

A Development of Digital Learning Platform for Malacca High School

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Abstract: Teaching and learning (T&L) activity is a main thing in the education institution. In Malaysia, this activity fully carried out in physical mode which student have to come to the school for the teaching and learning session. However, COVID-19 virus is contagious, so movement control order (MCO) is only the alternative to be taken to prevent this virus from spread in a large scale. Initiative of digital learning platform is therefore created to overcome the obstacles that exist to continue the learning process. Objective toward this development is proposed to develop digital learning platform for Malacca High School (MHS) Community. Student, teacher, and school administrator will fully utilize this system for teaching and learning purposes. The platform builds by using prototyping-based methodology will digitalize part of the academic working process of teacher, administrator, and students at school. Digital learning platform is an integrated system in web-based form. All development process take part in this project will use hardware and software tools to ensure the end-product match with the estimation project end-product and tally with the objective for the project. Software use in this system is Operating System Microsoft Windows 10, atom software as compiler, XAMPP as server that connect source code, MySQL for the database system. Development of this system makes students be able to carry out their responsibilities well as a student and the distribution of work carried out by lecturers indirectly becomes systematic and acceptable to most of students. This platform will be pioneer in digitalization in education system in Malaysia. Student will be exposed toward the technology development and experienced while using it. In a nutshell, with the presence of idea and system development from this project, it could help some extent contribute to technology-based development implemented in the national education system.

Keywords: Digital Learning Platform, Online Distance Learning, Distance Learning, e-learning, web-based learning system.

1. Introduction

Digital learning is learning supported by technology that provide the user some degree of control over time, place, path and pace, while platform in computer science define as the medium or base for the software or application to execute. Digital learning platform is defined as the implementation of the

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software designed to assist during teaching and learning process in educational institution. Significant for this project is to provide better platform in education to implement flexibility in the teaching and learning process. Providing a better platform is the alternative for student and teacher to ensure there is no confusion in the delivery of information besides provide the high-quality level of education in Malaysian educational sector. As a result, this project will be lead toward the quality in education that being stated in Sustainable Development Goal (SDG) 4 and will be the benchmark toward other education institution in Malaysia. The project structure will change from the conventional system structure that need the physical interaction, to the new digital system that provide flexibility and improving the student technology experience.

Malacca High School (MHS) conduct face-to-face learning activities where the student needs to attend physical class at school. In 2017, the school recorded a total of 2000 registered students who underwent the teaching and learning process in the school [1]. But it's different compared to the new norm where student attend and doing all the learning activities in virtual mode and all the class have been carried out via online base either synchronize nor unsynchronized mode. The idea of a digital learning platform erupted when global crisis Pandemic COVID-19 attack global community and all country had to limit the movement of the public to prevent the virus from spread on a larger scale. Ministry of education has decided to carry out distance learning to continue the existing learning for their student. One of the methods of distance learning is by using technology to assist and support the learning process either synchronize nor unsynchronized mode.

The main problem for the existing system is, it fully focusing on the physical class and student need to come to school to attend the class according to the schedule. During the Movement Control Order, schools were ordered by Ministry of Education to close to curb the spread of the Pandemic COVID-19 [2]. This causes annoyance on the part of parents and teachers because the time that passes is not filled with learning and students spend a lot of time at home by doing nothing. The idea of learning from home is come out and teacher were the struggling parties that want to set everything up to carried out their class at home. However, the main problem occurs when unstable medium for teaching and learning activity and most of the daily task is not running as usual in that situation. In this project, the system will undergo the digitalization process in accordance with the current needs where MHS need to carry out fully distance learning classes at home. The learning activities and distribution of task or information will be centralized with this website being a platform for the students to attend daily classes, get the right information, and keep track about the latest update for the subject throughout the system. The improvement also will take part in displaying academia performance which is student can see their performance in academic.

In this project, based on the objective, web-based learning system is designed using structured approach. The platform is then developed and being tested. The system meets the current needs for Malacca High School community and solve the state problem regarding the online based learning due to pandemic COVID-19. The end of this project, analysis will be carried out to make sure the end-product meets the current need and achieving the project objective.

This paper contain4 sections in total to describe the development of digital learning platform. The first section describes the introduction toward the digital learning platform idea, while in section 2 take part on literature review for providing well understanding toward the project. In section 3 the writer explains about the project methodology that being use. Finally, in section 4result, analysis and discussion is carried out toward the end-product for this project to ensure the successful of this project in deliver the digital learning platform for Malacca High School community.

2. Literature Review

This report contains 2 segment, first segment will be explaining to the learning platform and the second segment will explaining about the information system.

In this day and age, many tasks and daily activities already digitalize. Technology expands with no limits caused the education sector also effected. This problem become bigger because of limitation of the application for student to communicate with lecturer is not fully organized and completely ready for the new norm. The developed - “Digital Learning Platform” will be used by secondary school student (MHS) to make the innovation on the current system and solve the existing problem. It also will prove it learning from home is not the big problem if all the preparation is well managed.

