

Parcel Hub for UTHM Residential College Management System

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Abstract

Logistics management is a process of organizing and supervising the movement of goods and products [1]. Effective management of package logistics is crucial for the smooth functioning of educational institutions and ensuring secure operations, particularly in busy residential college settings. Nonetheless, the service center of UTHM Residential College is using a traditional procedure throughout their logistics operations. The current manual approach presents issues in terms of security, tracking, and misplaced package due to the growing volume of package and deliveries. Therefore, the development of a new system hopefully can solve the problem and can be more efficient than before. The proposed system will assist students receive real-time notifications so they can pick up shipments as soon as possible. Administrative staff will benefit from automated data entry since it will improve record-keeping and reduce errors. By leveraging advanced technologies and a user-friendly interface, the Parcel Hub system will enhance the overall efficiency of the parcel management process. This report outlines the conceptual framework, development methodology, and technology stack utilized in the creation of the Parcel Hub system. System Development Life Cycle Prototyping model is used as the methodology to develop this system and using PHP as server-side scripting. As a result, the project development benefits for emphasizing student information management, package receipt and delivery information to meet a systematic and efficient management of the UTHM Residential College System.

1. Introduction

The effective handling of parcel information is essential to facilitate the seamless movement of goods to and from its vibrant student population in the busy and active setting of the UTHM Residential College. In the context of this study, parcel management refers to the supervision of inbound and outbound deliveries, a procedure that is essential to student life. Currently, the administration of the college, postal services, and the students themselves all share responsibility for this management. For examine the current approaches, the problems they pose, and an innovative solution that will streamline and improve the parcel management experience for all stakeholders considering the crucial relevance of this process.

The existing system in UTHM Parcel Residential College was involved in the combination of the manual processes and digital basics of tools for managing the various aspects of their operations. The current system process has

specific processes and tools. In the current system, UTHM Parcel Residential College relies on manual methods. For example, they are still using spreadsheets or physical documents to manage the parcels information and track. This system is like the formulation management that often handles using the manual records where the parcels are received, modified, and documented.

A variety of difficulties have been found with the present parcel management system. First, relying on paper documentation and human data entry raises the possibility of errors and might cause delays in parcel retrievals. Second, students who are waiting for their parcels are frustrated by the lack of transparency and real-time tracking in the process. The engagement of numerous parties also causes coordination problems, misunderstandings, and inefficiencies. The seamless and efficient management of parcels within the UTHM Parcel Residential College is hampered by these issues taken together.

The implementation of an advanced Parcel Hub for UTHM Residential College Management System has been suggested to solve these issues and streamline the parcel handling procedure. With the help of this system, students will receive notifications in real time so they may quickly pick up packages. Automated data entry will aid administrative workers by lowering errors and enhancing record-keeping. Furthermore, by providing real-time tracking and status updates, the suggested system will improve transparency. With the help of the Parcel Hub, UTHM Residential College hopes to develop a centralized and effective parcel management solution that will improve students' overall experiences.

2. Literature Review

The literature review delves into current research and advancements in parcel management systems, focusing on challenges faced by residential college administrations. It critically analyzes previous studies to identify gaps and highlight the potential contributions of the proposed system. The review establishes the importance of efficient parcel management in enhancing user experience and streamlining operations. First system, the UTM ACAD - UTM CPS (UTM College Parcel Services) system allows users to manage parcel information, search for students, and update packaging and reporting details. Students can register with their ID, password, and email, while administrators can register new parcels and manage parcel details. Users can track parcel status, receive email updates, and return unknown parcels, while administrators can monitor parcel movements and access distribution reports [2].

Second system, e-Pos UMS, developed by the Registrar's Department of Universiti Malaysia Sabah, streamlines the university's correspondence management with a user-friendly interface and secure features. It consists of two modules: incoming mail, where postal staff record and notify recipients of received mail, and outgoing mail, where staff request postal services for official duties. These modules enhance the efficiency and transparency of the university's administrative processes [3].

Third system, the ePARCEL KV Kuala Selangor System streamlines the retrieval of student and lecturer items with a user-friendly, publicly accessible interface, eliminating the need for registration. Users can easily check parcel status by inputting a tracking number or name, and the system displays comprehensive contact information and detailed parcel records. Inspired by its efficient search and record-keeping features, a similar system is being developed for UTHM's residential colleges to enhance the management and tracking of student parcels [4].

