FINAL REPORT

School of Computer Sciences, USM, Penang

CMT221/CMM222: Database Organization and Design Semester 1, Academic Session: 2019/2020

TITLE: MY POSTCROSSING POSTCARD DATABASE

Group 30

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FINAL PROJECT REPORT

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Table of Content

Introduction

MY Postcrossing Postcard Database System is a database system made for an organisation called MY Postcrossing Company and its users. This organisation uses this database essentially for regulating their members' and employee's information and also their system of postcards exchange, which we called post crossing. Postcard exchange will happen when MY Postcrossing Company's members exchange postcards with random strangers who are members too.

Besides that, this database is also used to keep sales records of their products, which are postcards and stamps. The members can make purchases of stamps and postcards from MY Postcrossing Company. Thus, this database system is for the company to manage their sales operations of postcards and stamps to their members and also make the post crossing activities of their members easier.

As postcrossing involves delivery and posting, this system will also be used to record the real time updates of the delivery process as well as the tracking numbers for both stamps and postcards.

To summarize, this database is simply encompassed of a few systems as below:

1. User system
2. Postcard exchange system
3. Sales system
4. Tracking system

This database is created to make the workflow of the organisation smoother and and thus makes it easier for the users to use the application made by this company. After having this database system, the organisation's employees can use this database to handle the information of their members easily and make the users which are the members to use the application more carefreely and more efficiently. The members can also use this application which it is less complicated compared to before as we have this database system to organise all the data better.

Description of each module:

Module 1:

Module 1 holds the information of the members of the company, employee details and their job scopes.

- MY Postcrossing company keeps the details of their members as well as their details. The information enclosed in the system include:
  - Member ID/ Member username
  - Member email
  - Member password
  - The state
  - The city
  - Postal code
- MY Postcrossing Company also saves the details of the employees
  - Employee ID
  - Employee name
  - Employee phone number
- My Postcrossing Company saves the job scope of every employee and the job scope description.
- My Postcrossing Company employee must have one online account. The details about the account will be saved in database.
  - Email used
  - Password

Module 2:

Module 2 handles the information for trace and track by the user:

- The members of MY Postcrossing Company can use this to trace their past or currently postcard exchange activities or record by using some specification key. The information can be traces which are:
    - Member ID involved in that postcard exchange activities which acts as sender (member_id) or receiver(PTrace_receiver).
    - The sent date and the received date.
    - Total number of the postcard sent and received.
- They also can track their status of the sending postcard by using the postcard ID.
- They also can trace their purchase item by using the package ID. The information can be tracks which are:
    - Courier ID and name of courier which deliver the package.
    - The real-time update status of the delivery.

Module 3:

Module 3 handles the information of the postcards' and stamps' details, sales record and also the stocks' details.

- The details of the postcards provided and stored by the MY Postcrossing Company.
    - Different types of design of the postcards sold by MY Postcrossing Company.
    - Different sizes of the postcards sold by MY Postcrossing Company.
    - The specific postcard's item code according to its design and size. ○ The selling price of the postcards.
- The details of the stamps provided and stored by the MY Postcrossing Company.
    - Different types of design of the stamps sold by MY Postcrossing Company.
    - Different sizes of the stamps.
    - The specific stamp's item code according to its design and size. ○ The selling price of the stamps.
- Member's sales record is kept by MY Postcrossing Company. ○ Member ID that purchased postcards and stamps.

    - Package ID that involved postcard's item code and stamp's item code.
  - The total number of items purchased by the members of MY Postcrossing Company.
- The updated information of the stock of MY Postcrossing Company.
    - The updated number of postcards in the stock either replenished or sold.
  - The updated number of stamps in the stock either replenished or sold.

Module 4:

Module 4 mainly handles the activities of the deliveries of sales and postcards exchange which is needed to be delivered by the courier companies. This module saves the information and details of:

- The different courier companies
- Packages details which are needed to be delivered
- Postcards details which are needed to be delivered for postcard exchange
- Details of the delivery persons of each courier company
- Types of vehicles owned by each courier company and who are using it

The courier companies are in charge of delivering the packages which are the sales items of MY Postcrossing Company to their respective buyers which are the members. They are also in charge of delivering the postcards which are meant for postcard exchange to the members which each postcard is assigned to. The packages are the sales items of MY Postcrossing Company which can be postcards or stamps sold by the company. As the main function of a courier company is to deliver goods, hence there must be many delivery persons for each courier company. Therefore, each delivery person will be assigned to a vehicle which is owned by the respective courier company.

