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Kindergarten Management System

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Abstract

The Kindergarten Management System, a web-based solution, addresses the challenges faced by administrators, teachers, and parents at Kindergarten Khalifah Junior UTHM. The existing manual record-keeping system, primarily reliant on Microsoft Excel, necessitates a more efficient and streamlined approach.This project aims to design and implement a structured approach design kindergarten management system with a web-based interface, focusing on enhancing student and teacher information management. The scope encompasses the target users of the system, ensuring it meets the specific needs of administrators, teachers, and parents.Employing the prototyping model, this project integrates prototype methods into critical phases of the system development life cycle (SDLC). The approach spans planning, analysis, design, prototype development, and implementation, facilitating a systematic and iterative process. The prototype system is developed using HTML, CSS, PHP, and JavaScript, hosted on an Apache server. The software tools used include XAMPP and Microsoft Visual Studio Code as the integrated development environment. Notably, it simplifies administrative processes, including the enrollment of new teachers and students, contributing to overall system robustness. The system maintains comprehensive student data, academic records, and payment information securely. email notifications to parents about financial obligations enhance communication. The computerized data management system prevents potential data loss and disposal.

1. Introduction

The Kindergarten Management System project emerges from the imperative need for efficient data management within educational institutions, particularly kindergartens. This project lays the groundwork by delving into the challenges faced by Kindergarten Khalifah Junior UTHM, highlighting the historical reliance on manual record-keeping systems. The chapter underscores the pivotal role of technology in addressing these challenges, proposing the development of an automated web-based system [1].

The specificity of Kindergarten Khalifah Junior UTHM's challenges is thoroughly explored, emphasizing the inefficiencies of conventional methods, including the risks of data loss and the time-consuming nature of manual reporting [2]. This sets the stage for the proposal of a comprehensive Kindergarten Management System designed to streamline administrative processes and enhance data accuracy. The proposed system's scope encompasses administrators, teachers, and parents, with a focus on revolutionizing kindergarten management through systematic and secure data handling.

It articulates a robust set of objectives, outlining the structured approach to system design, web-based development, and user acceptance testing. The scope is meticulously defined, highlighting the case study's stakeholder, Madam Siti Fatimah Binti Zainal Abidin, the Manager of Kindergarten Khalifah Junior UTHM. The chapter concludes by envisioning the expected results, emphasizing the system's capacity to modernize kindergarten operations, provide real-time data access, and strengthen communication channels among stakeholders.

This article consists of five parts. The first part explains the background of the project. The second section summarizes the literature review. The third part describes the project methodology and the findings from the system analysis and design. The implementation and testing of the system is shown in the fourth part. The final section summarizes the project.

2. Related Work

This section explains kindergarten management system, web-based information system and comparison between existing system and proposed system.

2.1 Current Kindergarten Management System

The current Kindergarten Management System at Kindergarten Khalifah Junior UTHM relies heavily on manual processes, lacking integration with any management information system. Administrative tasks, including registration and documentation of new intakes, are conducted using traditional tools such as ordinary books, pens, rulers, and a dry stamp for confirmation. The system's documentation also involves the use of a printer capable of producing only regular colorless paper. In contrast, a modern Kindergarten Management System, characterized as a Kindergarten Information System, serves as an advanced and user-friendly management tool. Operated through a web-based interface, it offers multi-user functionality to streamline various aspects of kindergarten management. Unlike the current manual approach, the Kindergarten Management System enables administrators to set goals, formulate long-term plans, and evaluate the performance of both teachers and students, enhancing decision-making and control within the kindergarten.

2.2 Management Information System

An information system is a comprehensive set of components designed to collect, store, process, and disseminate data and knowledge. In the educational context, a Management Information System (MIS) emerges as a vital computer-based tool facilitating the organization, evaluation, and efficient management of various departments within an institution. Specifically, for a Kindergarten, an MIS streamlines the collection, storage, and processing of essential data, encompassing student records, attendance information, and academic performance metrics. Through the utilization of software tools integrated into the MIS, administrators gain the capability to systematically organize and manage these crucial aspects of kindergarten operations.

Moreover, a Kindergarten Management System often involves complex decision-making processes for administrators and educators. The MIS can incorporate decision support systems, providing valuable insights that aid in making informed choices related to resource allocation, curriculum planning, and overarching educational strategies. This functionality ensures that decisions are grounded in accurate and up-to-date information, contributing significantly to the effective management of the kindergarten. By leveraging MIS capabilities, administrators can enhance their decision-making processes, fostering a more responsive and adaptive educational environment.

To encompass past, present, and future information needs, an MIS integrates various components, including decision support systems, databases, hardware resources, people management tools, project management applications, and computerized processes. This holistic approach enables the MIS to provide a comprehensive view of the kindergarten's operations, facilitating efficient decision-making and contributing to the overall functionality of the educational institution.

2.3 Comparison of Existing System

A study of the existing system has been conducted on three existing systems in the market. Various school management systems play integral roles in the educational landscape. The Sistem Maklumat Prasekolah Kebangsaan (SMPK) serves as a government web-based system exclusive to authorized users, facilitating the storage and management of registered preschool data [3]. While advantageous for its efficient teacher and student data management, it falls short in addressing broader kindergarten information, such as attendance records and fees. On the other hand, the **SimTrain School Management System**, a PHP-based platform, provides a comprehensive solution adaptable to schools of all sizes. With features like student profiles, fee payments, attendance tracking, and more, SimTrain ensures efficient school management [4]. Lastly, the Anak2U School Management System stands out as an end-to-end early education platform, emphasizing a digital-centric approach for EEC centers [5]. Its teacher and parent apps, coupled with a wealth of resources, enable real-time

progress tracking and interactive communication between educators and parents, significantly enhancing the overall early education experience. Each system brings unique strengths and limitations, reflecting the evolving landscape of digital tools in educational management. This study is conducted so that the system developer can analyze and identify the advantages and disadvantages of the existing system to use it as a reference when developing the system. **Table 1** shows the comparison between existing systems and the proposed system.

Table 1 *Comparison between existing systems and the proposed system*

Features/System	SMPK	SimTrain School Management System	Anak2u School Management System	Kindergarten Management System
System types	Web-based	Web-based and Application	Web-based	Web-based
Registration and login module	Yes	Yes	Yes	Yes
Administrator management module	Yes	Yes	Yes	Yes
Teacher management module	Yes	Yes	Yes	Yes
Student management module	Yes	Yes	Yes	Yes
Parents management module	No	Yes	Yes	Yes
Payment	No	Yes	Yes	Yes
SMS notification	No	No	No	Yes
Connection types	Internet Connection required	Internet Connection required	Internet Connection required	Internet Connection required

3. Methodology

The Prototyping Model serves as the framework of this project development methodology, providing a structured method for the development of a functioning model of the Kindergarten Management System with the goal to gather user feedback and gradually improve the system. The system may be updated based on direct user feedback through this iterative approach, matching it more closely with the true requirements and expectations of administrator, teacher and parent The Prototyping Model was chosen because it can assure that the final solution is user-centric and responsive to changing requirements. **Table 2** shows software development activities and their task.