The proposed Parcel Hub for UTHM Residential College Management System is a web-based platform designed to streamline parcel management for UTHM students and administrators. It includes modules for registration, parcel notification, tracking, data entry, fee management, and reporting, allowing students to register, track parcels, and receive notifications, while administrators can manage parcel data, fees, and generate detailed reports. The system aims to enhance efficiency and provide comprehensive insights into daily parcel operations through user-friendly dashboards and customized reports. Table 1 summarizes the comparison of existing systems.

Table 1 Comparison of existing systems

Features	UTMCPS	e-Pos UMS	ePARCEL KV Kuala Selangor	Parcel Hub College Management System
Registration and Login	User id and password	User id and password	Not using registration and login module	User id and password
Parcel Notification	Email notification	Email notification	Not using notification module	Email notification

Parcel Tracking	Using tracking number and name	Using tracking number	Using tracking number	Using tracking number
Data Entry and Record Keeping	Add and update record	Add and update record	Add and update record	Add and update record
Parcel Fee Management	Not using fee module	Not using fee module	Not using fee module	Charge fee management
Reporting and Analytics	Graph and bar chart	Table reporting	Not using reporting module	Table reporting

3. Methodology

The prototyping model is a method for developing software that entails building a basic, condensed version of a system [5]. The prototype is an additional work that should be considered when calculating effort because it frequently does not contain the exact logic utilised in the software application. Based on the specifications acquired from the client, a quick build of this preliminary version was undertaken. Table 2 shows the software development activities and their task.

Table 2 Software development activities and their task

Fasa	Task	Output
Planning	<ul style="list-style-type: none"> Proposed the project to the supervisor. Identify problem statement, objective, scope and project purpose. Determine the project schedule, activities and output. 	<ul style="list-style-type: none"> Project proposal and interview session with residential college director. Statement of the problem, objectives, scope and importance of the project is obtained. Develop Gantt chart.
Analysis	<ul style="list-style-type: none"> Gather detailed requirement relates to the problem statement. Define stakeholders needs and requirements. 	<ul style="list-style-type: none"> Project requirement specification obtained. Data Flow Diagrams (DFD). Entity-Relationship Diagram (ERD). Flowcharts.
Design	<ul style="list-style-type: none"> System architecture creation. Schema and data dictionary development. User interface design 	<ul style="list-style-type: none"> Comprehensive blueprint for the system. Detailed data dictionary with definitions and relationships. Visually intuitive screens for end-users.
Prototype	<ul style="list-style-type: none"> Create preliminary model. Showcase key features. Provide hands-on experience. 	<ul style="list-style-type: none"> Initial version of the parcel management system prototype. Demonstration of functionalities like entering parcel tracking information.
Implementation	<ul style="list-style-type: none"> Coding and development. Testing system components. Debugging and error handling 	<ul style="list-style-type: none"> Use of JavaScript, MySQL, and PHP for development. Verification of each module. Identification and resolution of faults.
Testing	<ul style="list-style-type: none"> Functional testing. Performance testing. User involvement in testing. 	<ul style="list-style-type: none"> Verification of all features of as intended. Assessment of system performance under various scenarios. End-user participation in functional and performance testing.

4. Analysis and Design

This section will describe the analysis of the study and data schema. It includes Context Diagram (CD), System Architecture Data Flow Diagram (DFD), Flowcharts, and Entity Relationship Diagram (ERD).

4.1 Context Diagram

Context diagrams present an overview of interaction between the system and its user. Context diagram also shows the input and output to and from its user and system. Figure 2 shows the context diagram of the developed system.