User Requirements and Business Rules

Target Users: The users which are the members and the employees of this MY Postcrossing Postcard

Database System

Module 1

User Requirements	Business Rules
1.1) MY Postcrossing Company is a company with 100 employees. This company allows its employees to handle more than one member	1.1) An employee can handle many members. Each member can only be handled by one employee.
1.2) MY Postcrossing Company have many employees. The company has two jobs copes which are customer service crews and admins. Employees will be assigned to only one job scope.	1.2) One job scope can have many employees. Each employee can be assigned to only one job scope.
1.3) Employee in MY Postcrossing Company must have one online account to deal with the users/customers.	1.3) An employee owns an account. An account is only owned by one employee.

Module 2

User Requirements	Business Rules
2.1) The member of MY POSTCROSSING can act as a sender or receiver. This system will link the data of the member to be a sender or receiver.	2.1) A sender can have many receivers. Each receiver can have many senders.
-The member can send maximum 5 postcards at one time. He or She can continue to send the postcard after the postcard is received by the receiver. Besides, they will get the postcard ID which needs to write on the postcard for the receiver to register it while it is received by the receiver.	- A sender can be sent one up to five postcards at one time. A postcard can sent by a sender. -A receiver can be received many postcards. One postcard can received by one receiver.

2.2) The member of the system can trace their postcrossing activities record by the member ID. The can know the total number of the postcards received and sent.	2.2) Each member can trace many of their postcrossing records. Each postcrossing record can traceed by many members.
2.3) The member also can track the postcard status(sender ID, receiver ID, sent date, received date ,delivery_Status) by using the postcard ID.	2.3) Each postcard has a postcard tracking status. Each postcard tracking status generated for one postcard.
2.4) The member can track their postcard status by the postcard ID. However, the postcard status also can track by another member if they know the postcard ID.	2.4) Each member can track many postcard status. Each postcard status can check by one or many members.
2.4) The member can track the package status by using the package ID. He or She can track the details such as courier ID, delivery_Status, and so on.	2.4) Each package has a package tracking status. Each package tracking status is generated for only one package.

Module 3

User Requirements	Business Rules
3.1) My Postcrossing Company sells postcards with different types of designs and sizes which are given a specific item code according to their characteristics. All of the postcards stored as a stock are priced at different selling prices.	3.1) Each of the different item codes of the postcards stores as one and only one stock of MY Postcrossing Company. Each stock has stored many postcards with different item code.
3.2) My Postcrossing Company sells different types of designs and sizes of the stamps. Each of the stamps are given with a specific item code according to their characteristics. All of the stamps which is stored as the stock vary in amount of the selling price.	3.2) Each of the different item codes of the stamps stores as one and only one stock of MY Postcrossing Company. Each stock has stored many stamps with different item code.
3.3) MY Postcrossing Company saves all the transactions done by the members in their sales records which includes theirs ID, package ID and the total number of their purchased items. All the sales record are in charged by the employees.	3.3a) Each of the sales record are in charged by one and only one employee. Each employee in charged on many sales records. 3.3b) Each member has zero or many sales records. Each sales record is involved by only one member.
3.4) The information of the stock of MY Postcrossing Company about postcards and stamps information such as quantity of these two categories items.	3.4) Each sales record contains many stocks. Each stock can be involved in zero or many records.

Module 4

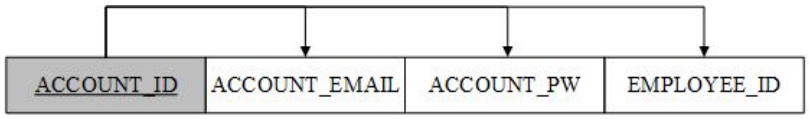
User Requirements	Business Rules
4.1) The members of the system can use different courier companies to handle their postcrossing activities and purchases. Each courier company can handle the deliveries of the postcrossing activities and purchases deliveries of many members.	4.1) Members can use many courier companies to make activities. Many courier companies is used by many members to make activities.
4.2) As the courier companies cooperates with MY Postcrossing Company to make deliveries, the courier companies will need to deliver many packages of purchased items.	4.2) Each courier company can deliver many packages. Each package can only be delivered by one courier company.
4.3) As the members can use many courier companies to make their postcards exchange activities, the courier companies will need to send many postcards to other members.	4.3) Each courier company can send many postcards. Each postcard can only be sent by one courier company.
4.4) Each item purchased by the members from the company would be recorded in a sales record and thus each sales record will have a package that needs to be sent by the courier company to the buyer.	4.4) One package will be recorded in a sales record. Each sales record records only one package.
4.5) Each courier company will hire many employees which are the delivery persons to make the deliveries. Each courier company in each state will hire a certain number of delivery persons.	4.5) One courier company can hire many delivery persons. Each delivery person is hired by only one courier company.

