when the requirements are well defined then will start the analysis, design and test phases to deliver the software as first release and repeat the 4 phases to add function to the previous release as second release until all the requirements have been implemented. In figure 3.1 is shown how the incremental model diagram works.

Graphical user interface, application

Description automatically generated

Figure 3.1: Incremental Model (Incremental Model in SDLC, 2021)

The reason to develop with an increment model is because the software is developed based on the requirement priority. It can reduce the risk and focus more on the main functionality first rather than develop all at once. If you develop all the functionality at once and the errors come from many modules then it will consume a lot of time to solve each error and confusion about the source of the errors occurs. In addition, if the design is not suitable, it can change at an early stage and is less expensive because it does not require changing the whole system. Another reason for using this process model is that the programmer can work more effectively and flexibly. In the first increment is planned to deliver main functionality (i.e. users are able to upload, edit, view, update their product in the database and the product can be viewed by other users). Then, the second increment will deliver the chat and search functionality (i.e. public/private chat among users and search the specific product based on the keyword input). Lastly, any further requirements can be added if there is available time.

## 3.2 Requirements Gathering Techniques

### 3.2.1 Questionnaire

Questionnaire is a valuable tool which collects data from many people. These techniques are the cheapest source of fact finding and easy send/receive from respondents. The questionnaire is created by using Google form, which is made available for 1 week for collecting data from TARUC students and staff who have experienced using any mobile commerce application. All questions are answered on a 5-point Likert scale. Besides, a pre-test pilot will be done to find the problems and finalize the survey form before distributing to respondents.

### 3.2.2 Interview

Interviews are another way to collect data from respondents. These techniques can be used if the respondents are available and free to have the interview. This technique is able to send a better understanding question to respondents. Thus, the data collected will be more accurate and acceptable.

## 3.3 Requirements Analysis

### 3.3.1 Use Case diagram

Use cases define interactions between external actors and the system to attain particular goals. Use case driven analysis is that it helps manage complexity, since it focuses on one specific usage aspect at a time. Besides that, use cases start from the very simple viewpoint that a system is built first and foremost for its users. . A use case diagram can identify the different types of users of a system and the different use cases

### 3.3.2 Entity Relationship Diagram

An entity relationship diagram (ERD) is crucial to creating a good database design. It is used as a high-level logical data model, which is useful in developing a conceptual design for databases. Besides that, entity relationship diagram (ERD) shows the relationships of entity sets stored in a database. An entity in this context is a component of data.

## 3.4 Functional and Non-Functional Requirements

### 3.4.1 Functional Requirements

#### 3.4.1.1 Admin

|  |  |  |
| --- | --- | --- |
| Module | | Functional Requirement |
| Main | Sub-module |
| User | Registration | Users are allowed to create a new account. |
| Student Management | Users are allowed to perform CRUD about students’ records. |
| Staff Management | Users are allowed to perform CRUD about staffs’ records. |
| Report | Student Fees | System will generate reports of students’ fees. |
| Staff Salary | System will generate reports of staffs’ salary. |
| Student’s Performance | System will generate reports of students’ performances. |
| Academic Management | Subject | Users are allowed to perform CRUD about the tuition centre subjects. |
| Timetable | Users are allowed to perform CRUD about the tuition centre timetable. |

#### 3.4.1.2 Staff

|  |  |  |
| --- | --- | --- |
| Module | | Functional Requirement |
| Main | Sub-module |
| User | Login/Logout | Users are allowed to login their account. |
| Profile | Users are allowed to manage their own account and logout from their account. |
| Scheduling | Timetable | Users are allowed to view their timetable and request to change their timetable. |
| Classroom | Announcement | Users are allowed to post announcements. |
| Student Management | Attendance | Users are allowed to manage students’ attendance. |
| Marks | Users are allowed to manage students’ marks. |

#### 3.4.1.3 Student

|  |  |  |
| --- | --- | --- |
| Module | | Functional Requirement |
| Main | Sub-module |
| User | Login/Logout | Users are allowed to login their account. |
| Profile | Users are allowed to manage their own account and logout from their account. |
| Academic | Attendance | Users are allowed to register their attendance. |
| Timetable | Users are allowed to view tuition class timetables. |
| Task | Users are allowed to get notifications and reminders. |
| Examination | Users are able to view examination timetables and results. |
| Payment | Tuition Fee | Users are allowed to make payments online. |
| Classroom | Announcement | Users are allowed to receive announcements. |

### 3.4.1 Non-Functional Requirements

#### 3.4.1.1 Performance

User don’t need to wait long time for the system responses, the users should get their feedback from any request within 10 seconds with a good condition network environment.