Table 2 *Software development activities and tasks*

Phase	Activity	Deliverable
Planning	• Discussion with stakeholder • Determine the problems, objectives, scope and goal in the project.	• Project proposal • Develop Gantt chart
Analysis	• Interview session • Analyze problem and identify solution. • Collect the requirements.	• System requirement • Context Diagram or DFD • ERD • Flowcharts
Design	• Design the interface for the system. • Design the database • Choose a suitable programming language.	• System architecture • Database schema and data dictionaries. • User interface of the system.
Implementation	• Testing the system and fixing any errors occur.	• Php programming. • MySQL

Table 2 *cont*

Phase	Activity	Deliverable
Prototype	• Detect the weakness of the system and fix the errors.	• Updated prototype incorporating changes and improvements
Testing	• Final Check	• Final report
	• Test the developed system and deliver.	• Complete system

3.1 System Requirement Analysis

Functional requirements delineate the specific system functions or features essential for users to accomplish their tasks, capturing the intended behaviour of the system. These requirements, expressed as services, tasks, or functions, guide the developer in implementing the necessary functionalities for the kindergarten management system [6]. Additionally, non-functional requirements, also known as quality attributes, set criteria for evaluating the system's operation and are crucial in ensuring the overall effectiveness and performance of the system for administrators, teachers, and parents. Both functional and non-functional requirements play pivotal roles in shaping the capabilities and quality standards of the kindergarten management system. **Tables 3 and Table 4** show the functional and non -functional requirements for the proposed system.

Table 3 *Functional Requirements*

Modules	Function
1. Login Module	• Allow administrators to create, update, and manage user accounts. • Enable users to log in using email and password. • Verify user credentials against stored database data. • Show alerts for incorrect login attempts. • Redirect users to appropriate pages upon successful login.
2. Administrator Management Module	• Allow administrator to manage students and parent's information • Allow administrator to manage teacher's information • Allow administrator can manage classes. • Allow administrator can manage class subjects • Allow administrator can manage events' schedules in calendars.
3. Teacher Management Module	• Allow teachers to view, update and delete students' and parent's information • Allow teachers to can view class information only. • Allow teacher to view only the exams of their respective subjects and classes. • Allow the teacher to add and update the attendance of class. • Allow teachers to manage student payment details and send email notifications to parents through the system.
4. Parents Management Module	• Allow parents can view teacher's profile and class and subject's details handling in their kids' class • Allow parents can view their child's information. • Allow parents can view their child's marks • Allow parents to can receive email notifications from the administrator and teacher. • Allow parents to pay offline payments & stripe payments in credit card under the same invoice. They can print the receipt for the payment.
5. Report Module	• Provide an Attendance Report that tracks students' attendance by filtering date, encompassing daily or monthly records. • Provide generate payment of this month of each student, showing the status of fees paid and unpaid payment.

Table 4 *Non-Functional Requirements*

Requirements	Description
1. Performance	• The system should always be usable. • The system should be able to function on any web browser
2. Operational	• The system can be used in any web browser such as Chrome and Microsoft Edge. • The system will have a database to store all the data
3. Security	• The system should be only accessed by authorized administrators and staff • User credentials should be stored securely using industry-standard encryption techniques
4. Usability	• The system is simple and easy to use and the system is user-friendly.

3.2 System Analysis

A Data Flow Diagram (DFD) visually represents the flow of data within an information system, illustrating its movement between internal processes, external entities, and data stores.[7] In the upcoming section dedicated to the kindergarten management system, various diagrams will be presented, including the Context Diagram, DFD Level 0, Entity Relationship Diagram, and Flowchart. **Appendix A** shows the DFD level 0 of the kindergarten management system. Flowcharts depicted in **Appendices B, C, and D** illustrate the sequential operations of the Kindergarten Management System, delineating the processes involved in administrator, teacher, and parent roles. An entity-relationship diagram (ERD), illustrated in **Appendix E** serves as a visual representation of the information generated, stored, and utilized within the system.

3.2.1 Context Diagram

A context diagram is a graphical representation of a system and its relationships with other elements. It is particularly useful for stakeholders unfamiliar with the system or those seeking a quick understanding of its overall functionality. **Figure 1** illustrates the context diagram for the Kindergarten Management System. This diagram outlines the input and output data processing involving the administrator, teacher and parent entities.

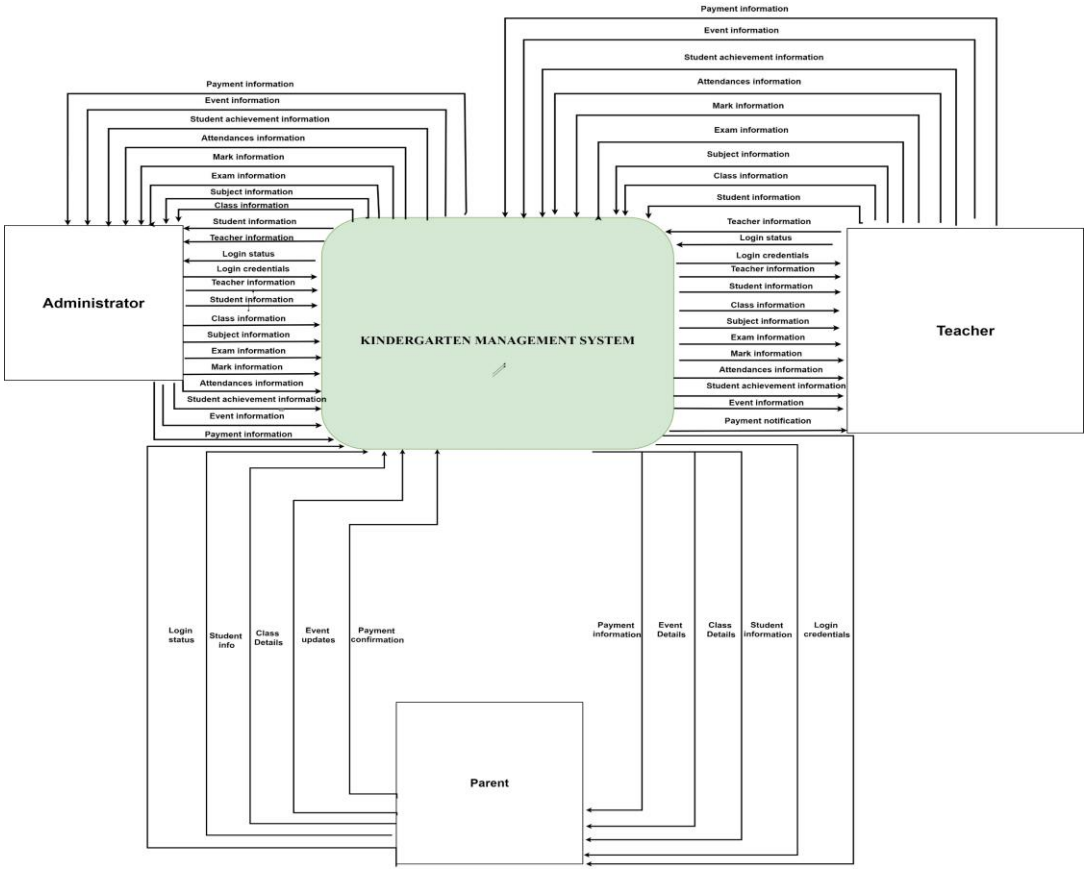

Fig 1. *Context Diagram of Kindergarten Management System*

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3.3 System Design

After all the users' requirements are successfully analyzed, the project will proceed in the design phase. In this phase, both the interface and database had been designed to help visualize the system before proceeding with the coding of the system.

