APPENDIX A: FUNCTIONALITY DESCRIPTION OF THE CASE STUDY

Background – NP Courier Service Management System

NP Courier Service (NPCS) provides express parcel delivery to more than 30 countries. In each country, it has set up front offices to receive parcels, and a delivery station to coordinate delivery. The company is planning to set up a web application to improve its business productivity. The application should provide the following four functional areas (or packages):

1. Parcel Receiving
2. Parcel Delivery
3. Parcel Tracking
4. Administrative and Marketing Tasks

The users are:

Front Office Staff – responsible for creating a "Parcel Delivery Order" record into the system receiving a parcel from customers. The front office staff will also use the system to collect payments in cash or cash vouchers (customers to collect from a front office). Login account: "***FrontOffSG1***", password: "***passFront***".

Station Manager – responsible for assigning each parcel to a delivery man. He/she will use the system to report the delivery status upon customers' phone queries (parcel tracking), as well as responding to feedback/queries made by registered customer in the system. The station manager will also follow up with the parcel sender when receives a "Delivery Failure Report" in the system. Login account: "***StationMgrSG***", password: "***passStation***".

Delivery Man – will access the system for parcels to be delivered each day. He will update the delivery status in the system upon acknowledgement from the parcel receiver, or after custom's clearance for delivery to overseas station. If delivery is unsuccessful or parcel is being damaged, the delivery man will have to create a "Delivery Failure Report" in the system. The login credentials for each delivery man is indicated in the "***LoginID***" and "***Password***" columns of the "*Staff*" table in the database of the system.

Admin Manager – responsible for updating the delivery rate and transit time for delivery to various destination from a delivery station. For promotion purpose, he/she can also use the system to issue cash voucher to a registered customer whose date of birth falls in the current month. Login account: "***AdminMgrSG***", password: "***passAdmin***".

Customers – can track the delivery status of their parcels (either as a sender or receiver). The customer can also give online feedback or make enquiry. For privacy protection, each customer can only view their feedback or enquiry, together with the corresponding responses from the station manager. The login credentials for each customer is indicated in the "***eMailAddress***" and "***Password***" columns of the "*Customer*" table in the database of the system.

Each student in a team should implement a package. If you are working in **3-student team, omit the 4th package**. On top of the 4 packages, you should have a login page to authenticate each user type when they access the website. You should authenticate the password for each login account with the relevant table and column.

Refer to Appendix B and C for the database design that supports each package. **You should not change the database design unless permitted by your tutor**.

When creating and updating data in database, you should ensure data integrity of the database design, e.g. not changing the primary key, taking care of foreign key integrity.

You may make reasonable assumption when implementing the functions, as well as any reasonable extra functions, discuss with your tutor when you want to do so.

Package 1 - Parcel Receiving

NPCS operates front offices in the main cities of each country to serve walk-in customers every day from 9:00am to 9:00pm. Upon receiving a parcel, the front office staff will enter the necessary information into the system. The system will compute the delivery charge based on the weight and shipping distance. A target delivery date will also be computed based on the shipping distance. All this information will be printed on a "Parcel Delivery Order" and passed to the parcel sender for payment. A carbon copy of the "Parcel Delivery Order" is also attached to the parcel to initiate delivery.

Basic Features:

1. Create a parcel delivery record upon receiving the parcel to be delivered *(See "Parcel" Table for details.)*. After a "Parcel" record is created, a unique id "*ParcelID*" will be generated in the "*Parcel*" table. The system should then insert a record associated to the "*ParcelID*" in the "*DeliveryHistory*" table, with a description: e.g., "Received parcel by *FrontOffSG1* on 29 Mar 2023 2:00pm." *(Note: FrontOffSG1 is the Login ID of the front office staff.)*