#### 3.4.1.2 Availability

The system should operate on a 24/7 basis and able to interact with users anytime even during high traffic usage.

#### 3.4.1.3 Usability

Usability defined as the degree to which software can be used by specified consumers to achieve quantified objectives with effectiveness, efficiency, and satisfaction in a quantified context of use (Geneva, 1998). Therefore, the system UI should have a well designed by following the Schneiderman’s “Eight Golden Rules of Interface Design”.

#### 3.4.1.4 Security

The systems should be functioning in a secure manner and unauthorized user unable to grant access to view other user’s personal information that consists of password, chat log, home address etc.

#### 3.4.1.5 Reliability

During the system operates, the failure rate must not more than 2%. In other hand, if we ask for 99.9% reliability, the system will become costly. Therefore, we target 98.0% reliability, which mean it only allow 29 minutes of outage time for every day.

## 3.5 Summary

After this chapter has been done, I have learned about how the system structure and the data should be collected by using different methods and techniques.

Chapter 4

# System Design

## 4.1 System Design

There are a lot of challenges to design the entire system. First of all, the user interface is the most challenging part to design. Thus, I decided to use Figma as the designing tools. It contains all the appropriate widgets and controls that are available in different platforms. For database, Entity Relationship Diagram (ERD) is used to show the relationships of entity sets stored in the database. In addition, the processes flow are described with activity diagrams.

## 4.2 User Interface

Table

Description automatically generated

Figure 4.1: Home Page

Graphical user interface, application, website

Description automatically generated

Figure 4.2: Tutor Profile Page

Chart, treemap chart

Description automatically generated

Figure 4.3: Course Page

Chart, bar chart

Description automatically generated

Figure 4.4: Tutor Page

Graphical user interface, application

Description automatically generated

Figure 4.5: Order Page

Graphical user interface, application, website

Description automatically generated

Figure 4.6: Login Page

## 4.3 Database Design

### 4.3.1 Entity Relationship Diagram

Diagram, engineering drawing

Description automatically generated

Figure 4. : ERD for Tuition Centre Application

### 4.3.2 Data Dictionary

#### 4.3.2.1 Student Table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Student | | | | | | |
| Column Name | Role | Type | Null? | Format | Length | Description |
| studentID | PK | INT | N | Auto Increment Number |  | Use auto incremented number as a unique ID to identify every student. |
| name | - | NVARCHAR | N | - | 100 | Name of the student. |
| email | - | NVARCHAR | N | Standard email format | 100 | Email address of the student’s account. |
| password | - | NVARCHAR | N | Encrypted password | 100 | Password of the student’s account. |
| IC | - | INT | N | 12 digits | 12 | IC number of the students. |
| avatar | - | NVARCHAR | Y | Binary format | 100 | Student’s account’s profile image. |
| address | - | NVARCHAR | Y | - | 500 | Home address of the student. |
| phoneNo | - | INT | Y | 10 to 11 digits | 11 | Phone number of the student or their parents. |
| DOB | - | DATETIME | Y | DD-MM-  YYY | - | Date of birth of the student. |
| educationLV | - | NVARCHAR | N | ‘Primary’ or ‘Secondary’ | 10 | Education level of the student. |
| school | - | NVARCHAR | N | - | 100 | School name where the student is studying. |

#### 4.3.2.2 StudentAttendance Table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| StudentAttendance | | | | | | |
| Column Name | Role | Type | Null? | Format | Length | Description |
| studentID | PK, FK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every student. |
| attendanceID | PK, FK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every attendance. |
| recordTime | - | DATETIME | N | DD-MM-  YYYY  hh:mm:ss | - | The date-time of attendance taken. |

#### 4.3.2.3 Attendance Table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Attendance | | | | | | |
| Column Name | Role | Type | Null? | Format | Length | Description |
| attendanceID | PK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every attendance. |
| createTime | - | DATETIME | N | DD-MM-  YYYY  hh:mm:ss | - | The date-time of creation of the attendance. |