3.3.1 System Architecture

The Kindergarten Management System Architecture serves as the foundational structure outlining the system's intricate dynamics and interactions. Illustrated in **Figure 2** the architecture is meticulously crafted to accommodate distinct user roles administrators, teachers, and parents each accessing tailored interfaces aligning with their responsibilities. In essence, the Kindergarten Management System Architecture provides a robust framework, facilitating efficient user task performance and the continuous flow of accurate records within the kindergarten management system.

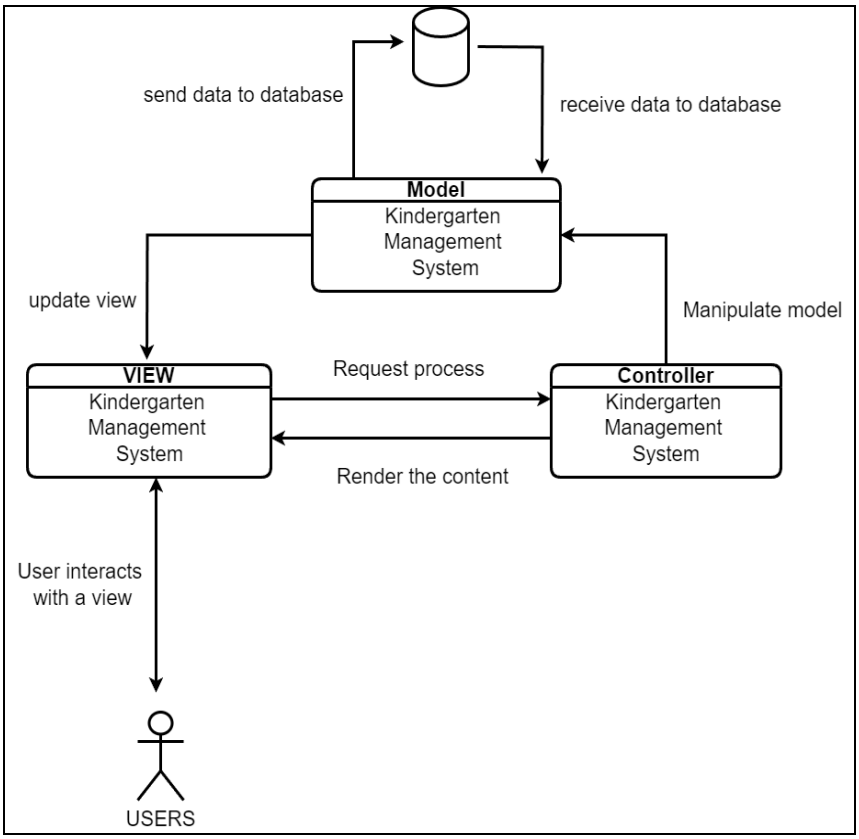
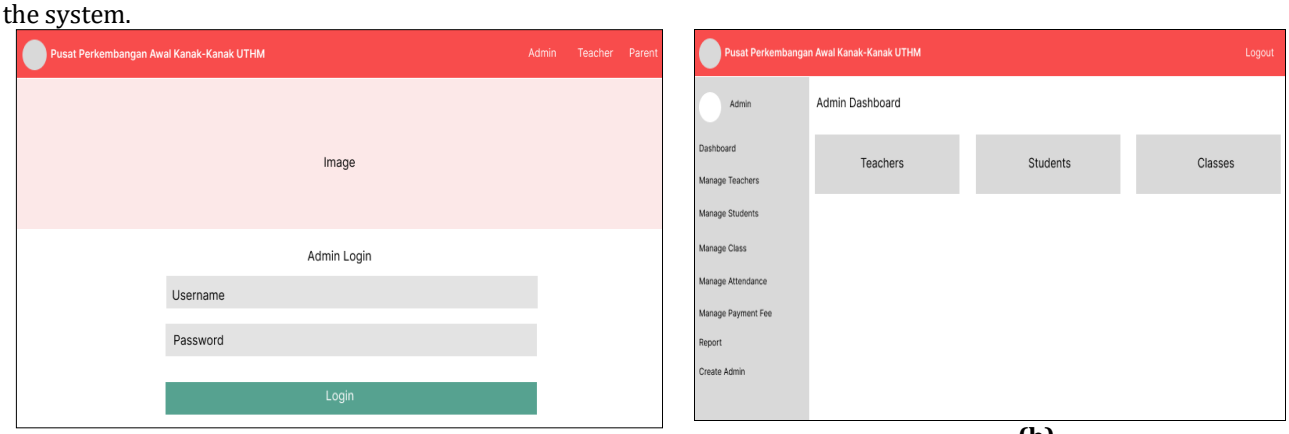


Fig 2. *System Architecture of Kindergarten Management System*

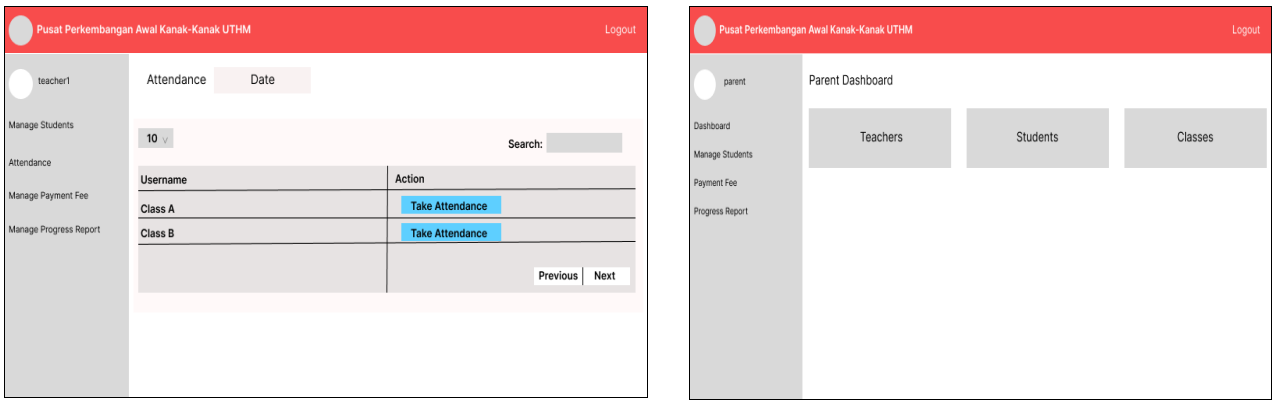
3.3.2 Interface Design

User interface (UI) design is the process of creating the visual components that make up the interface of a product or service. For example, user interfaces consist of visual components such as colors and fonts. Wireframing, or prototyping, is a common step in the user interface process. The goal of UI design is to create products that are easy to use, attractive, and help people achieve their goals efficiently and effectively. For this project, used Figma to create user interface design wireframes. **Figure 3, 4 and 5** show all the user interfaces of the system.



