



UTM
UNIVERSITI TEKNOLOGI MALAYSIA

SECD2523 DATABASE

SEMESTER I 2025 / 2026

Phase 1:

Project Proposal & Database Requirement

Lecturer:

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- Group 2 -

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1.0 Introduction

Internet shopping has increasingly been a trend for university students and workers. Hence, there has been a remarkable increase in parcel deliveries to the institutions. At the Universiti Teknologi Malaysia (UTM), the One Stop Parcel Centre (OPC) acts as the primary point of receipt and distribution of parcels received for the university's students and workers. Everyday, OPC receives a high number of parcel deliveries from several courier services including PosLaju Couriers, J&T Express Couriers, Shopee Express Couriers, and DHL Couriers.

At the moment, parcel management activities at OPC are carried out manually. This takes a long time since the parcel information is documented by the staff members using paper documents and simplified spreadsheet applications. This also poses a challenge of tracking parcel information and notifying students of their parcel arrival. This results in the system being ineffective, particularly during peak times.

In a bid to address such problems, a Parcel Service System for the One Stop Parcel Centre (OPC) has been proposed. This system uses a postcode database to organize parcel information effectively and send automated notifications to the parcel owner. This system will also help the staff register a parcel, view a parcel status, and retrieve parcel information instantly.

With the implementation of this system, OPC can certainly enhance accuracy and efficiency in managing parcel records with reduced opportunities for human error and increased communication between the parcel centre and the intended receivers. This system intends to manage information rather than physical parcels and aims to optimize the processing and storage of parcel information at UTM's One Stop Parcel Centre.

2.0 Background Study

One Stop Parcel Centre (OPC) at Universiti Teknologi Malaysia (UTM) operates as a central point for the receipt and distribution of parcels to and from the university community. Owing to the escalating trend of online shopping culture, the number of parcels received by OPC has been increasing at a staggering rate. On a daily basis, OPC handles a figure of hundreds of parcels from a host of courier services including PosLaju, J&T Express, Shopee Express, and DHL. Every single parcel needs to be documented and tracked for distribution to its rightful owner.

At the moment, the current operations of OPC are highly manual. This means that once the parcels are received; the details of the parcel tracking number, courier services, and details of the person being delivered to are documented manually. This hinders the efficiency of notifications that are supposed to be sent to the respective parcel owners once the parcels arrive. This can at times cause a backlog during peak periods.

Absence of a common database system means that tracking the status of parcels and obtaining relevant information may be a challenge. A storage space at OPC may lack space due to undelivered parcels that go undetected by the intended receivers. Also, lack of a common system means that some information may be entered several times when searching for specific parcel details.

In a bid to counter these issues, a Parcel Service System for the One Stop Parcel Centre (OPC) can be developed. This system can aid OPC by making use of a structured database to automatically register and notify users of parcel information. This technology can help OPC optimize services and reduce the chances of error between OPC and its parcel receivers.

3.0 Problem Statement

The current parcel handling system within the Universiti Teknologi Malaysia (UTM) One Stop Parcel Centre (OPC) is prone to some drawbacks through its manual data handling, lack of traceable data, and manual parcel collection system. These drawbacks affect efficiency, precision, and general quality of service among students and staff.

Currently, students need to come and check manually once in a while through the parcel centre—combined with the inflexibility of the operating hours of the OPC, this process is both inefficient and time consuming. The time students spend on trying to pick-up their parcels can be spent on other things and with so many improvements that the management could make, leads them towards the need to implement an integrated parcel management system.

The several key issues that were found due to the absence of an integrated parcel management system are such as :

- **Lack of structured package information management :** Absence of a structured package information system causes inefficiency of parcel information search, prone from human error, and lack of parcel tracking accuracy.
- **Lack of traceable data records :** The lack of traceable data records in the OPC system makes it difficult to trace who collected the parcel or which staff handled the transaction/collection.
- **Long Queue and Inefficient Parcel Retrieval** During peak time like weekends and lunch break, the large number of students queuing to collect parcels causes congestion and long waiting times.

4.0 Proposed Solution (With Feasibility Study)

After careful examination of the problems that we have found within the One Stop Parcel Centre (OPC) system, we have concluded that below are the suitable solutions implemented for an integrated parcel management system.