#### 4.3.2.4 Comment Table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Comment | | | | | | |
| Column Name | Role | Type | Null? | Format | Length | Description |
| annID | PK, FK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every announcement. |
| studentID | PK, FK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every student. |
| commentDate | - | DATETIME | N | DD-MM-  YYYY  hh:mm:ss | - | The date-time of comments. |

#### 4.3.2.5 Announcement Table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Announcement | | | | | | |
| Column Name | Role | Type | Null? | Format | Length | Description |
| annID | PK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every announcement. |
| text | - | NVARCHAR | Y | - | 500 | Announcement text. |
| image | - | NVARCHAR | Y | - | 500 | Announcement image. |
| publishDate | - | DATETIME | N | DD-MM-  YYYY  hh:mm:ss | - | The date-time of creation of the announcement. |

### 4.3.2.6 Post Table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Post | | | | | | |
| Column Name | Role | Type | Null? | Format | Length | Description |
| staffID | PK, FK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every staff. |
| annID | PK, FK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every announcement. |

#### 4.3.2.7 Staff Table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Staff | | | | | | |
| Column Name | Role | Type | Null? | Format | Length | Description |
| staffID | PK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every staff. |
| name | - | NVARCHAR | N | - | 100 | Name of the staff. |
| email | - | NVARCHAR | N | Standard email format | 100 | Email address of the staff’s account. |
| password | - | NVARCHAR | N | Encrypted password | 100 | Password of the staff’s account. |
| IC | - | INT | N | 12 digits | 12 | IC number of the staff. |
| avatar | - | NVARCHAR | Y | Binary format | 100 | Staff’s account’s profile image. |
| address | - | NVARCHAR | Y | - | 500 | Home address of the staff. |
| phoneNo | - | INT | Y | 10 to 11 digits | 11 | Phone number of the staff. |
| salary | - | INT | N | - | 10 | Salary of every staff |
| onBoardingDate | - | DATETIME | N | DD-MM-  YYYY  hh:mm:ss | - | The date-time of the staff onboarding. |

#### 4.3.2.8 SubjectInCharge Table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| SubjectInCharge | | | | | | |
| Column Name | Role | Type | Null? | Format | Length | Description |
| subjectID | PK, FK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every subject. |
| staffID | PK, FK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every staff. |

#### 4.3.2.9 Subject Table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Subject | | | | | | |
| Column Name | Role | Type | Null? | Format | Length | Description |
| subjectID | PK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every subject. |
| subjectName | - | NVARCHAR | N | - | 50 | Name of the subject. |
| level | - | NVARCHAR | N | ‘Primary’ or ‘Secondary’ | 10 | Education level of the subject. |
| price | - | INT | N | - | 3 | Price of the subject. |

#### 4.3.2.10 ExamSubject Table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ExamSubject | | | | | | |
| Column Name | Role | Type | Null? | Format | Length | Description |
| examID | PK, FK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every exam. |
| subjectID | PK, FK | INT | N | Auto Increment Number |  | Use auto incremented number as a unique ID to identify every subject. |

#### 4.3.2.11 Examination Table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Examination | | | | | | |
| Column Name | Role | Type | Null? | Format | Length | Description |
| examID | PK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every exam. |
| examDate | - | DATETIME | N | DD-MM-  YYYY  hh:mm:ss | - | The date-time of the exam. |

#### 4.3.2.12 Result Table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Result | | | | | | |
| Column Name | Role | Type | Null? | Format | Length | Description |
| examID | PK, FK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every exam. |
| studentID | PK, FK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every student. |

#### 4.3.2.13 Payment Table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Payment | | | | | | |
| Column Name | Role | Type | Null? | Format | Length | Description |
| paymentID | PK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every payment. |
| amount | - | FLOAT | N | - | 5 | Total amount of the order. |
| status | - | NVARCHAR | N | ‘cancelled’ or ‘processing’ or ‘succeeded’ | 10 | Status of the order  payment. |
| cancelDate | - | DATETIME | Y | DD-MM-  YYYY  hh:mm:ss | - | The date-time of the payment cancelled. |
| succeedDate | - | DATETIME | Y | DD-MM-  YYYY  hh:mm:ss | - | The date-time of the payment succeeded. |