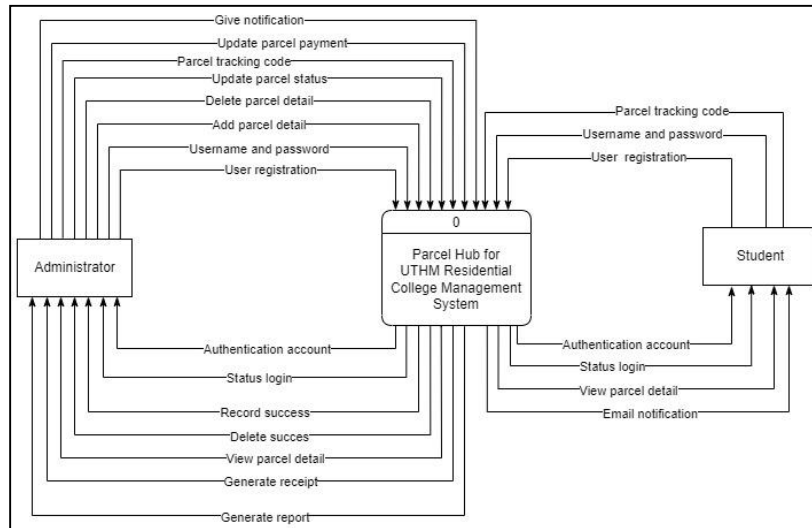


Figure 2: Context Diagram

4.2 Data Flow Diagram

Data Flow Diagram (DFD) is a graphical representation of the flow of data or input from an entity through a process, which then generates output either to another entity or stored in data storage. DFD shows each input and output for each entity and process. Figure 3 shows the Level 0 Data Flow Diagram (DFD 0) of the developed system.

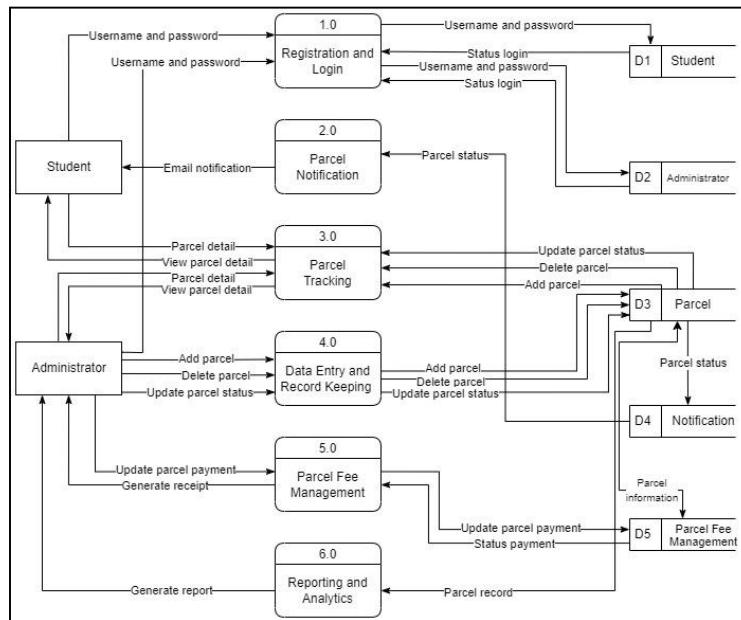


Figure 3: Data Flow Diagram Level 0

4.3 Entity Relationship Diagram

Entity Relationship Diagram is a visual representation of the relationships among entities in a database. The primary components of an ERD are entities, attributes, and relationships. Figure 4 shows the Entity Relationship Diagram of Parcel Hub for UTHM Residential College Management System.

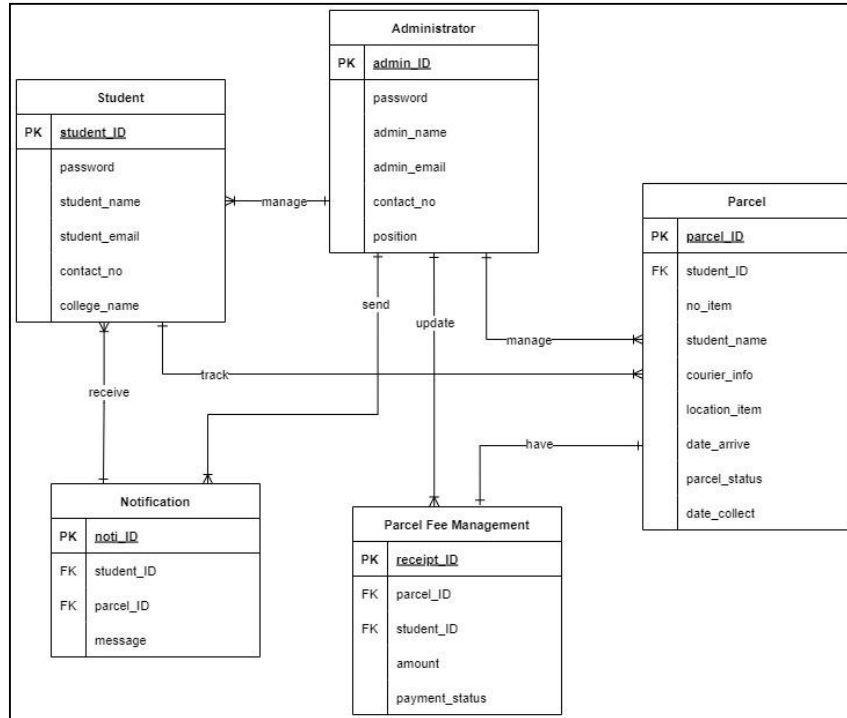


Figure 4: Entity Relationship Diagram (ERD)