- **Implementation of digital management system with database :** using QR code and/or barcode to record the parcel's related information like recipient's name, phone number, and etc.
- **Information access from database :** Information access from database regarding the parcel's related information (recipient's name, phone number, etc) and the inclusion of information about the collector of the parcel and also which staff handled the transaction.
- **Implementation of a notification system for parcel pickup :** Parcel availability for pickup automatically sends a notification to students based on the phone number of the parcel info via platforms such as WhatsApp so that the students can collect them ASAP.

From the proposed solutions above we can conclude that it fulfilled 3 feasibility, which is :

- **Technical Feasibility :** Integrating QR/Barcode and notification system's API into the database for the digital management system.
- **Operational Feasibility :** the measures being used makes the workflow more efficient, reduce the risk of human errors, and improve the accountability and security of the system.
- **Economic Feasibility :** The estimated benefit outweighs the estimated cost, with the estimated cost being low-medium.
- **Legal Feasibility :** It includes data protection and also consent-based communication which ensures no unrelated data will be used to execute something.

In summary, the proposed parcel management system improves the operational efficiency and accuracy of the OPC system by introducing digital management, database information integration and automated notification mechanisms. This solution is feasible from technology, operation, economy, and legal perspectives. It not only reduces human error and management costs but also enhances system security and transparency, meeting actual operational needs, and possessing significant implementation value.

5.0 Objectives

Main Objective :

To upgrade the existing parcel service system by improving overall operational efficiency, strengthening data management and record accuracy through the use of modern technology and automation tools, and enhancing customer satisfaction by providing a faster, more reliable, and transparent parcel handling and notification services.

The upgraded system aims to reduce manual work, minimize human errors, and ensure that both staff and customers benefit from a more efficient and user-friendly process.

Specific objective :

1. To automate the recording of parcel handling by integrating QR code scanning or barcode, allowing the parcels to be easily logged, tracked, and identified withing the system.

This automation will reduce human error during data entry, eliminate repetitive manual tasks, and ensure that parcel details are stored accurately in the database. It will also allow staff to retrieve parcel information quickly, resulting in faster processing times and better service delivery.

2. To enhance customer satisfaction by minimizing/eliminating long queue hours and waiting time during parcel pickup, particularly during peak periods such as lunch breaks or weekends.

This will be achieved by implementing a more organized and automated parcel retrieval process, potentially supported by a self-service parcel locker system. The upgrade will streamline parcel collection, allowing customers to receive their items efficiently without unnecessary delays or staff dependence.

3. To provide more precise feedback regarding the parcel's condition and location, ensuring full transparency and accountability throughout the delivery process. By integrating real-time status updates and automated notifications (email alerts, etc), the system will keep customers informed of their partner's journey - from arrival to pickup.

6.0 Scope

Based on our proposed problem and solution for the One Stop Parcel Centre (OPC), these are the things that will be covered in the implementation of the database system :

1. Parcel registration and management
 - record parcel details and assign them with QR or barcode.
2. Tracking and status update via official email
 - system will send notice regarding the parcel for students through their graduate email.
 - update parcel status automatically (“in transit”, “delivered”, “returned”)
3. Client-side interface
 - Allow customers to book deliveries online, view parcel details and status, and print receipts
 - Provide delivery notification via designated email and SMS
4. Admin dashboard
 - Let administrators manage users, delivery couriers, and system data
 - generate reports (revenue, costs, etc)
5. Users data management and security
 - stores parcel and user information in database and grants access depending on the different user roles (admin, customer, courier)

7.0 Project Planning

7.1 Human Resource

Our project team consists of 4 key members and each of whom has a specific role. In this project, each of the team members played their own role perfectly.

Wong Jia Kai:

He discussed client and system identification with other team members. He then divided our team's work to make them easier to complete. He also kept a timeline of our discussions, client search, each part working and other tasks, and drew an AS-IS diagram of the current state of the system which helped for understanding the system.

Muhammad Rendy Atsary:

Involved in the development of the Introduction, Background Study and Problem Statement of the project proposal for parcel service system at One Stop Parcel Centre (OPC). His responsibilities include analyzing the parcel management system followed by identifying key problems associated with the parcel management system that requires a solution using a database system.

Rafly Salim Kaaffah Abdillah:

Planned a discussion about the solutions as well determining which feasibility is fulfilled with each solution for each problem, his contribution after that is the research of the scope of how far the proposed system will reach, by identifying the solution and how it will affect the clients who will use the system.