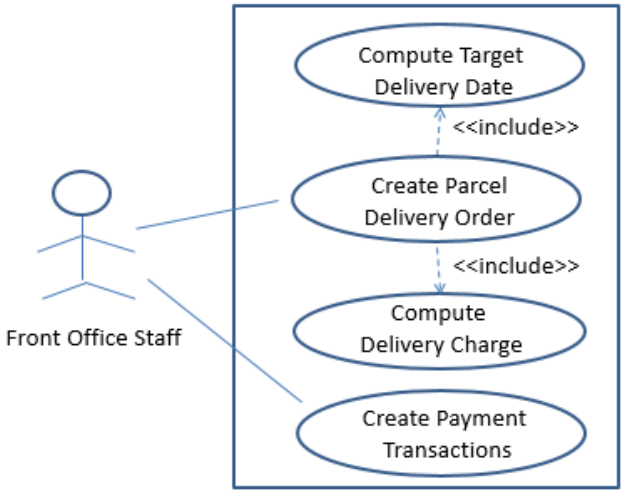
2. Compute the target delivery date. The transit time can be obtained from the "*ShippingRate*" table *(assume that the parcel is always sent out from Singapore).* For example, if a parcel from Singapore to Hong Kong is received at the front office on 29 Mar 2023, the transit time is 3 days. The computed target delivery date will be 1 Apr 2023.

Advanced Features:

3. Compute the delivery charge. The shipping rate to a destination can be obtained from the "*ShippingRate*" table. The delivery charge is then computed by **multiplying the rate with the parcel weight**. The result is **rounded to the nearest dollar and the minimum delivery charge is S$5.00**. *(Hint: In C#, use a function in the "Math" class to perform rounding of decimal places.)* An example is illustrated as follow:

Parcel Weight:	0.2 kg
From City and Country:	Singapore, Singapore
To City and Country:	Hong Kong, China
Shipping Rate:	S$8.35/kg
Delivery Charge (Raw):	(8.35 x 0.2) = S$1.67
Delivery Charge (Rounded):	S$2.00
Delivery Charge (Final):	S$5.00 (*Note: Minimum delivery charge is S$5.00*)

4. Create payment transactions. A payment for a parcel delivery can be in one or more transactions. It can be paid by cash, voucher, cash and voucher. *(See "PaymentTransaction" Table for details. Assume all payment values are in Singapore Dollar - SGD.)*



Use Case Diagram for Package 1

Package 2 - Parcel Delivery

Parcels received from the front offices will be transferred to a delivery station as soon as possible. At the delivery station, the station manager will assign the parcel to a delivery man. The delivery man will check for the outstanding delivery assigned to him. He will deliver the parcel to either the local destination or send to the airport for overseas destination. The delivery man will update the status of parcel delivery to the system. If the delivery is late or unsuccessful, the delivery man will have to create a "Delivery Failure Report" in the system with the reasons.

Basic Features:

1. Upon receiving a parcel, the station manager will search for the parcel delivery record based on the "*Parcel ID*" and assign it to a delivery man. The system should update the delivery status of the parcel to "*delivery to destination in progress*". *(See "Parcel" Table for details.)*. A record associated to the "*Parcel ID*" should be inserted in the "*DeliveryHistory*" table, with the description: e.g., "Received parcel by *StationMgrSG* on 29 Mar 2023 4:00pm." *(Note: StationMgrSG is the Login ID of the station manager.)*