(a) **(b)**

Fig. 3 *Interface of kindergarten (a) Login; (b) Admin Dashboard*



(a) **(b)**

Fig. 4 *Interface of Kindergarten (a) Teacher Dashboard (Attendance); (b) Parent Dashboard*

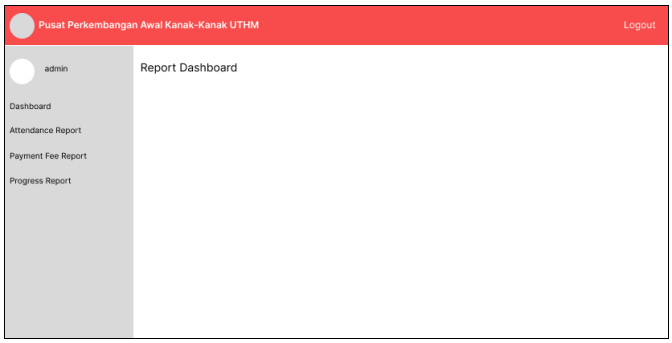


Fig. 5 *Report Dashboard*

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4. Result and Discussion

A web platform was used to build the system. This section presents the results of the system implementation and testing. The HTML, CSS, and PHP programming languages were used to build the system. In the meantime, XAMPP is used to setup the MySQL connection. The system implementation and system testing are discussed in this section.

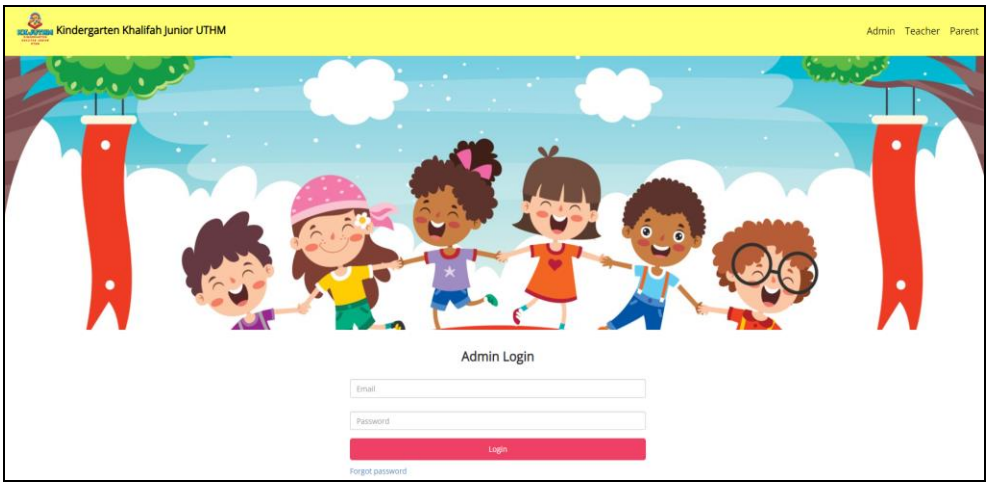
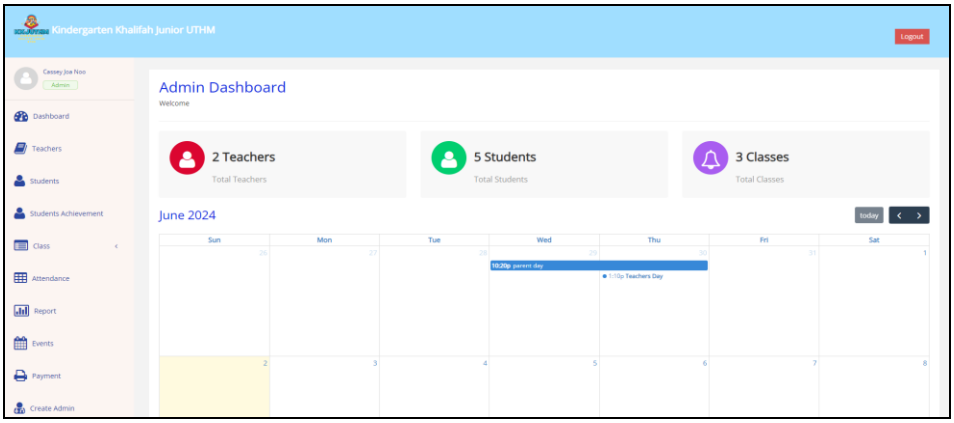


Fig. 6 *Login page*

Figure 6 shows the interface of the Kindergarten Management System login page. On the login page, users, including the admin, teacher and parent are required to log in to access the system. They are granted access only if they provide valid login credentials. If incorrect credentials are entered, an alert message is displayed on the screen.

Table 5 *Test Case for Login Module*

Test Case ID	Description	Expected Output	Actual Output
M1-1	To check whether administrator, teacher and parent can log in into the system	The user should be able to log in into the system	The user has successfully logged in into the system
M1-2	To check whether administrator could create account for other users	The administrator should be able to create account for another user	The administrator has successfully created account for another user
M1-3	To check whether the system will restrict login whenever a wrong credential is entered	The system should restrict login when an incorrect email credentials has been entered	The system restricted the login when an incorrect email or no credentials has been entered



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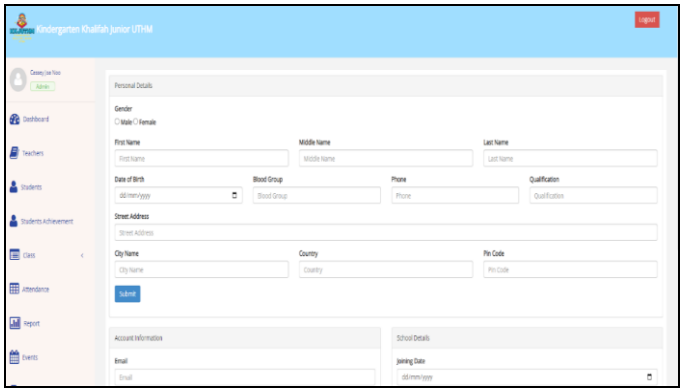

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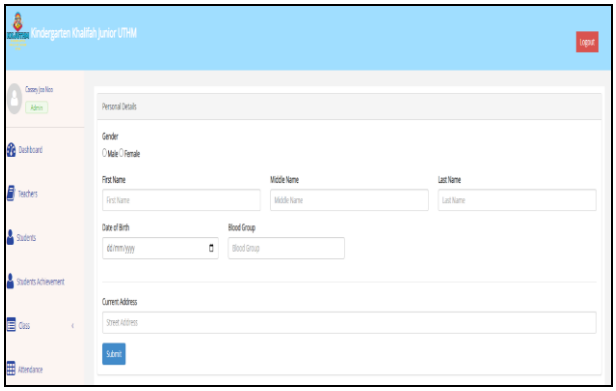

(c)

Fig. 7 (a) *Interface of Admin dashboard; (b), (c) Features of admin*

In the **Figures 7** admin dashboard, administrators have access to all system modules. They can navigate through the sidebar to manage teachers, students, student achievements, classes, and handle submenus for managing subjects, exams, marks, viewing attendance, generating reports, events, and handling payments, as outlined in **Table 6:** Test Case for Administrator Management Module.