The Entity Relationship Diagram includes five entities which are student, administrator, parcel, notification, and parcel fee management with their respective attributes also the relationships between them. The Entity Relationship Diagram describes how the various entities interact within the developed system. Administrator manages students and handles parcel records, including sending updates and maintaining fee records. Students are linked to parcels both directly and through notifications, which keep them informed about their parcels' status.

4.4 Flowchart

Flowchart is a visual representation of a process or algorithm using symbols, shapes, and arrows to illustrate the sequence of steps and decision points. It provides a clear and systematic way to understand, document, and communicate complex workflows or procedures in various fields.

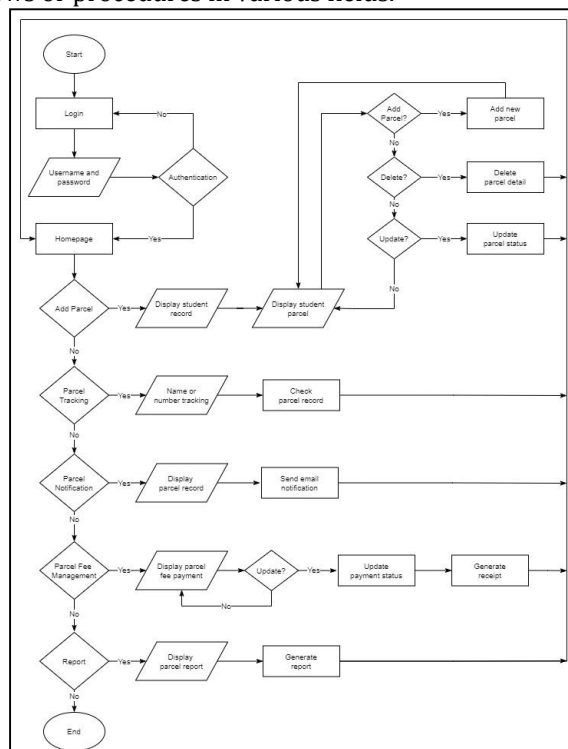


Figure 5: Flowchart for Administrator

Figure 5 shows the flowchart for administrator. The operational procedures of the developed system are outlined in the provided flowchart. The process initiates with user login, requiring a username and password for authentication. If the authentication fails, the user is prompted to re-enter credentials otherwise, they proceed to the homepage. On the homepage, users can add, delete, or update parcel details, and choose functionalities such as parcel tracking, notification, fee management, and report generation. The flow intelligently navigates through decision points based on user choices. For instance, adding a parcel prompts entry of parcel details, while opting not to adds the choice of deleting or updating parcels. Parcel tracking leads to a search by name or tracking number, and if notifications are needed, email notifications are sent. Parcel fee management allows for payment display, status updates, and receipt generation. The process concludes with optional report generation or the natural end of the flowchart.