2.1 Learning Platform

Learning defined as a transformative process of taking in information or knowledge through study, experience or being taught. According to De Houwer, Jan & Barnes-Holmes, Dermot & Moors, Agnes. (2013), learning has been described functionally as behavior changes resulting from experience or mechanistically as changes resulting from experience in the organism. It is troublesome to have both forms of meanings. We describe learning as ontogenetic adaptation-that is, as changes in an organism 's actions arising from regularity in the organism's environment. Not only does this functional description address the issues of other concepts, but it also has major cognitive learning benefits [3].

2.2 Information system

Digital learning platform is a web base platform that will support the online learning for Malacca High School community. This platform as a center to integrate all the daily education activity inside one platform. The web-based system is proposed by this platform is compatible and mostly will be used by laptop or mobile device for carried out the class. This web can be visited by surfing on web search engine like Mozilla Firefox or Google Chrome. This platform one of the cheapest in term of cost developing in support and maintenance. In term of functionality, this system involves student and teacher as their main user to ease their daily learning activity. This method encourages students to be able to use digital tasks and open lines of communication to among students and teachers. Using an intelligent sequence of agents on behalf of those who conduct learning tasks Professors, students, and managers [4].

Table 1 summarized the comparison between all three-learning platform that offered in the market.

Table 1: Comparison between 3 different learning platform.

Features/System	Edmodo	Author UTHM	Google Classroom	Digital Learning platform
System type	Web-based / mobile application /Desktop Application	Web-based	Web-based / mobile application / Desktop Application	Web-based
Module	- Login - Registration - Classroom - Activity - Schedule - Performance	- Login - Learning Material - Activity - Assessment - Classroom - Subject - Lecturer Task	-Registration - Login -Classroom -Subject Task -Booking	-Registration -Login -Classroom -Go Live Classroom -Activity -Student Performance - Attendance

Table 1: (Cont.)

Type of User	Teacher and student	Administrator, teacher and student	Teacher and student	Prototyping model
Software Development	-	-	-	Prototyping Model

3. System Methodology

System development methodology is the framework for planning, managing, and controlling the development of an information system[5]. It is very important because it can reduce the system failure risk and improve the system success rate. In digital learning platform, prototyping model being used to show the overall development process. There are 5 phases in total to complete the project. Figure 1 shows the prototyping phase for the digital learning platform.

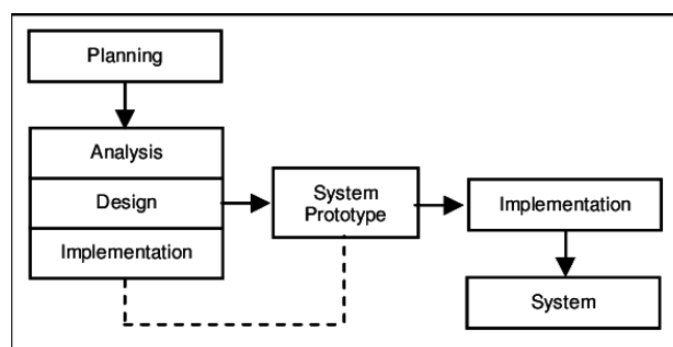


Figure 1: Prototyping Model (Dhani 2016)

This method is well planned, and it benefit for client that have limited budget on developing the system. This system also well knows as the fast development approach that suit to the current situation Pandemic COVID-19 because the education needs to be carried out as the instruction issued by the ministry of education [6]. Table 2 shows the system development task and deliverables for the purposed system.

Table 2: Development activity and deliverables for digital learning platform.

Phase	Activity	Output
Planning Phase	Phase to look in depth about the problem occur, assemble all user needs, develop the project plan diagram (Gantt Chart) and assemble the human resource with the specialist needed.	<input type="checkbox"/> Project proposal <input type="checkbox"/> Gantt chart <input type="checkbox"/> Team specialist.
Analysis Phase	Analysis on the data from the planning process and only relevant data will be used to develop the system modelling.	<input type="checkbox"/> System requirement master list. <input type="checkbox"/> UML Diagram <input type="checkbox"/> Data Flow Diagram
Design Phase	System quick design for the client overview toward the system features based on the user needs.	<input type="checkbox"/> System wireframe <input type="checkbox"/> User Interface <input type="checkbox"/> Database design <input type="checkbox"/> Basic system prototype.

Table 2: (Cont.)

Prototyping Phase	System actual prototyping and refining process toward the system development.	<input type="checkbox"/> System Prototype <input type="checkbox"/> Final system prototype is produced.
Implementation Phase	Development system phase that requires developer to work on the back end for the system to make the system function according to the needs.	<input type="checkbox"/> System that able to achieve project objective. <input type="checkbox"/> Datastore that able to accept to store data. <input type="checkbox"/> System with the client and supervisor approval.