Table 6: *Test Case for Administrator Management Module*

Test Case ID	Description	Expected Output	Actual Output
M2-1	To check whether the system could display the dashboard for administrator	The system should be able to display the dashboard for administrator	The system has successfully displayed the dashboard for administrator
M2-2	To check whether the administrator can navigate through other modules via the dashboard	The admin should be able to navigate through other modules via the dashboard	The admin has successfully navigated to other modules via dashboard
M2-3	To check whether the administrator can log out from the system	The admin should be able to log out from the system	The admin has successfully logged out from the system
M2-4	To check whether the admin can add, update and delete new teacher information into the system.	The admin should be able to add, update and delete new teacher information into the system	The administrator has successfully added, updated and deleted teacher information into the system
M2-5	To check whether the admin can add, update and delete new student information into the system.	The admin should be able to add, update and delete new student information into the system.	The administrator has successfully added, updated and deleted student information into the system.

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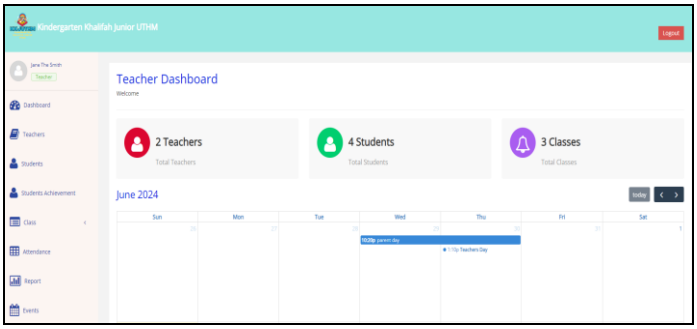
Table 6 *cont*

Test Case ID	Description	Expected Output	Actual Output
M2-6	To check whether the admin can add student achievement information into the system.	The admin should be able to add student achievement information into the system.	The administrator has successfully added student achievement information into the system
M2-7	To check whether the admin can add class information into the system.	The admin should be able to add class information into the system.	The administrator has successfully added class information into the system
M2-8	To check whether the admin can add subject information into the system.	The admin should be able to add subject information into the system.	The administrator has successfully added subject information into the system
M2-9	To check whether the admin can add exam information into the system.	The admin should be able to add exam information into the system.	The administrator has successfully added exam information into the system
M2-10	To check whether the admin can add mark information into the system.	The admin should be able to add mark information into the system.	The administrator has successfully added mark information into the system
M2-11	To check whether the admin can view attendance records across all classes.	The admin should be able to view attendance records across all classes.	The administrator has successfully viewed attendance records across all classes.
M2-12	To check whether the administrator can modify existing attendance records.	The administrator should be able to modify existing attendance records.	The administrator has successfully modified existing attendance records.
M2-13	To check whether the admin can add a new event information into the system.	The admin should be able to add a new event information into the system.	The administrator has successfully added event information into the system
M2-14	To verify that the admin can generate monthly payment reports	The admin should be able to generate and view monthly payment reports.	The admin has successfully generated and viewed monthly payment reports.
M2-15	To verify that the admin can update payment records when fees are received.	The admin should be able to update payment records to reflect received fees.	The admin has successfully updated payment records to reflect received fees.



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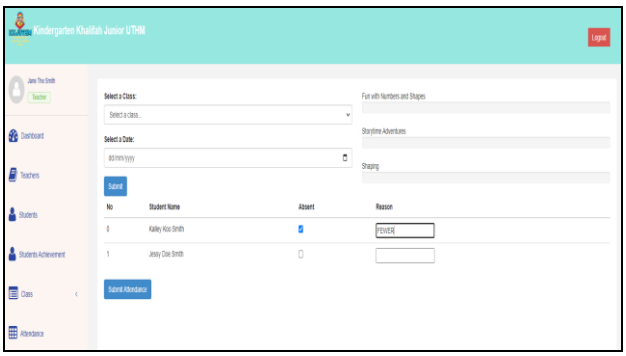

(b)

(c)

Fig. 8 (a) *Interface of Teacher Dashboard ;(b), (c) Attendance feature*

The attendance feature allows teachers to record student attendance for the specific classes they are assigned. On the other hand, admins can only view attendance records across all classes. They have the ability to record or modify attendance themselves. Instead, admins can access and review the attendance records submitted by teachers for different classes and dates. This functionality is detailed in **Table 7:** Test Case for Teacher Management Module.

Table 7: *Test Case for Teacher Management Module*

Test Case ID	Description	Expected Output	Actual Output
M3-1	To check whether the teacher can view and edit student information	The teacher should be able to view and edit the student information in the system	The teacher successfully viewed and edited the student information in the system
M3-2	To check whether the teacher can view, edit student achievements	The teacher should be able to view and edit the achievements of students	The teacher successfully viewed and edited the student achievements
M3-3	To check whether the teacher can record attendance of students	The teacher should be able to mark attendance for students in the system	The teacher successfully recorded the attendance of students
M3-4	To check whether the teacher can create, update and delete event information	The teacher should be able to create, update and delete event information in the system	The teacher successfully created updated and deleted event information
M3-5	To check whether the teacher can handle payments	The teacher should be able to manage payment information and process payments	The teacher successfully handled payments in the system
M3-6	To check whether the teacher can send notifications to parents via email	The teacher should be able to send email notifications to parents	The teacher successfully sent email notifications to parents
M3-7	To check whether the teacher can view receipts	The teacher should be able to view payment receipts in the system	The teacher successfully viewed the payment receipts

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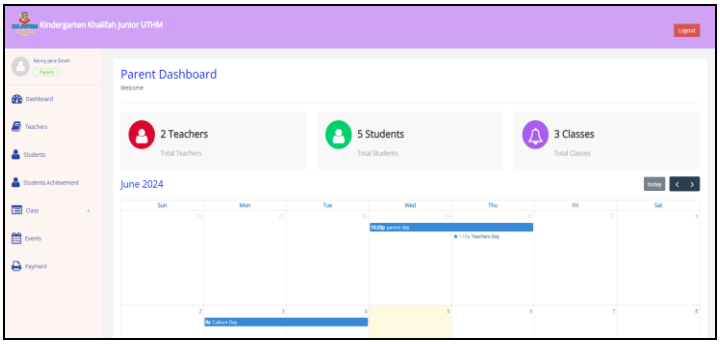