4.6) A courier company will need to make many deliveries of packages since there can be many orders to be delivered out. Thus, this will be the job of the delivery person of each courier company to deliver all the packages to their respective recipients.	4.6) One delivery person is in charge of delivering many packages. Each package can only have one delivery person in charge of delivering it.
4.7) A delivery person of each courier company will need to do their jobs by delivering the postcards sent by the members using different courier companies.	4.7) A delivery person is responsible to deliver many postcards. Each postcard is the responsibility of only one delivery man to be delivered.
4.8) The courier companies own many vehicles. These vehicles can come in various types such as vans and motorcycles.	4.8) One courier company owns many vehicles. Each vehicle is owned by one courier company.
4.9) Each courier company will assign a vehicle for each of their delivery man to make the delivery process easier.	4.9) One delivery man will be assigned to one vehicle. Each vehicle is assigned to only one delivery person.

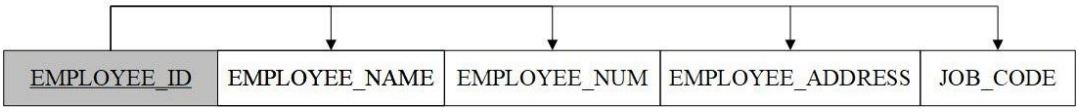
Data normalization

Module 1

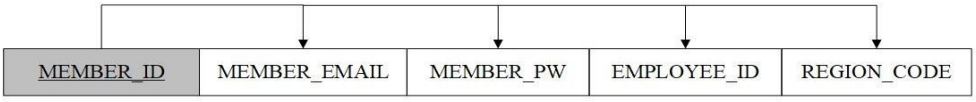
ACCOUNT (ACCOUNT_ID , ACCOUNT_EMAIL , ACCOUNT_PW, EMPLOYEE_ID



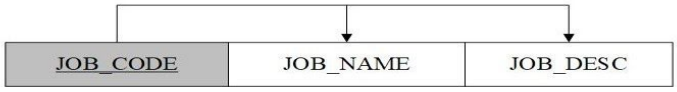
EMPLOYEE (EMPLOYEE_ID , EMPLOYEE_NAME , EMPLOYEE_NUM , EMPLOYEE_ADDRESS , JOB_CODE)



MEMBERS (MEMBER_ID , MEMBER_EMAIL, MEMBER_PW, EMPLOYEE_ID, REGION_CODE)

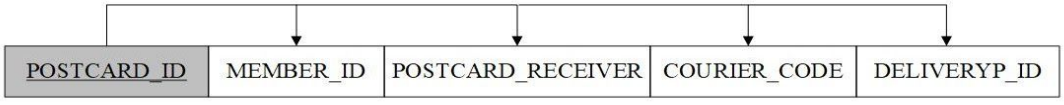


JOBSCOPE (JOB_CODE, JOB_NAME, JOB_DESC)



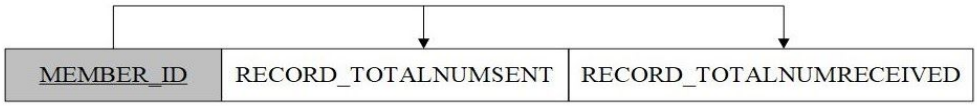
Module 2

POSTCARD (POSTCARD_ID , MEMBER_ID, POSTCARD_RECEIVER, COURIER_CODE, DELIVERP_ID)

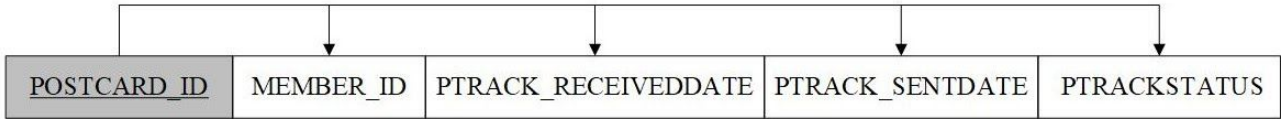


POSTCROSSING_RECORD (MEMBER_ID, RECORD_TOTALNUMSENT,

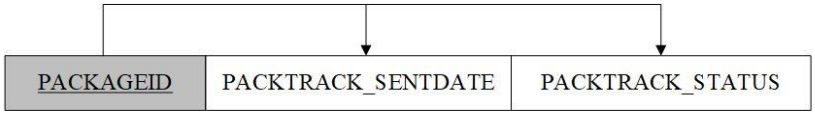
RECORD_TOTALNUMRECEIVED)