4. Result/Analysis/Discussion

Analysis phases involve a detailed study of the current system, leading to specification of a new system. Analysis also a detail study of various additional operations performs by the system and their relationship within and outside the system. Flowchart, Data Flow Diagram (DFD) and Entity Relationship Diagram (ERD) will be developed in the model analysis. The analysis process is explained in detail about the system behavior while the design of the system will deliver the actual sketch system.

The phase involves determining the system architecture to show how the actual system development work. During the analysis phase, data are collected on the available files. In this system the design and analysis of the system are implemented to ensure the improvement from the existing system and the actual system is developed. It is concerned with issue relating to converting the final models into code and demonstrates the mapping between the models and the code.

4.1 System Requirement

Table 3(a), 3(b), and 3(c) shows the functional requirement for digital learning platform.

Table 3 (a): Functional requirement for administrator.

No.	Modules	Functionalities
1.	Registration	○ System will allow administrator to register their user inside the system database.
2.	Login	○ System allows the user to log in into the system by using their staff number and the registered password.
3.	Batch	○ Provide the Malacca High School student registered for their current batch.
4.	Class	○ Assemble the student and lecturer inside the class.
5.	Subject	○ Allow access for teacher to carried out teaching and learning activity.
6.	Assessment	○ Monitor the teacher carried out the assessment for their student (online examination)
7.	Class Attendance	○ Monitored the student attendee toward the virtual class carried out by teacher.
8.	Student Performance	○ Monitored the student performance and approve the student result to allow student to generate their performance report.

Table 3 (b): Functional requirement for teacher.

No.	Modules	Functionalities
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1. Subject	○ Distribute the teaching video, learning exercise and learning material for student reference.
2. Class Attendance	○ Teacher able to collect the class attendance by subject to ensure all the student is commit on the online class.
3. Assessment	○ Carry out the assessment (examination for performance evaluation) toward the student.
4. Student Performance	○ Update student performance after the assessment result is come out.

Table 3 (c): Functional requirement for student.

No.	Modules	Functionalities
1.	Subject	○ Allow access toward learning video, learning exercise and learning material.
2.	Assessment	○ Answer the assessment according to the time given (examination for performance evaluation).
3.	Class Attendance	○ Student to verify their attendance toward the online class.
4.	Student Performance	○ Student able to see their current performance report inside the platform as a result for their assessment.

4.2 System Design

This system development used data flow diagram for represent all the data movement and all the process running in this system. The figure movement of the module process inside the system is shown in the data flow diagram.

4.2.1 Context Diagram

Context diagram is the diagram that show the entire process that running inside the system. This diagram will show the input and output data process from the entity to the system. This system involves 3 users which is school administrator, teacher and student that will operate this system for educational purposes. Figure 2 shows the context diagram for the digital learning platform for Malacca High School.

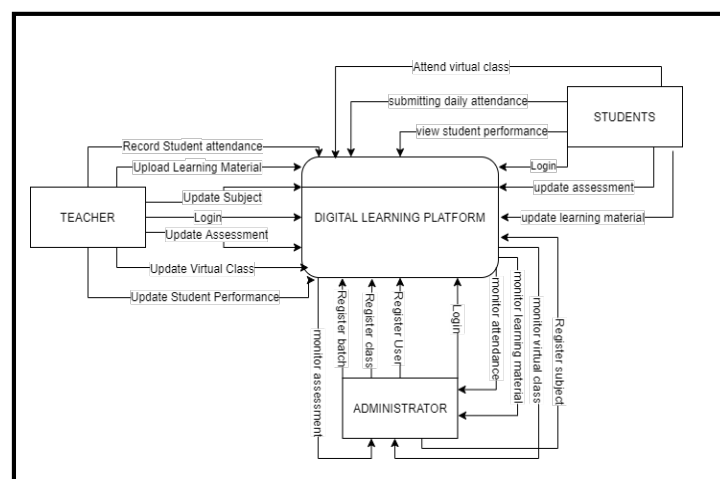


Figure 2: Context Diagram

4.2.2 Data Flow Diagram Level 0

The data flow diagram level 0 is the breakdown context diagram that show in detail about the process, data store location and the input or output for the data. Appendix A show the data flow diagram

level 1 for the digital learning platform, Malacca High School. It contains 8 processes in total which is registration process, login process, batch process, class process, subject process, assessment process, attendance process and student performance process.

4.2.3 Data Flow Diagram Level 1

Data flow diagram level 1 (DFD L1) is defined as the lower-level dataflow because this dataflow is a breakdown for the data flow diagram level 0. Each of the process inside the data flow diagram level 0 will be broken down to the very detail process in data flow diagram level 1. Appendix B shows the data flow diagram for the registration process by administrator.