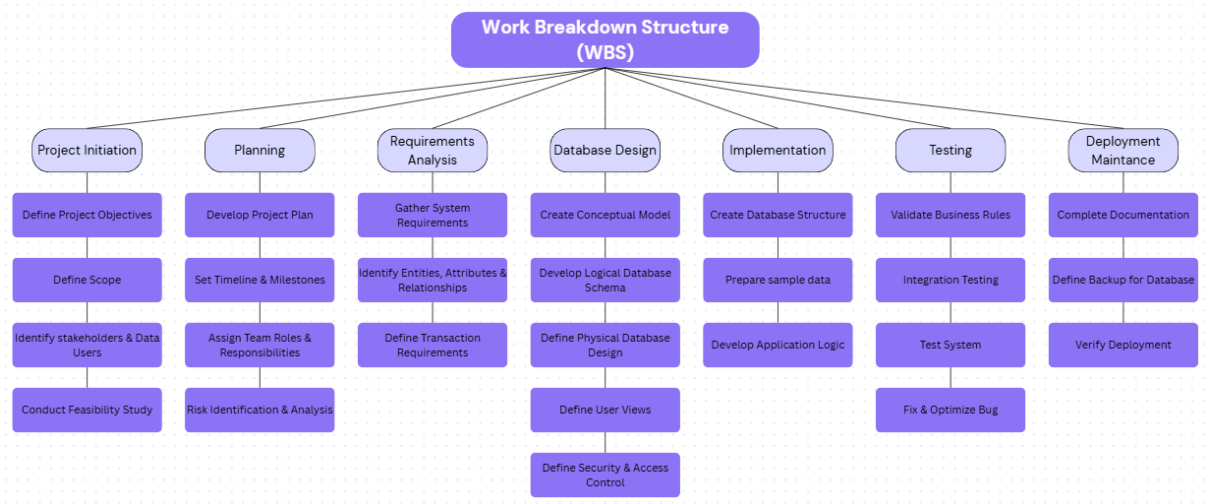
Ezz Eddin Marwan:

Identify the overlooked issues that team members haven't noticed and contribute some additional ideas for making the solution and problems more complete. Have a good understanding of the transaction requirement that gives more details about it.

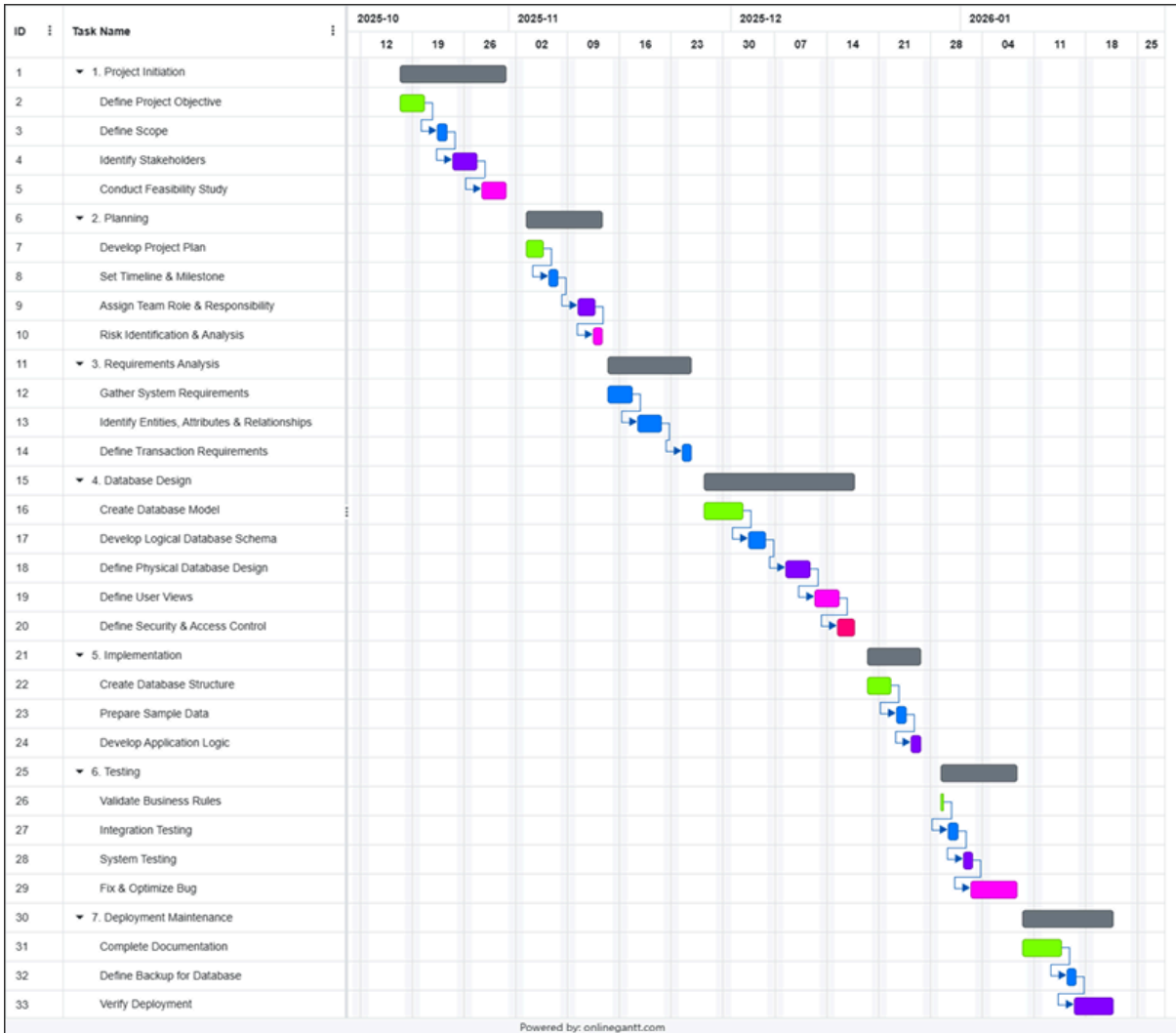
Guo DingMing:

His task during the project period is giving his own views about the problem and solution of our client and giving a good understanding about all the process of developing the system for concluding the function of the system.

7.2 Work Breakdown Structure (WBS)



7.3 Gantt Chart



8.0 Requirement Analysis (AS-IS System, Functional & Non-Functional)

8.1 Current Business Process (Scenarios + Workflow)

In order to effectively analyze and understand the system requirements and the data involved, it is essential to examine the scenarios and workflow of the current business process. By studying the scenarios and workflow of the existing system, the functional and non-functional requirements can be accurately identified, which highlights the limitations of the current system.

Scenario:

When multiple parcels are delivered to the One Stop Parcel Centre (OSP), the staff receive the parcels and manually record basic parcel information, such as the recipient's name and phone number, in a logbook. The parcels are then manually sorted based on the delivery address indicated on each parcel.

After the parcels have arrived, students visit the OSP to collect their parcels. However, due to the manual sorting and searching process, students are often required to wait for a long period while staff locate the parcels.

In addition, the manual retrieval process makes it difficult to trace wrongly collected or missing parcels, as information regarding the parcel recipient and the staff responsible for handling the transaction is not systematically recorded.

Workflow:

The current workflow of the One Stop Parcel Centre (OSP) begins when the courier delivers the parcel to the centre, the staff will collect the parcels first and start to record the detailed information of the parcel manually. After that, the staff will sort the parcels based on its delivery address and place them on the specific shelf. When the students arrived at the centre, they should be provided their own personal information for finding their parcel. Staff will manually search the parcel based on the provided information. The student will collect their parcel.

The existing system lacks a structured parcel information management mechanism that is capable of efficiently recording, searching, and tracking parcel and recipient's information. As a result, the manual process leads to inefficient information retrieval and inaccurate record-keeping. By developing a centralized database, issues related to the lack of traceable data records and inefficient parcel retrieval can be effectively addressed.

8.2 Functional Requirement

After gaining a clear understanding of the current business process of the existing system, the functional requirements required to support the system operations can be systematically analyzed.

Requirement	Description
Record Parcel Information	Parcel information can be stored inside the system like the name, phone number and address systematically.
Searching Parcel	Staff able to use the phone number or name to search the parcel
Record of collection	System can record the status of parcel and collected time
Record staff information	System can record the information of the staff who handle the collection
Identify recipient information	The system can identify the correct recipient based on the correct recipient's name or phone number to collect the package.

8.3 Non-Functional Requirement

In addition to the functional requirements, it is essential to define the non-functional requirements of the system, which describe the quality attributes and operational constraints that the system must satisfy.

Type	Requirement	Description
Efficiency	Response time & Throughput	Response time of system cannot over 5 seconds
Accuracy	Data Accuracy & Consistency	Ensure the information is accurately recorded without duplication or inconsistency.
Traceability	Parcel Transaction Records	Maintain a complete record of parcel collection history.
Realibility	Data Storage & Availability	Securely store parcel data to prevent data loss.