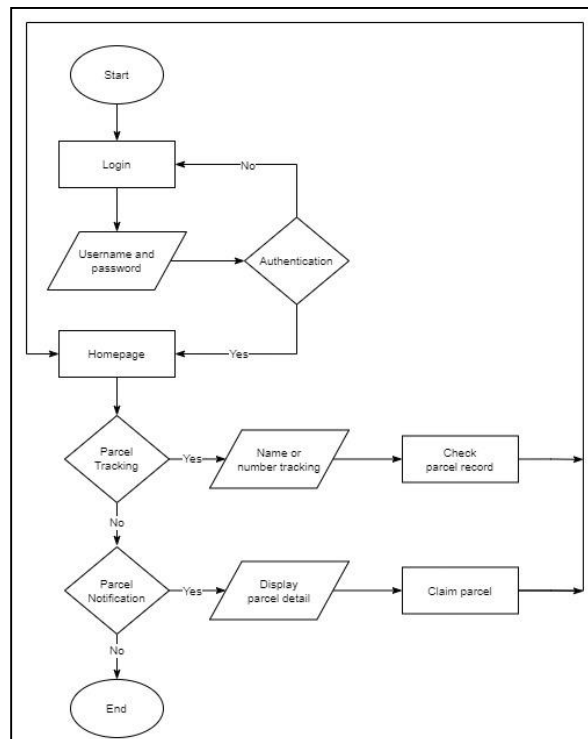


Figure 6: Flowchart for Student

Figure 6 shows the flowchart for students. Commencing with the initiation point, users are prompted to log in, requiring entry of their username and password for authentication. The system subsequently verifies the entered credentials, directing users to the homepage upon successful authentication. Once on the homepage, users are presented with options, including parcel tracking. If users choose to track a parcel, they are prompted to provide either a name or tracking number. Following this, the system checks for parcel notifications, and based on user preferences, either displays parcel details for potential claiming or concludes the process if no tracking or notification preferences are selected.

4.5 System Architecture

System architecture refers to the high-level structure and organization of a complex system, defining its components or modules, their relationships, and how they interact. It encompasses hardware and software aspects, providing a blueprint that guides the system's design and development.

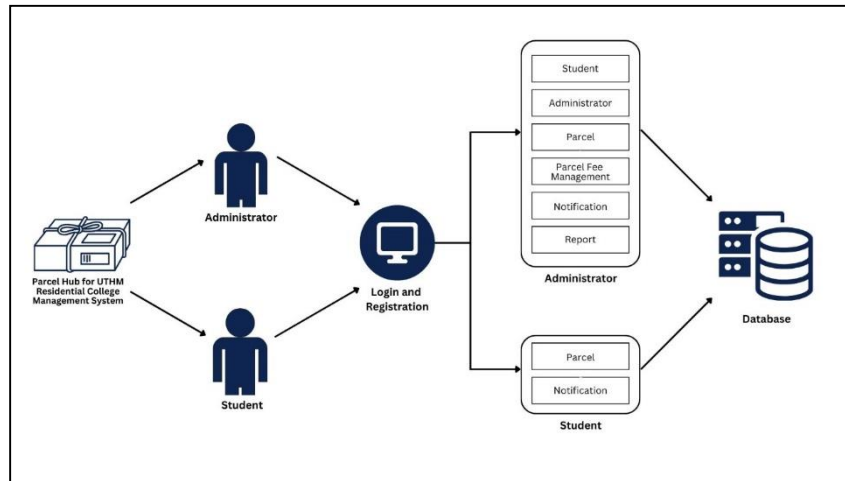


Figure 7: System Architecture

Figure 7 shows the System Architecture of Parcel Hub for UTHM Residential College Management System. There are consist of two users which are administrator and student that requires to register and login into the system. Administrators interact with six data store including student, administrator, parcel, parcel fee management, notification and report while student only interact with two data store including parcel and notification. These two data stores will be stored in the database of the developed system.

5. Result and Discussion

This chapter describes the system implementation process, and system testing for the Parcel Hub for UTHM Residential College Management System.

5.1 System Implementation

There is one side of implementation for this project, which is the website side. For websites, HTML, CSS, Javascript, and PHP programming languages will be used for coding. Then, the software used is XAMPP. XAMPP is a distributor that provides server and database modules. Then, integrated development environment software for website building used is Microsoft Visual Studio Code.

5.1.1 Software for System Development

This section describes some of the software used for system development and its functions.

a. Visual Studio Code

The purpose of using Microsoft Visual Studio Code is to build a website. Figure 8 shows the user interface of Microsoft Visual Studio. The user interface shows the HTML code for the home admin page. A list of folders and files are shown on the right-hand side user interface. The folder consists of multiple files such as HTML, CSS, Javascript, and PHP files. The output of these files will be displayed through a web browser and server-side files will be output by software provided by XAMPP distributor.