4.3 Database Design

Entity relationship diagram (ERD) is the detailed diagram that shows the relationship between entity and attribute inside the database. Entity relationship diagram (ERD) is used to design the database. The ERD shows the relationship between each of the tables, attributes inside the database. Entity relationship diagram is developed to show the relationship between entity and the system. Appendix C shows the entity relationship diagram (ERD) for the digital learning platform, Malacca High School.

4.4 User Interface Design

System user interface purpose is to give the initial view for the system design that will develop in the implementation phase. This user interface has been planned in advance to ensure the arrangement of the module is well managed before the real system has been developed. Figure 3 shows the user interface sample for the login module for this system.

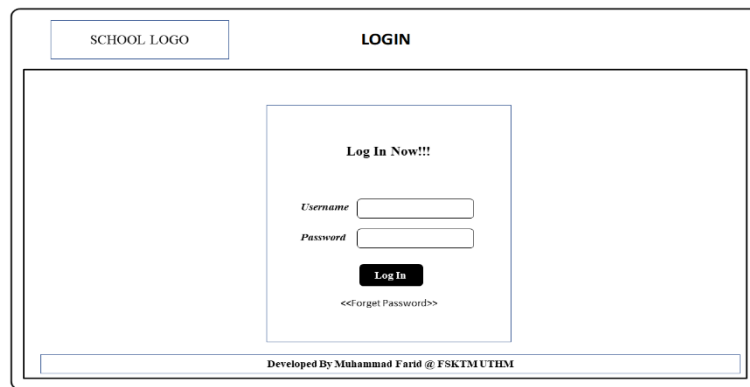


Figure 3: Sample of user interface design for login module

4.5 System Implementation

This system was developed by using PHP (Hypertext preprocessor) language and PhpMyAdmin as the system database. The main development software is Visual Studio Code (VS Code) which the interface and system design by using the HTML and CSS. Figure 4 shows the database connection for the website while in figure 5 shows the code segment for user registration module.

```

1 | <?php
2 |
3 | $servername = "localhost";
4 | $username = "root";
5 | $password = "";
6 | $database = "psm_farid";
7 |
8 | // Create connection
9 | $conn = mysqli_connect($servername, $username, $password, $database);
10 |
11 | // Check connection
12 | if (!$conn) {
13 |     die("Connection failed: " . mysqli_connect_error());
14 | }
15 | //echo "Connected successfully";
16 |
17 | ?>
    
```

Figure 4: Database Connection

```

<?php
include 'dbcon.php';

$v_fullname = $_POST['f_fullname'];
$v_icno = $_POST['f_icno'];
$v_address = $_POST['f_address'];
$v_email = $_POST['f_email'];
$v_password = $_POST['f_password'];
$v_phoneno = $_POST['f_phoneno'];
$v_class = $_POST['f_class'];
$v_roles = $_POST['f_roles'];

$sql = " INSERT INTO `tbl_user` ( `user_fullname`, `user_ic`, `user_address`, `user_email`, `user_password`, `user_phoneno`, `class_id`, `roles_id` ) VALUES ( '$v_fullname', '$v_icno', '$v_address', '$v_email', '$v_password', '$v_phoneno', '$v_class', '$v_roles' ); ";

if (mysqli_query($conn, $sql)) {
    //echo "New record created successfully";
    header("Location: list_all_user.php");
} else {
    echo "Error: " . $sql . "<br>" . mysqli_error($conn);
}

mysqli_close($conn);
    
```

Figure 5: Code segment for user registration module

Figures 6 and 7 illustrate the user interface design for digital learning platform that successfully developed using HTML-5 and CSS to ensure the design is attractive and responsive toward the users.