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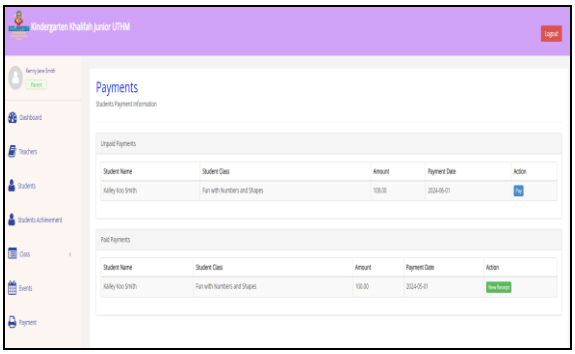


(b)

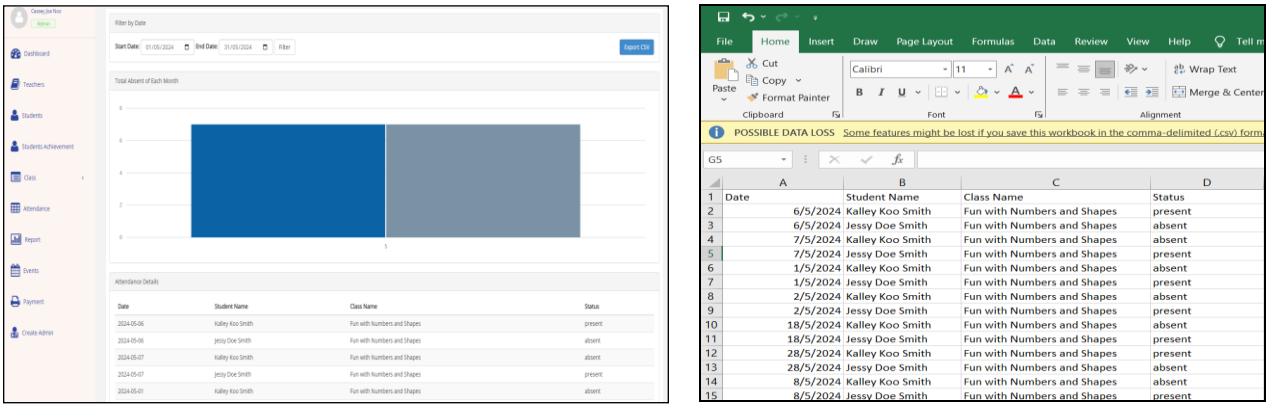
(c)

Fig. 9. (a)*Interface of Parent Dashboard; (b), (c) Payment feature*

In the parent dashboard, parents have access to more detailed information and functionalities. They can navigate through the sidebar to accessing individual student profiles, viewing student achievement, viewing events calendar, handling payments and potentially other relevant features tailored specifically for parent users. **Figure 9(a)** show the interfaces of parent dashboard page. The payment section, shown in **Figure 9(b)** and **9(c)** is divided into "Unpaid Payments" and "Paid Payments". Parents can securely enter payment information by using stripe as the online payment platform and view outstanding payments, make online payments through the integrated gateway, and potentially generate receipts. **Table 8:** Test Case for Parent Management Module details the specific test cases related to this module.

Table 8: *Test Case for Parent Management Module*

Test Case ID	Description	Expected Output	Actual Output
M4-1	To check whether the parent can view student information	The parent should be able to view their child's information in the system	The parent successfully viewed their child's information
M4-2	To check whether the parent can view student achievements	The parent should be able to view their child's achievements in the system	The parent successfully viewed their child's achievements
M4-3	To check whether the parent can view class, subject and marks information	The parent should be able to view the class, subject and marks information in the system	The parent successfully viewed the class, subject and marks information
M4-5	To check whether the parent receives email notifications	The parent should receive email notifications from the system	The parent successfully received email notifications
M4-6	To check whether the parent can pay the kindergarten fee through the system using Stripe	The parent should be able to make a payment using Stripe in the system	The parent successfully made a payment using Stripe
M4-7	To check whether the parent can download the payment receipt	The parent should be able to download the receipt after payment	The parent successfully downloaded the payment receipt



(a) (b)

Fig. 10 (a) *Interface of Report Module (b) Export file of attendance in excel*

Figures 10(a) show the report module allows users to filter attendance records by date. Admin and Teacher can specify a start date and an end date to view attendance details within that range. The module also provides a summary of the total absences for each month. The attendance details are displayed in a table layout for easy viewing and can be exported as an Excel file. **Figures 10(b)** show the interface of the attendance records. The various test cases for this module are detailed in **Table 9:** Test Case for Report Module.

Table 9: *Test Case for Report Module*

Test Case ID	Description	Expected Output	Actual Output
M51	To check whether the administrator can filter attendance by date	The administrator should be able to filter the attendance records by specifying a date range	The administrator successfully filtered the attendance records by date
M5-2	To check whether the system can generate an attendance report based on filtered dates	The system should be able to generate an attendance report for the specified date range	The system successfully generated an attendance report for the specified date range
M5-3	To check whether the system can export the attendance report to an Excel file	The system should be able to export the generated attendance report to an Excel file	The system successfully exported the attendance report to an Excel file

5. Conclusion

In conclusion, the Kindergarten Management System was successfully developed, achieving its project objectives and effectively managing various aspects of kindergarten operations through role-based access, communication tools, and payment management. Despite its advantages, the system has limitations, such as a lack of integration with external systems, unspecified security measures, potential user complexity, and dependence on reliable internet connectivity. Future enhancements suggested include adding online chat functionality, the ability to upload test papers, and support for multiple children under one parent. These improvements aim to address current limitations and enhance system performance and functionality, making it more useful for its users.

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Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of the paper.

Author Contribution

The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.