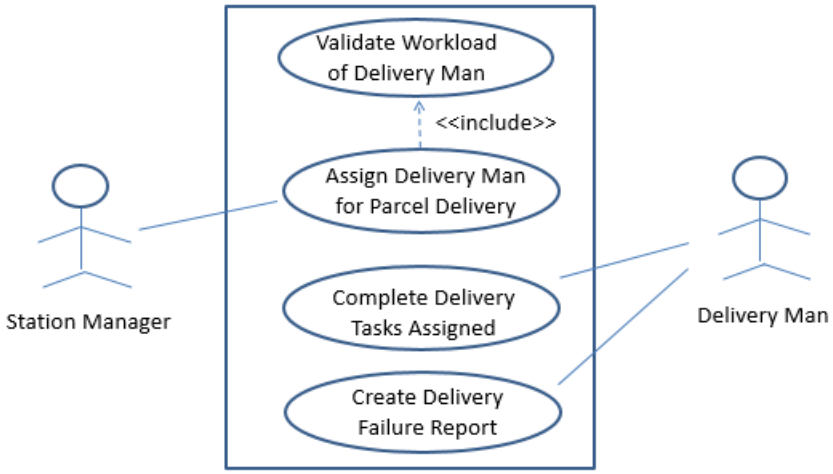
2. The delivery man can view a list of parcel delivery records assigned to him, with the status of "*delivery to destination in progress*". After completing the tasks assigned, the delivery man will update the delivery status as follows:
   - For local delivery, update the status to "*delivery completed*" once the delivery is successful. A record associated to the "*Parcel ID*" will be inserted in the "*DeliveryHistory*" table with the description: e.g., "Parcel delivered successfully by *abc1* on 30 Mar 2023 10:00am." *(Note: abc1 is the Login ID of the delivery man.)*
   - For overseas delivery, update the status to "*delivery to airport in progress*" after delivered to airport. A record associated to the "*Parcel ID*" will be inserted in the "*DeliveryHistory*"

table, with a description: e.g., "Parcel delivered to airport by *abc1* on 30 Mar 2023 1:00pm." *(Note: abc1 is the Login ID of the delivery man.)*

Advanced Features:

3. When the station manager assigns a parcel to a delivery man, the system should validate that the **delivery man can only be assigned with a maximum of 5 parcels with status of "*delivery to destination in progress*"**.

4. For each unsuccessful delivery, e.g., parcel receiver is not found, wrong address, parcel damaged, etc., the delivery man will update the delivery status to "*delivery failed*" and create a "Delivery Failure Report" in the system explaining the situation. *(See "DeliveryFailure" Table for details.)* System to ensure that **only parcel delivery records with the status of "*delivery failed*" are allowed to create "Delivery Failure Report"**.



Use Case Diagram for Package 2

Package 3 - Parcel Tracking

A customer may register as member to track the delivery status of parcels which he/she is sending or receiving. The registered customer may also use the feedback/enquiry feature to communicate with NPCS. The station manager is required to provide a response to the feedback/enquiry. Non-registered customers may track a parcel delivery status by making phone call to NPCS. The station manager will search for a parcel delivery record based on the information provided by the caller, and only report the delivery status and delivery history after ensuring that the caller is the parcel sender or receiver.

Basic Features:

1. Allow customer to register as member with a **unique e-Mail address** and password as login credentials. *(See "Member" Table for details.)*

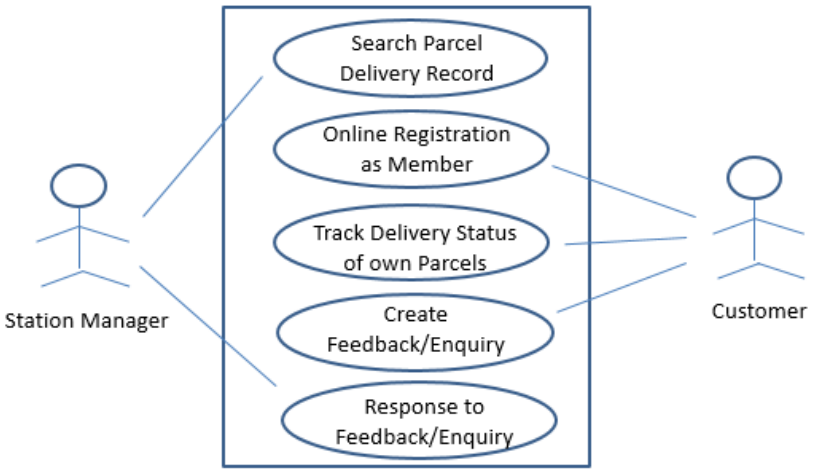
2. Allow station manager to search for a parcel delivery record based on a "*Parcel ID*", **or** a customer name (sender or receiver). The search result should be displayed for the station

manager to verify the customer information. Once verified, the system should display the delivery status and history. *(See "Parcel" and "DeliveryHistory" Tables for details.)*

Advanced Features:

3. Allow registered customer to log in to view his/her own parcel delivery records and the corresponding delivery history. For privacy protection, **system only displays the details of parcel which he/she is sending or receiving**. *(See "Parcel" Table for details.)*

4. Allow registered customer to create feedback/enquiry. (*See "FeedbackEnquiry" Table for details.)* Station manager will be able to view all feedback/enquiry with the status of "pending response" and create response for each of them. System to change the status to "closed" after a response is provided. For privacy protection, **customer can only view his/her feedback/enquiry and the corresponding response**.