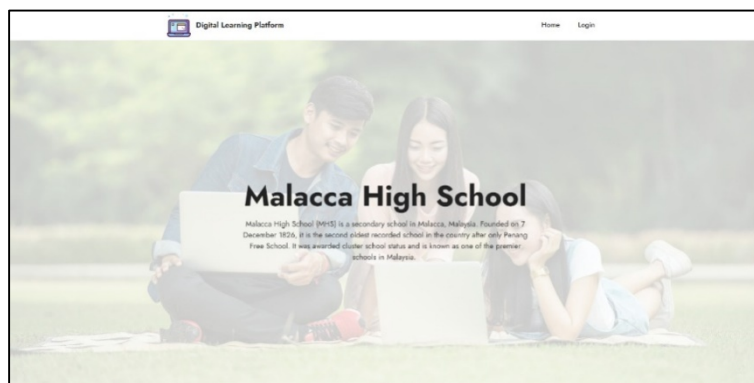


Figure 6: Homepage for digital learning platform

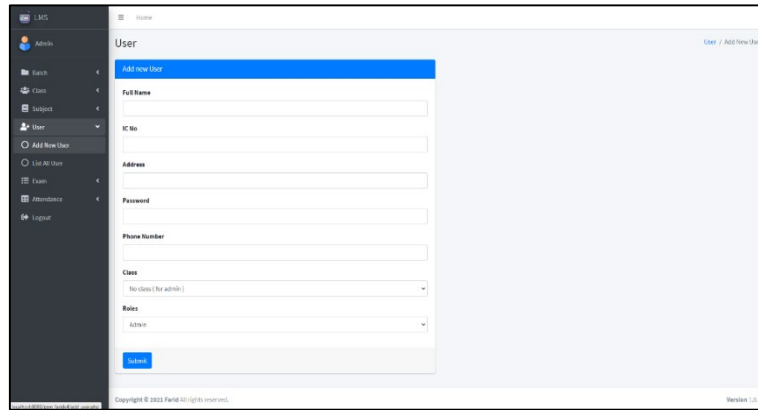


Figure 7: User registration page for digital learning platform

4.6 System Functionality Testing

Testing is carried out after the system completely function to ensure the system is well function and the system is running according to the user needs in order to achieve objective. Besides, the testing process is carried out to ensure all the error and bug will be fixed before the system being use by the user. Table 4 show the testing result for the system.

Table 4: System Functionality Testing

No.	Functionality	Expected Result	Testing Result
1.	User Registration Module		
	Administrators register Teacher's account	Teacher account is successfully registered.	Successful
	Administrators register Student's account	Student account is successfully registered.	Successful
	Administrators (Leader) register another admin account (according to the needed)	Administrator account is successfully registered.	Successful
	Administrators assign Teacher inside the class	All the class teachers will assemble in the class with student	Successful
	Administrators assign student inside the class.	All the class students will assemble in the class with their subject teacher.	Successful
	Administrators edit the user detail	Administrator can change the user detail.	Successful
	Administrators delete the user	Administrator can remove registered user.	Successful
2.	User Login Module		
	Administrators' login into the system by enter their ID and password.	Administrator successfully accesses toward the system.	Successful
	Teacher login into the system by enter their ID and password.	Teacher successfully accesses toward the system.	Successful
	Student login into the system by enter their ID and password.	Student successfully accesses toward the system.	Successful

Table 4: (Cont.)

3.	Batch Module		
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	Administrators register batch module for the new intake	Administrators able to insert the batch detail and register for the new intake.	Successful
	Administrators edit the batch detail	Administrator can change the batch detail.	Successful
	Administrators delete the batch	Administrator can remove registered batch.	Successful
4.		Class Module	
	Administrators register for the new class.	Administrators can enter the class detail and register for new class.	Successful
	Administrators edit the class detail	Administrator can change the class detail.	Successful
	Administrators delete the class	Administrator can remove registered class.	Successful
5.		Subject Module	
	Administrators register for the new subject.	Administrators can enter the subject detail and register for new subject.	Successful
	Teachers insert the learning material.	Student be able to achieve the learning material.	Successful
	Teachers upload the virtual class (video format)	Student able to saw the video inside the system	Successful
	Teachers upload the subject exercise	Student able to see the exercise, download the exercise, and reupload the exercise with answer sheet.	Successful
6.		Assessment Module	
	Teachers assign the assessment	Student be able to access the assessment.	Successful
	Teachers upload the question paper	Student able to download the question paper	Successful
	Teacher set the assessment duration and date	Students have to upload the answer sheet within the time period set by teacher.	Successful
	Students upload their answer sheet.	Teacher able to download the answer sheet and do their marking.	Successful
7.		Attendance Module	
	Teachers monitor the class attendance list according to timestamp	Teacher can see their student attendee.	Successful
	Students verify the attendee by choose their class and subject then hit the submit button.	Teacher can see their attendance by seeing at the time and date record.	Successful
	Administrators monitor the student attendance	Administrator can see the student attend, and absenteeism	Successful

Table 4: (Cont.)

8.	Student Performance Module		
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Subject teachers insert their student result according to the subject.	Teacher can enter the mark according to the assessment.	Successful
Subject teachers edit the student result.	Teacher able to edit the mark for their student	Successful
Students see their performance report	Student able to see their result when all the teachers already submit their assessment result.	Successful