POSTCARD_TRACK (POSTCARD_ID , MEMBER_ID, PTRACK_RECEIVEDDATE, PTRACK_SENTDATE, PTRACKSTATUS)

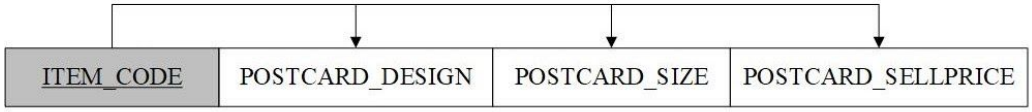


PACKAGE TRACK (PACKAGEID, PACKTRACK_SENTDATE, PACKTRACK_STATUS)

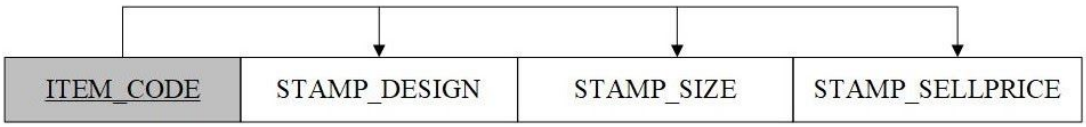


Module 3

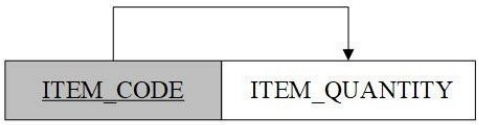
POSTCARD_DETAILS (ITEM_CODE, POSTCARD_DESIGN, POSTCARD_SIZE, POSTCARD_SELLPRICE)



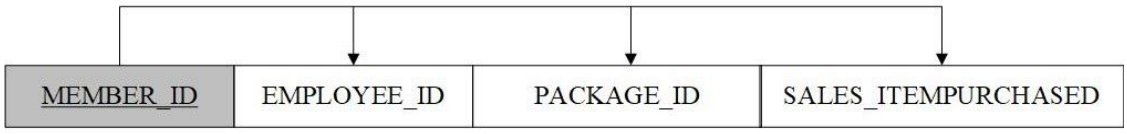
STAMP_DETAILS (ITEM_CODE, STAMP_DESIGN, STAMP_SIZE, STAMP_SELLPRICE)



STOCK (ITEM_CODE, ITEM_QUANTITY)

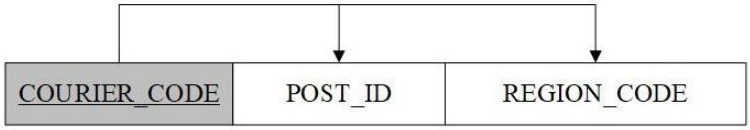


SALES_RECORD (MEMBER_ID, EMPLOYEE_ID, PACKAGE_ID,
SALES_ITEMPURCHASED)

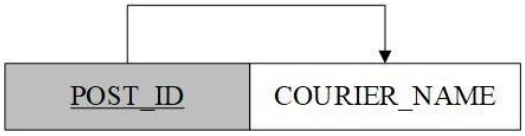


Module 4

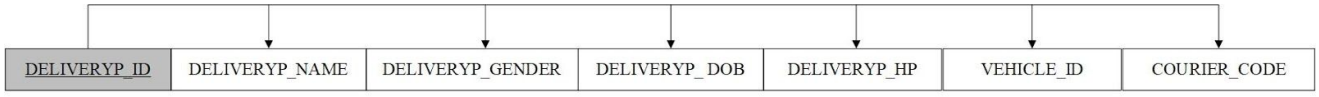
COURIER (COURIER_CODE, POST_ID, REGION_CODE)



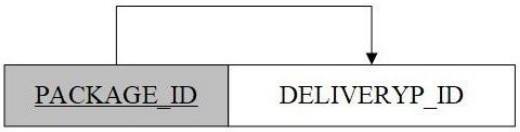
POST_INFORMATION (POST_ID, COURIER_NAME)



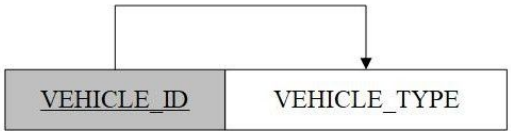
DELIVERY_PERSON (DELIVERYP_ID, DELIVERYP_NAME, DELIVERYP_GENDER,
DELIVERYP_ DOB, DELIVERYP_HP, VEHICLE_ID, COURIER_CODE)



PACKAGE (PACKAGE_ID, DELIVERYP_ID)



VEHICLE (VEHICLE_ID, VEHICLE_TYPE)