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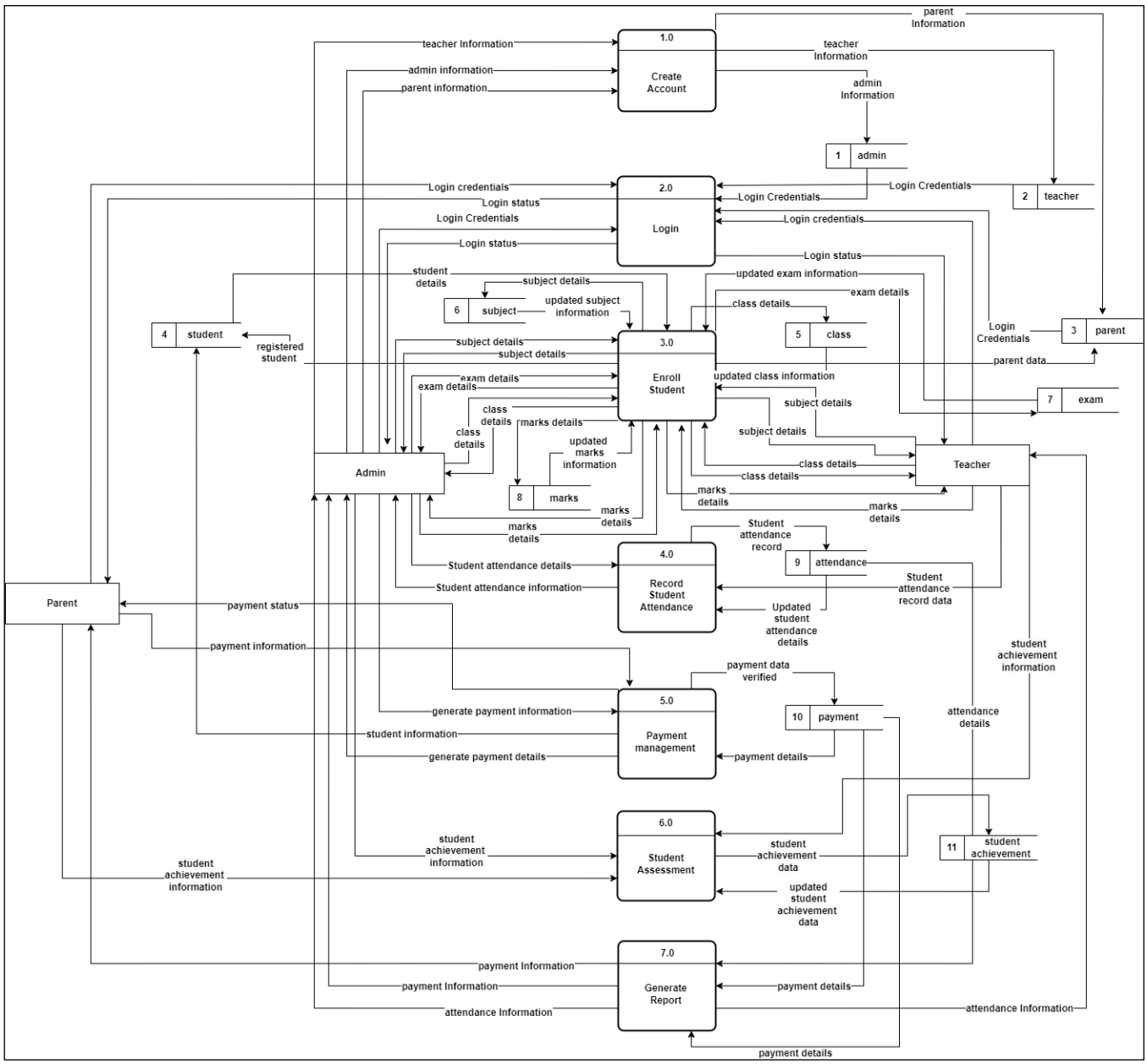
Appendix A: Data Flow Diagram Level 0



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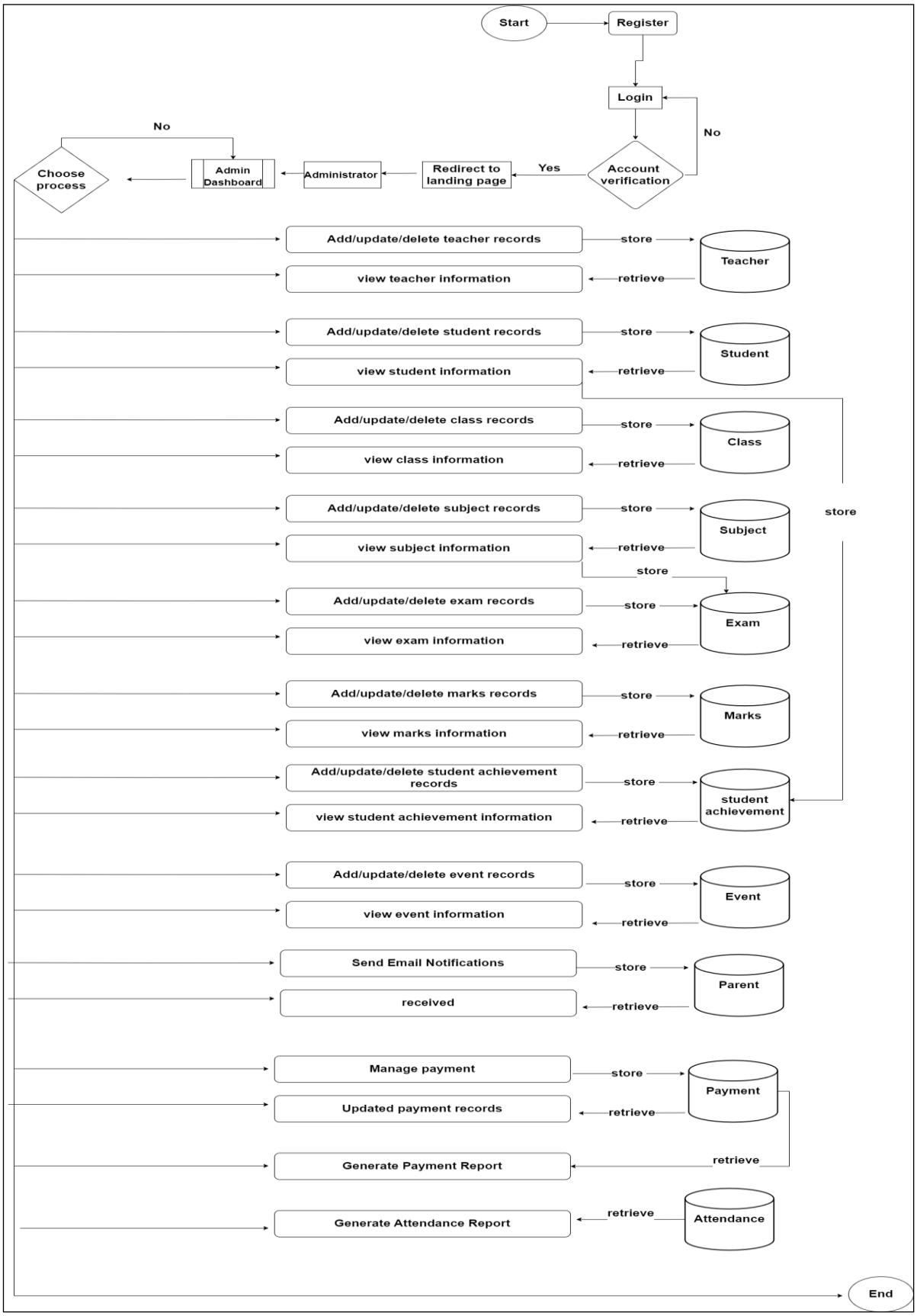
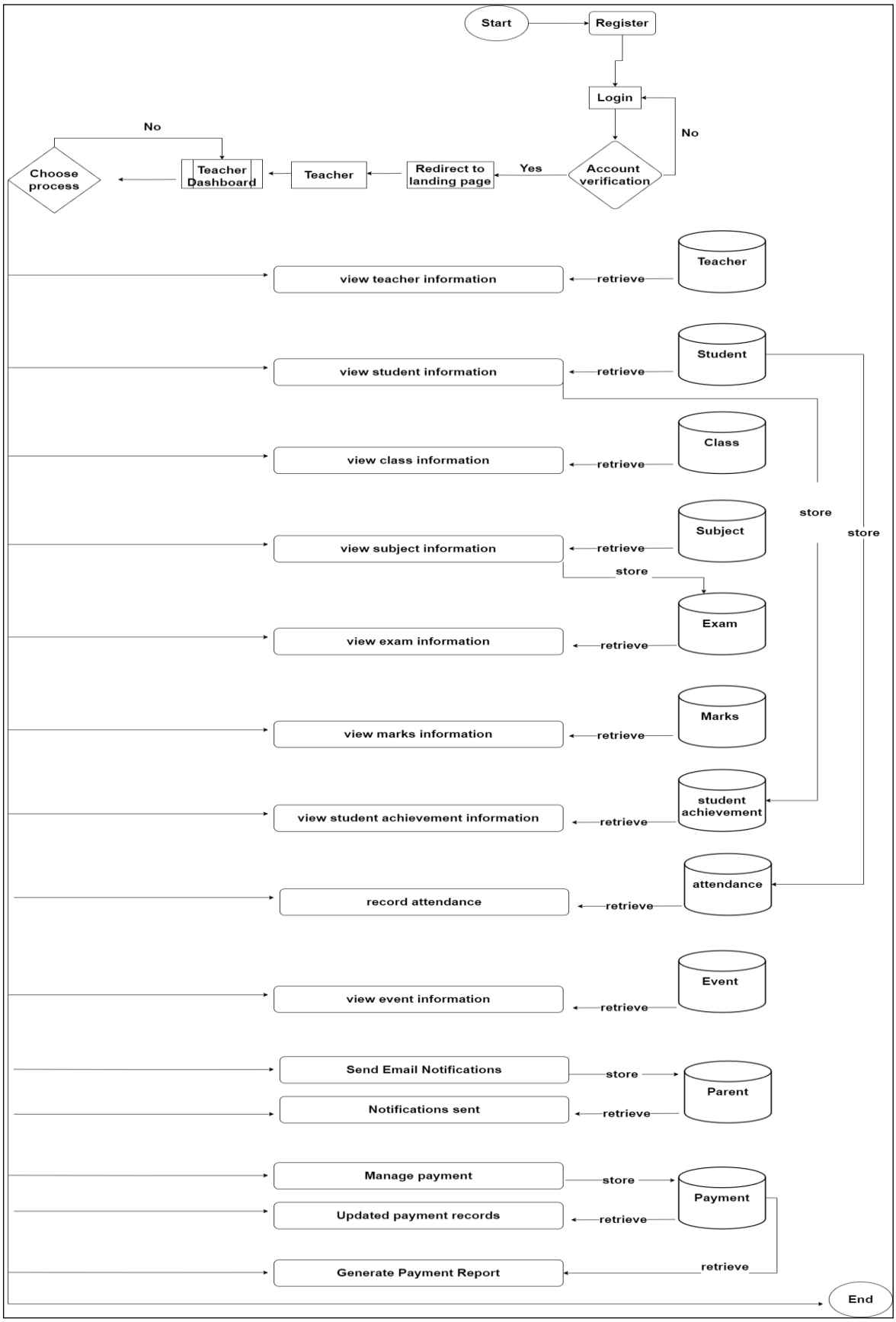
Appendix B: Flowchart for Administrator