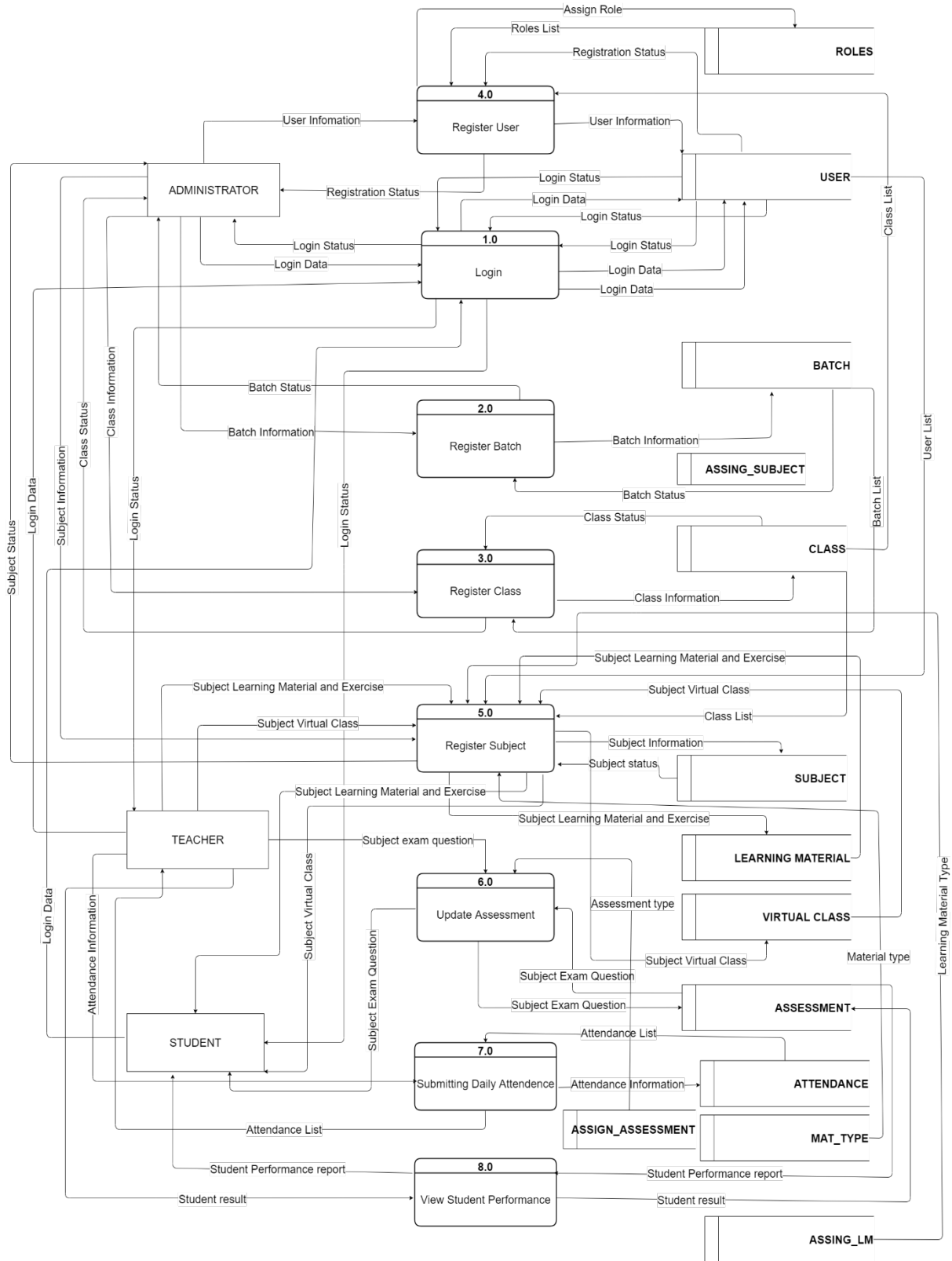
The testing table result shown all the module is being tested according to the needs and requirement. All the activity is meet the expectation and it lead to the successful in delivering all the system features. This shows a positive sign that this platform has been successfully developed according to the specifications given by the Melaka High School.

5. Conclusion

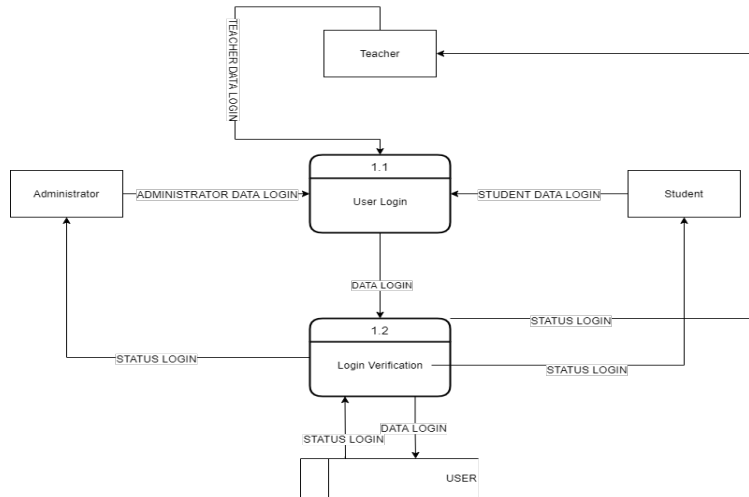
In conclusion, the system developed in this project is now can be used by Malacca High School student to carried out their teaching and learning activity at home during movement control order (MCO). This platform also already solves the problem faced by Malacca High School community. By using this platform, student will be more motivated to continue their education activity at home. Now it will be a benchmark for other school to start figure out their needs in quality education by implementing technology. This system can be further developed for the use of co-curricular activities in school when students can return to school to undergo learning activities as usual.