9.0 Transaction Requirement (Entry, Update/Delete, Queries)

9.1 Database Requirement Analysis

A.Business Rules

1. Each parcel must be registered with a unique parcel tracking ID (barcode/QR).
2. A student can have multiple parcels, but all must be collected within 7 days.
3. Parcel status must always be one of the valid states:
“Received” / “Stored” / “Notified” / “Collected”
4. A parcel can only be collected after the system verifies the student ID/matric number.
5. Students must have a valid university email for notification; duplicate emails are not allowed.
6. Only authenticated staff can register and update parcel records.
7. Overdue parcels (uncollected for more than 7 days) must be recorded for action and included in reports.

B.Data Requirements

Entity	Key Attributes	Description
Student	StudentID, Name, Matric Number, Email, Phone Number	Parcel recipients
Parcel	ParcelID , Courier Name, Parcel Type, Arrival Date, Storage Location, Status, StudentID	Tracks each physical parcel
Notification	NotificationID , ParcelID , Sent Date, Notification Type (Email/SMS), Status	Records communication attempts
Staff	StaffID , Name, Position, Login Credential, ActivityLog	Authorized handlers of parcels
Parcel_Handling_Log	LogID , ParcelID , StaffID , Timestamp, Activity (Receive/Update/Collect/Return)	Accountability tracking

C.Transaction Functional Requirements

Data Entry

Function	Description
Register new parcel	Scan barcode → link to student → record arrival info
Add new student	During first parcel arrival, if student not in system

Data Update / Delete

Function	Description
Update parcel status	Soft-delete student account
Record parcel pickup	Verify student and record exact timestamp and handler
Manage storage location	Reassign parcel location for easier retrieval
Modify student info	Update contact details when needed
Soft-delete student account	Mark as inactive but maintain historical data

Data Query (Select)

Query Type	User	Description
Search parcel by: ParcelID, StudentID, Matric Number, Courier, Date	Staff/Student (self-only)	Fast retrieval to reduce queue time
List overdue parcels	Staff	Identify uncollected parcels >7 days
List parcels by storage location	Staff	Improve search efficiency
Notification history	Staff	Verify sent notices
Daily statistics	Admin	Total received/collected items

10.0 Benefits of the Proposed System

The proposed system, if implemented correctly, will allow for One Stop Parcel Centre to gain various benefits to the company as a whole, as opposed to the current system. Benefits include that the parcel centre can properly record and keep track of every parcel received by the centre, ensuring that all parcels are accounted for. This will significantly decrease the rate of errors by the centre in keeping track of all the parcels, which will make students less worried about their parcels.

In addition, the students or customers will be assured knowing that they'll receive a notification upon the parcel being received by the centre. This will allow customers to plan on picking up their parcel from the centre, whether to make an appointment or have the parcel centre send it to them directly. Thus allowing for a better customer experience and an increase in satisfaction with the centre's services.

Furthermore, staff will have a decrease in workload with the implementation of the proposed system. This is because of the scanning of the barcode or QR code, which allows for all information of the parcel to be recorded easily into the database. Moreover, this will allow for staff to have more time to do other crucial duties. Thus, the proposed system will increase the staff's efficiency at the centre.

Finally, the proposed system will allow for smoother operations during peak time with the multi-criteria search. This will enable the staff to be able to search the customer's parcel through matric number, parcel ID, phone number, name and arrival date. The staff will be able to locate the parcel more easily and no longer need a considerable amount of time. The centre will have less the amount of long queues and better customer experience.

11.0 Summary

Overall, this proposal aims to develop a “Parcel Service System” that is fundamentally driven by a well-structured relational database. The core of the project is to replace error-prone and inefficient manual processes with a centralized data management solution, ensuring accuracy, speed, and traceability in daily operations.

This Phase 1 report has laid the essential groundwork by defining the project's scope, analysing user needs, and detailing the specific data and transactions the system must handle. The feasibility of the project is assured by its clear focus on database technology, the use of cost-free development tools, and a realistic project plan.

All the analysis conducted here—from the problem statement to the functional requirements—directly informs and guides the next stage of the project: the creation of the database's conceptual design. The subsequent phase will translate these clear requirements into a precise Entity-Relationship Diagram (ERD), moving us decisively toward a functional and reliable database at the heart of the proposed system.