Appendix C: Flowchart for Teacher



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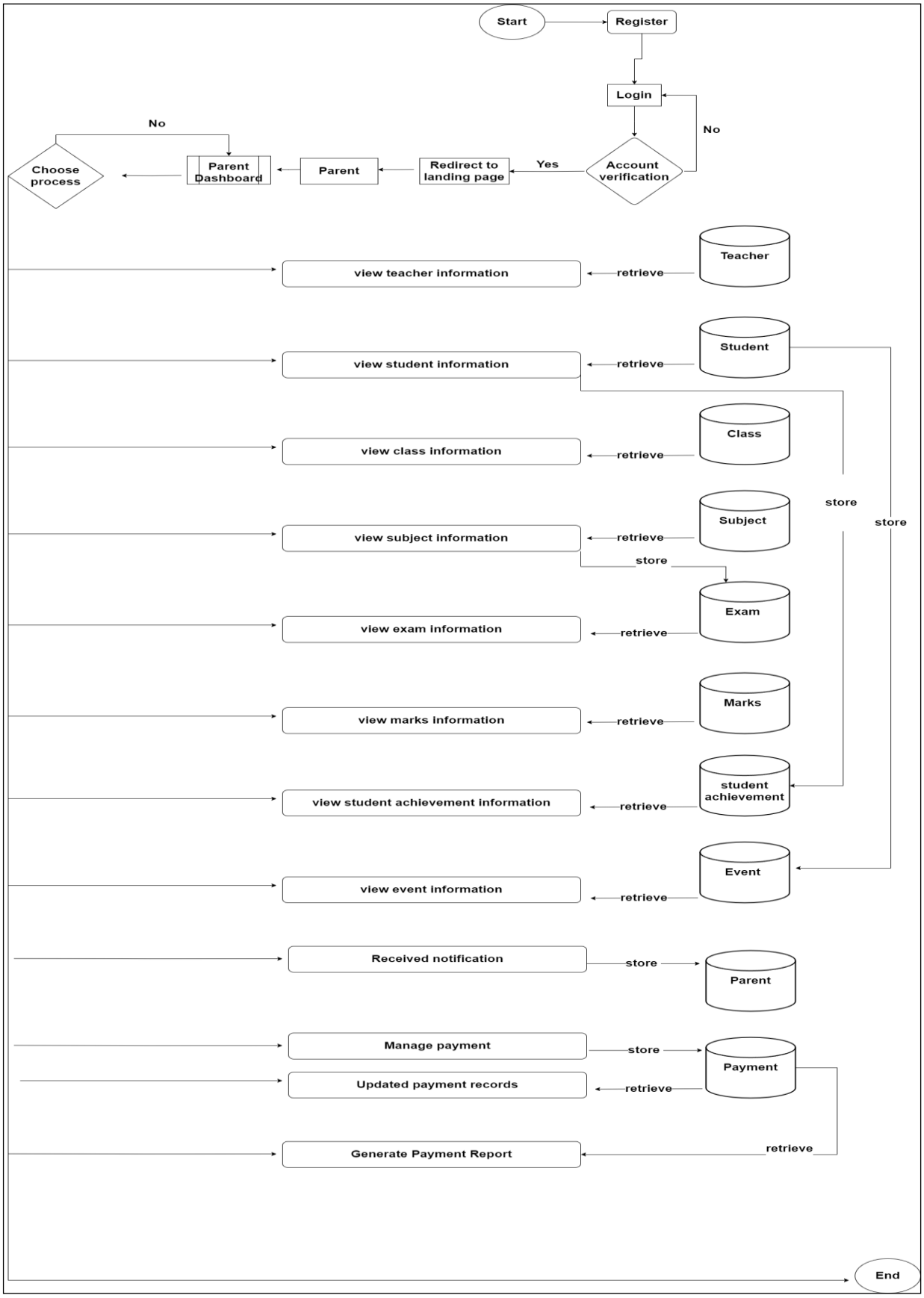
Appendix D: Flowchart for Parent



Appendix E: ERD of Kindergarten