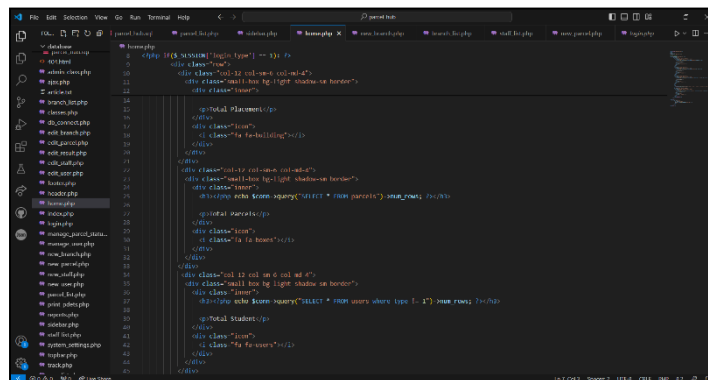
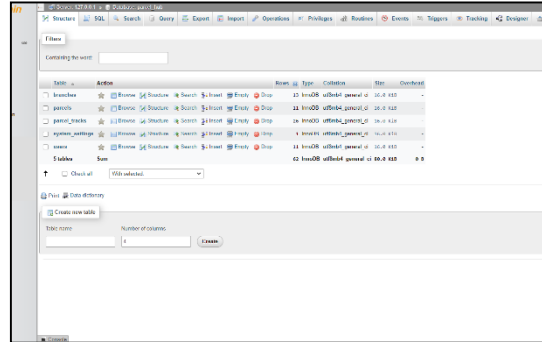
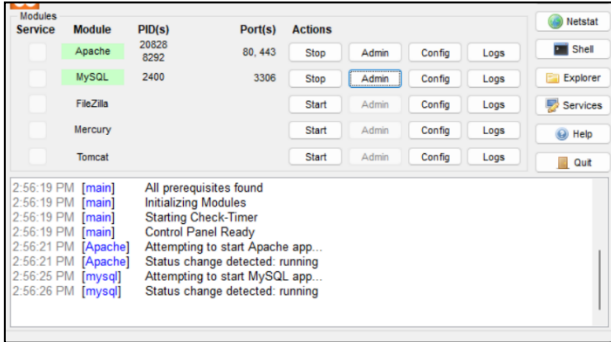


Figure 8 Front-End Development in Microsoft Visual Studio

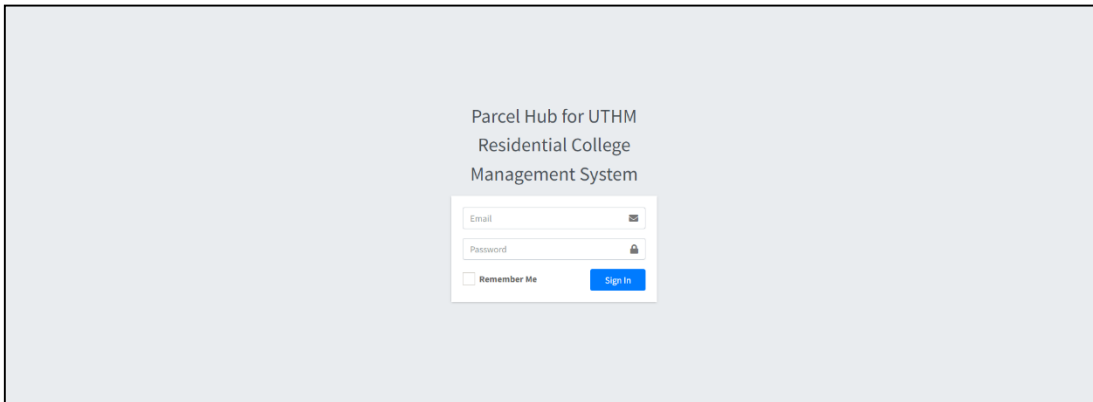
b. XAMPP

XAMPP is a software distributor that contains all the essential modules required to set up a server and to execute server-side coding. In accordance with XAMPP distributor, Apache server and MySQL database will be used in this project. Figure 5.2 and Figure 5.3 illustrates the XAMPP user interface and user interface of MySQL database respectively.