Acknowledgement

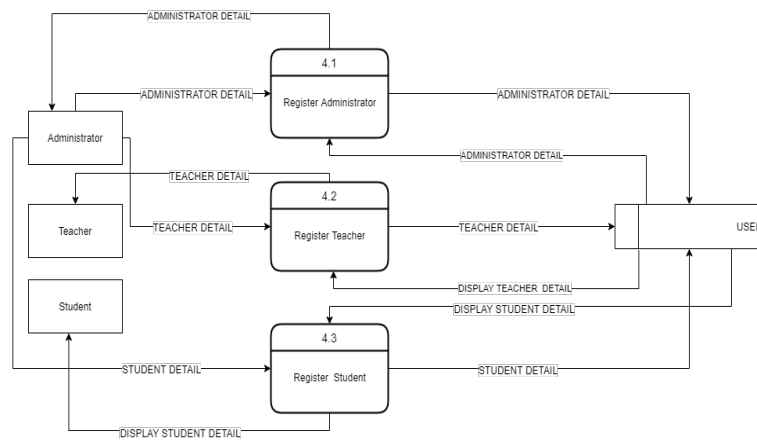
The author would like to express his gratitude to the Faculty of Computer Science and Information Technology, Universiti Tun Hussein Onn Malaysia for its support and encouragement throughout the process of conducting the study and project implementation.



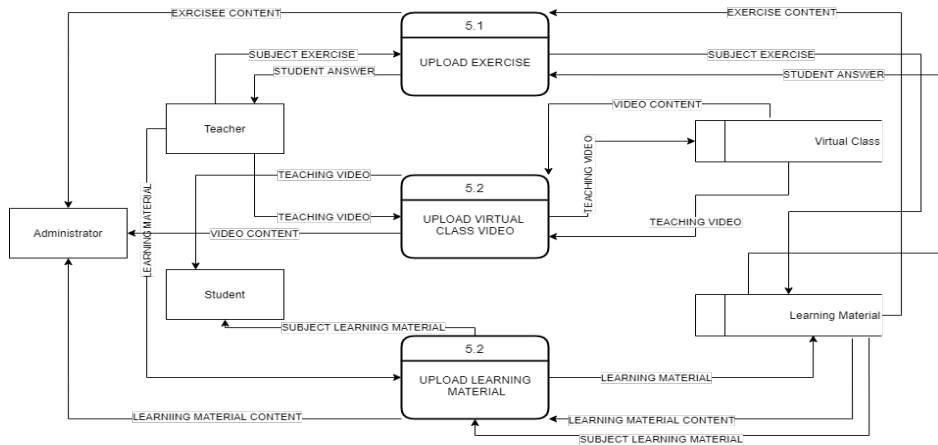
Appendix B



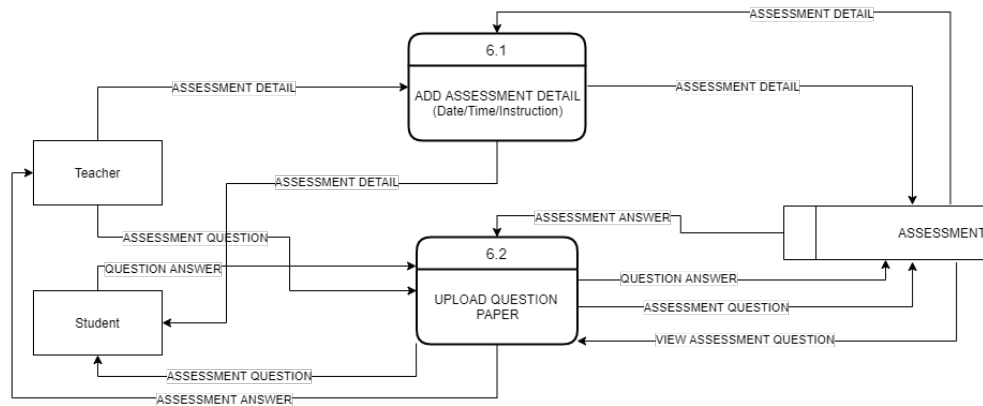
Data Flow Diagram Level 1 – Login Module