Use Case Diagram for Package 3

Package 4 - Administrative and Marketing Tasks

For each failed attempt recorded in "Delivery Failure Report", the station manager will assess the situation and follow up with the parcel sender. If the fault is at NPCS, the station manager will compensate the sender by issuing cash voucher which can be collected at NPCS front offices.

The admin manager stationed at each delivery station will be responsible for updating the shipping rate and shipping duration for parcel delivery to each possible destination (local and overseas). To help to promote registration and also to retain registered customers, the admin manager will issue cash voucher to registered customer whose date of birth falls in the current month.

Basic Features:

1. Admin manager to create and update shipping rates and transit time for local and overseas delivery to each possible destination. **System to ensure that no two records with the same "*FromCity*", "*FromCountry*", "*ToCity*" and "*ToCountry*" are created**. For updating, only shipping rate and transit time should be editable. When creating or updating shipping rate, the

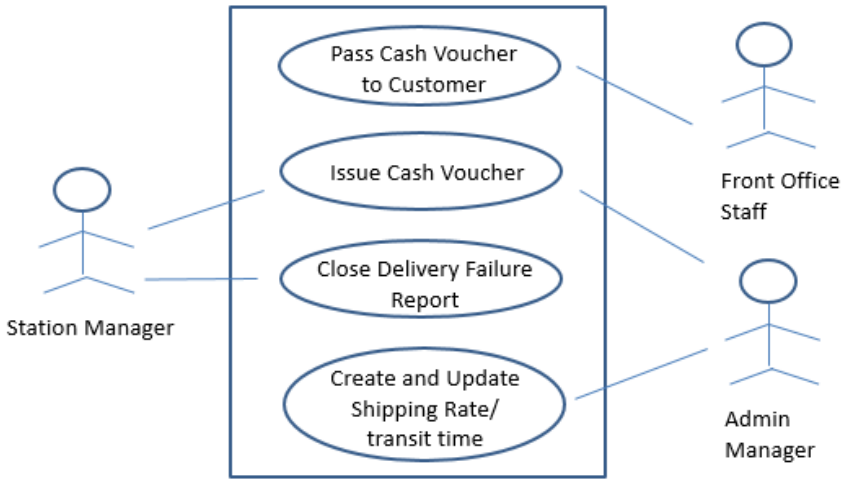
"StaffID" of the person who last edited should be recorded. *(See "ShippingRate" Table for details)*

2. Allow front office staff to search for cash vouchers details by registered customer name and telephone number when customer collects the cash vouchers at the front office. After the cash vouchers is collected, update the status from "*pending collection*" to "*collected*". *(See "CashVoucher" Table for details)*

Advanced Features:

3. After assessing a "Delivery Failure Report", the station manager will contact the parcel sender for follow up action. For cases where the fault is with NPCS, the station manager will compensate the sender by issuing $20 cash voucher. (*See "CashVoucher" Table for details)* After follow up with the sender, the station manager will update the "*FollowUp*" field in the "Delivery Failure Report" and system should then insert a record associated to the "*Parcel ID*" in the "*DeliveryHistory*" table, with a description: e.g., "Follow up with sender for delivery failure completed by *StationMgrSG* on 30 Mar 2023 3:00pm." *(Note: StationMgrSG is the Login ID of the station manager.)*

4. Allow the admin manager to issue $10 cash voucher to registered customer whose date of birth falls in the current month. The system will notify the registered customer when he/she login. System to ensure that this type of voucher **should not be issued more than once for each member in a year.** (*See "CashVoucher" Table in Data Dictionary for details)*



Use Case Diagram for Package 4