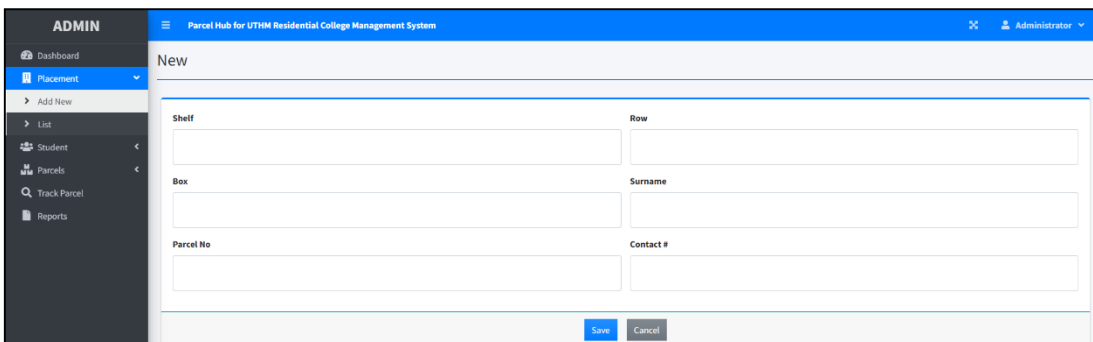


5.2 Functional Module Development

a. Account Registration and User Login Module



b. Data Entry and Record Keeping Module



ADMIN Courier Management System Administrator

Dashboard Placement Add New List Student Parcels Track Parcel Reports

List

+ Add New

#	Unique Code	Shelf	Row.Box.Surname	Parcel No	Contact	
1	yQeVZNRljBdKtW3	88, Jalan Pending,	Kuching, Sarawak, 93450	Malaysia	037727-6374	
2	9ZcKyCNgWxk4v	DAHLIA	6, 9, AYIN	13	0156721321	
3	FUH2h8mWojPqRnQ	HALIMAH	4, 5, TINA	13	0197621345	
4	aZt5306yFV7uAMQ	Jalan Gopeng, Off Jalan Pasar,	Klang, Selangor, 41400	Malaysia	60333428825	
5	UxDn4Ba0MoRm3sE	JALAN MEWANGI	JOHOR BAHRU, JOHOR, 81200	MALAYSIA	01111324453	
6	lBLUPSOWdtHhX	KASTURI	2, 5, MALIA	16	01111762431	
7	9pl0bDaz2CosJK	KASTURI	3, 3, JAY	12	DATU	
8	9lPFCGXuTlekbo	KASTURI	3, 5, HALIMAH	12	01145621231	

All rights reserved. Courier Management System

ADMIN Parcel Hub for UTHM Residential College Management System Administrator

Dashboard Placement Add New List Student Parcels Track Parcel Reports

List

+ Add New

Show 10 entries Search:

#	Student	Email	College	Action
1	Ali Sariah	alii@gmail.com	Larkin Jaya, JOHOR BHARU, Johor, 80350, MALAYSIA	
2	Alya Amran	alya@gmail.com	Jalan Gopeng, Off Jalan Pasar,, Klang, Selangor, 41400, Malaysia	
3	Fatin Syazwani	syazwani@gmail.com	JALAN MEWANGI, JOHOR BAHRU, JOHOR, 81200, MALAYSIA	
4	Qistina Ali	qistina@gmail.com	Jalan Gopeng, Off Jalan Pasar,, Klang, Selangor, 41400, Malaysia	
5	Zakwan Rosman	zakwan@gmail.com	MERLIMAU, 4, 5, ISKANDAR, 12	

Showing 1 to 5 of 5 entries Previous 1 Next

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ADMIN Parcel Hub for UTHM Residential College Management System Administrator

Dashboard Placement Add New List Student Parcels Track Parcel Reports

New Parcel

<p>Sender Information</p> <p>Name <input type="text"/></p> <p>Address <input type="text"/></p> <p>Contact # <input type="text"/></p>	<p>Recipient Information</p> <p>Name <input type="text"/></p> <p>Address <input type="text"/></p> <p>Contact # <input type="text"/></p>
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Type **Pickup** Deliver - Deliver to Recipient Address, Pickup - Pickup to nearest branch