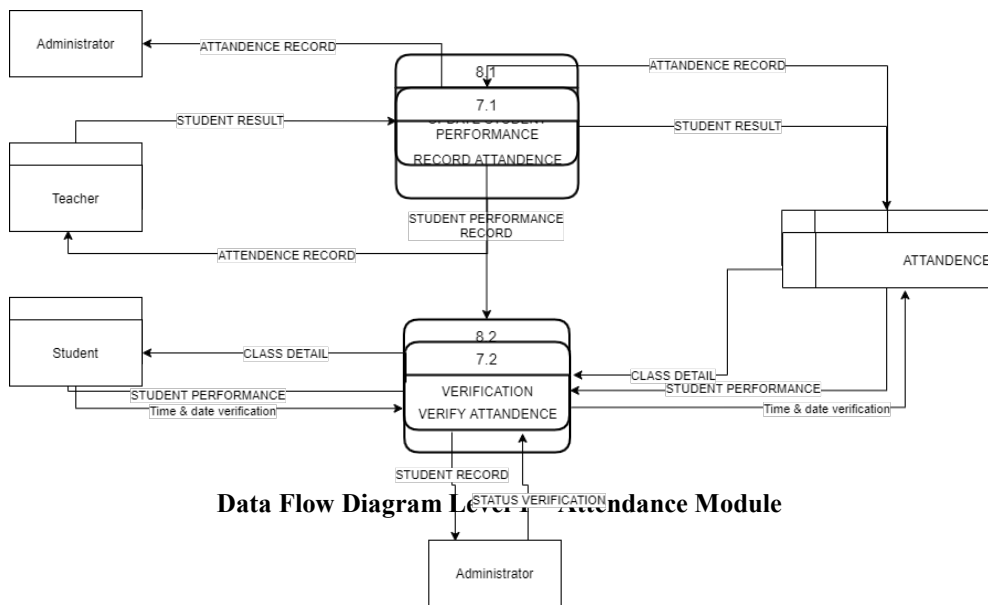
Data Flow Diagram Level 1 – User Registration Module



Data Flow Diagram Level 1 – Subject Module



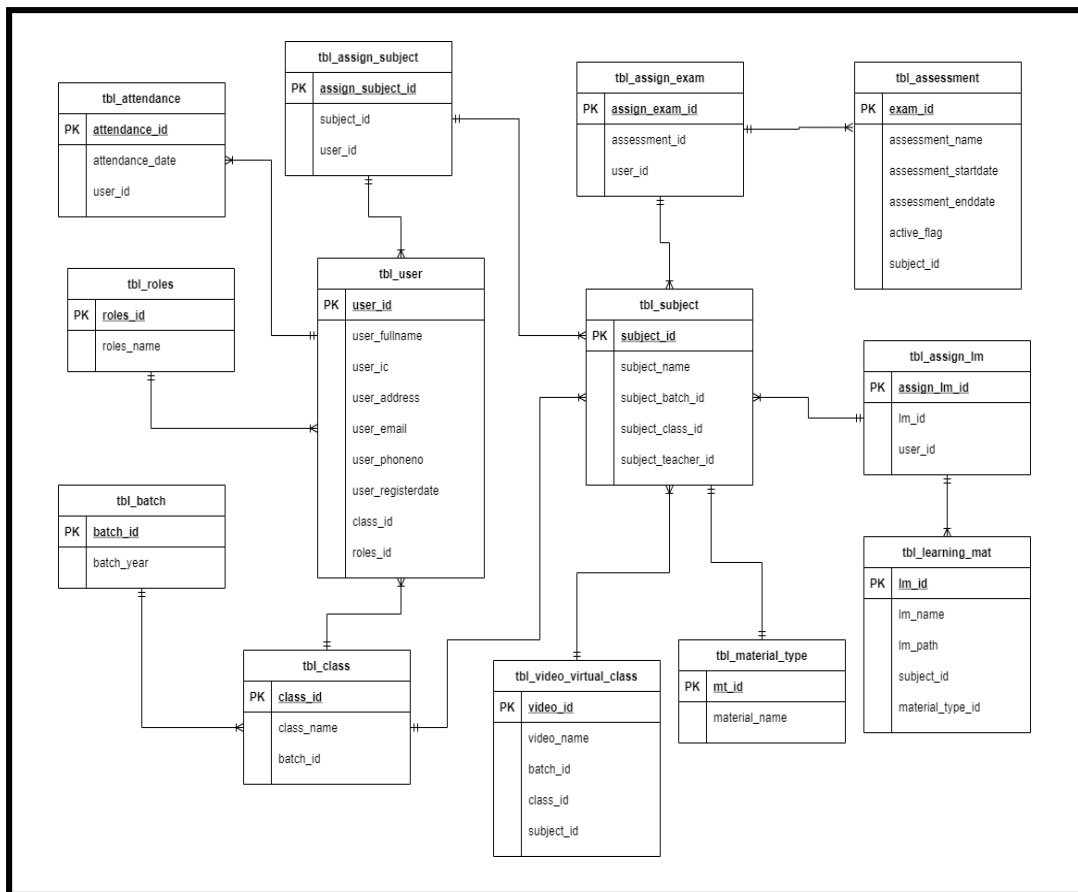
Data Flow Diagram Level 1 – Assessment Module



Data Flow Diagram Level 1 – Attendance Module

Data Flow Diagram Level 1 – Student Performance Module

Appendix C



Entity-Relationship Diagram

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