#### 4.3.2.14 Order Table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Order | | | | | | |
| Column Name | Role | Type | Null? | Format | Length | Description |
| orderID | PK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every order. |
| paymentID | FK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every payment. |

#### 4.3.2.15 SubjectOrder Table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| SubjectOrder | | | | | | |
| Column Name | Role | Type | Null? | Format | Length | Description |
| subjectID | PK, FK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every subject. |
| orderID | PK, FK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every order. |

#### 4.3.2.16 SubjectTaken Table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| SubjectTaken | | | | | | |
| Column Name | Role | Type | Null? | Format | Length | Description |
| subjectID | PK, FK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every subject. |
| studentID | PK, FK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every student. |
| registerDate | - | DATETIME | Y | DD-MM-  YYYY  hh:mm:ss | - | The date-time of the subscription of the subject by the student. |

#### 4.3.2.17 AvailableTime Table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| AvailableTime | | | | | | |
| Column Name | Role | Type | Null? | Format | Length | Description |
| subjectID | PK, FK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every subject. |
| datetimeID | PK, FK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every date-time. |
| availableID | PK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every available time. |
| seatLeft | - | INT | N | Default start value at 40 | 3 | Seat left of every time slot. |

#### 4.3.2.18 Timetable Table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Timetable | | | | | | |
| Column Name | Role | Type | Null? | Format | Length | Description |
| availableID | PK, FK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every available time. |
| studentID | PK, FK | INT | N | Auto Increment Number | - | Use auto incremented number as a unique ID to identify every student. |

#### 4.3.2.19 DateTime Table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Timetable | | | | | | |
| Column Name | Role | Type | Null? | Format | Length | Description |
| datetimeID | PK | INT | N | Auto Increment Number |  | Use auto incremented number as a unique ID to identify every date-time. |
| date | - | DATETIME | N | DD-MM-  YYYY | - | Date. |
| time | - | DATETIME | N | hh:mm:ss | - | Time. |

## 4.4 Process Design

### 4.4.1 Use Case Diagram

#### 4.4.1.1 Admin

##### 4.4.1.1.1 Registration Module

Diagram

Description automatically generated

##### 4.4.1.1.2 Student Management Module

Diagram, schematic

Description automatically generated

##### 4.4.1.1.3 Staff Management Module

Diagram, schematic

Description automatically generated

4.4.1.1.4 Student Fee Module

Diagram

Description automatically generated

##### 4.4.1.1.5 Staff Salary Module

Diagram

Description automatically generated

##### 4.4.1.1.6 Student Performance Module

Diagram

Description automatically generated

##### 4.4.1.1.7 Subject Module

Diagram

Description automatically generated

##### 4.4.1.1.8 Timetable Module

Diagram

Description automatically generated

#### 4.4.1.2 Staff

##### 4.4.1.2.1 Login/Logout Module

Diagram

Description automatically generated

##### 4.4.1.2.2 Profile Module

Diagram

Description automatically generated

##### 4.4.1.2.3 Timetable Module

Diagram

Description automatically generated

##### 4.4.1.2.4 Attendance Module

Diagram, schematic

Description automatically generated

##### 4.4.1.2.5 Marks Module

Diagram

Description automatically generated

##### 4.4.1.2.6 Announcement Module

Diagram

Description automatically generated

#### 4.4.1.3 Student

##### 4.4.1.3.1 Login/Logout Module

Diagram

Description automatically generated

##### 4.4.1.3.2 Profile Module

Diagram

Description automatically generated

##### 4.4.1.3.3 Attendance Module

Diagram

Description automatically generated

##### 4.4.1.3.4 Timetable Module

Diagram

Description automatically generated

##### 4.4.1.3.5 Task Module

Diagram

Description automatically generated

##### 4.4.1.3.6 Examination Module

Diagram

Description automatically generated

##### 4.4.1.3.7 Tuition Fee Module

Diagram

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##### 4.4.1.3.8 Announcement Module

Diagram

Description automatically generated

## 4.5 Chapter Summary & Evaluation

In this chapter, I have started to design the whole application structure and the interface. The hardest part to process is the UI design. Figma is the tool to design the prototype. After the UI design, the database design took a few days to complete. After all the system planning and design is done, all the after progress will be more efficient and saved a lot of time.

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# Appendices A

Chart, pie chart

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