c. Parcel Tracking Module

STUDENT Parcel Hub for UTHM Residential College Management System Alya

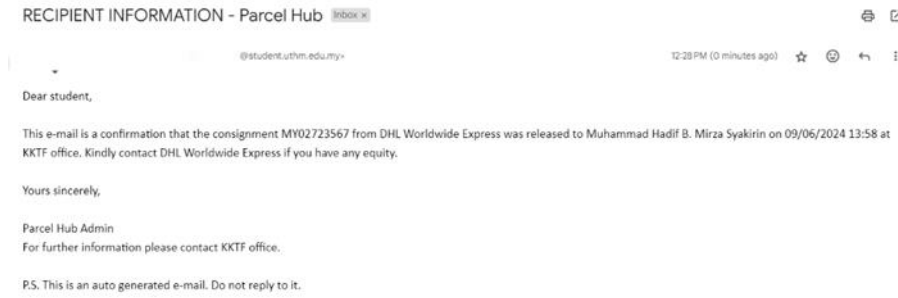
Dashboard Parcels Track Parcel Reports

Track

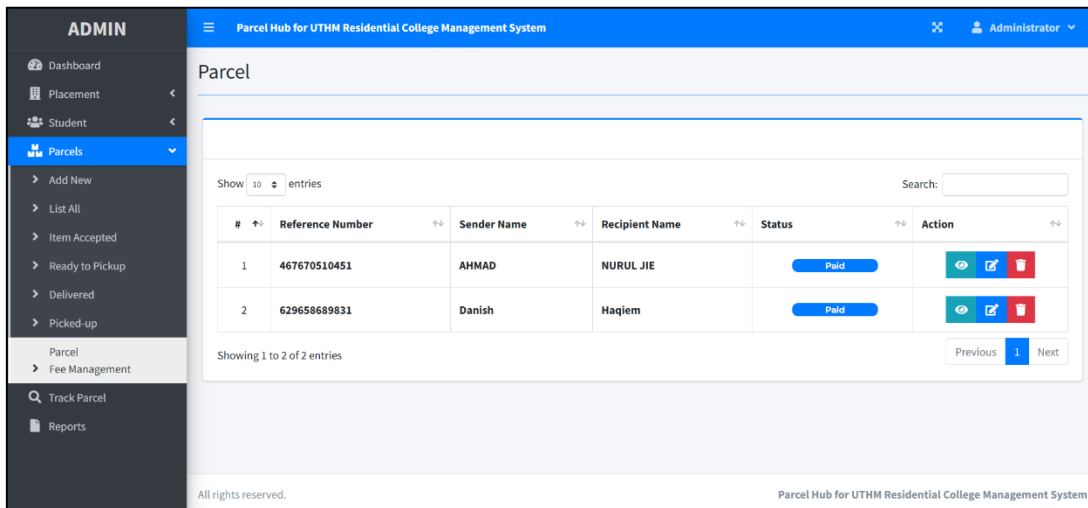
Enter Tracking Number

- Item accepted by Courier Jun 05, 2024 12:41:00
- Shipped Jun 05, 2024 12:40:00
- Arrived At Destination Jun 05, 2024 12:40:00
- Out for Delivery Jun 05, 2024 12:45:00

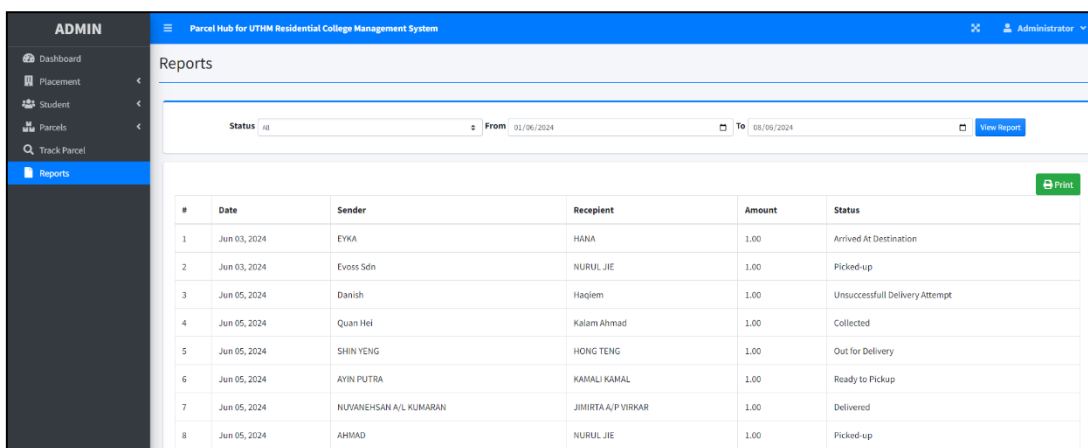
d. Parcel Notification Module



e. Parcel Fee Management Module



f. Reporting and Analytics Module



6. Conclusion

In conclusion, the existing logistics management process at UTHM Residential College, relying on traditional manual methods, has encountered challenges in terms of security, tracking, and efficient handling of the growing volume of packages. Recognizing these limitations, the proposed Parcel Hub system emerges as a strategic solution to address these issues. By introducing real-time notifications for students, automating data entry for administrative staff, and employing advanced technologies with a user-friendly interface, the Parcel Hub system aims to enhance overall efficiency in parcel management. The adoption of the System Development Life Cycle Prototyping model, with PHP as the server-side scripting language, underscores the commitment to systematic and efficient management of the UTHM Residential College System. This report provides a comprehensive overview of the conceptual framework, development methodology, and technology stack employed in the creation

of the Parcel Hub system, marking a significant step toward modernizing and optimizing logistics operations within the educational institution.

Acknowledgement

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