Data Dictionary

Module 1

Table name	Attribute name	Contents	Data type	Format	Nullable	PK or FK	Reference table
Members	member_id	ID of member	Varchar2 (5)	M002	No	PK	
	member_email	Email of member	Varchar2 (50)	jacksonwang@gmail.com	No		
	member_pword	Password to the email	Varchar2 (18)	jackie29	No		
	region_code	Member's region code	Varchar2 (5)	R001	No	FK	Region
	employee_id	Employee's ID to the	Varchar2 (5)	E001	No	FK	Employee

		assigned members					
Region	region_code	The code for the region	Varchar2 (5)	R001	No	PK	
	region_state	State of that particular region	Varchar2 (20)	Kedah	No		
	region_city	City of that particular region	Varchar2 (50)	Alor Setar	No		
	region_postal	Postal code of that particular region	Number(8,0)	05400	No		
Employee	employee_id	ID of employee	Varchar2 (5)	E001	No	PK	
	employee_name	Name of employee	Varchar2 (50)	Fara Syazlyn Binti Bahar	No		
	employee_num	Phone number of employees	Varchar2 (15)	013-7865 432	No		

	employee_address	Address of employee	Varchar2 (300)	39D,Lrg Masjid, Batu # Butterworth, Penang	No		
	job_code		Varchar2 (5)	J001A	No	FK	Jobscope
Account	account_id	The ID of account	Varchar2 (10)	A001	No	PK	
	account_email	Email address of the account	Varchar2 (50)	admin1@yahoo.com	No		
	account_password	Password of the account	Varchar2 (15)	admin1	No		
	employee_id	ID of employee	Varchar2 (5)	E001	No	FK	Employee
Jobscope	job_code		Varchar2 (5)	J001A	No	PK	
	job_desc		Varchar2 (100)	Person in charge in shipping items	No		
	job_name		Varchar2 (10)	Crew	No		

Module 2

Table name	Attribute name	Contents	Data type	Format	Nullable	PK or FK	Reference table
Postcard	postcard_id	ID of the postcard	VARCHAR2(10)	MY00000001	No	PK	
	member_id	ID of the member	VARCHAR2(5)	M001	No	FK	MEMBERS
	postcard_receiver	The member ID who received the postcard	VARCHAR2(5)	M002	No	FK	MEMBERS
	courier_code	The courier's ID	VARCHAR2(6)	PMR001	No	FK	COURIER
	deliveryP_id	ID of delivery person	VARCHAR2(9)	PMR001D1	No	FK	DELIVERY_PERSON
Postcrossing record	member_id	ID of member	VARCHAR2(5)	M001	No	PK,FK	MEMBERS
	record_totalnumsent	Total number of the sent postcards	NUMBER(4,0)	1	No		

	record_totalnumreceived	Total number of the received postcard	NUMBER(4,0)	1	No		
Postcard_track	postcard_id	ID of the postcard	VARCHAR2(10)	MY00000001	No	PK,FK	POSTCARD
	member_id	ID of member	VARCHAR2(15)	M002	No	FK	MEMBERS
	PTrack_Received	Date of receiver received postcard	DATE	11/23/2019	No		
	PTrack_SentData	Date of sender sent postcard	DATE	11/29/2019	No		
	P_TrackStatus	Delivery status of postcard	VARCHAR2(10)	Delivered	No		
Package_track	Package_id	ID of package	NUMBER(5,0)	14225	No	PK,FK	PACKAGE
	PackTrack_sentDate	Package sent date	DATE	11/25/2019	No		
	PackTrack_status	Delivery status of package	VARCHAR2(10)	Delivered	No		

Module 3

Table name	Attribute name	Contents	Data type	Format	Nullable	PK or FK	Reference table
Sales_record	member_id	ID of member	VARCHAR2(4)	M003	No	PK	
	package_id	ID of the package purchased	NUMBER (5)	14225	No	FK	PACKAGE
	employee_id	ID of the employee	VARCHAR2(4)	E10	No	FK	EMPLOYEE
	sals_item Purchased	Total number of items purchased	NUMBER (2)	10	No	FK	MEMBERS
Stock	item_code	Item code for postcards and stamps	VARCHAR2(5)	PC001	No	PK	
	item_quantity	Quantity of items	NUMBER (3)	10	No		
Postcard details	item_code	Item code for postcards	VARCHAR2(5)	PC002	No	PK, FK	STOCK
	postcard_	Design of	VARCHAR2(15)	Animal	No		

	design	postcards					
	postcard_size	Size of postcards	VARCHAR2(10)	180*90	No		
	postcard_sellPrice	Selling price of postcards	NUMBER (4,2)	10	No		
Stamp details	item_code	Item code for stamps	VARCHAR2(5)	SC001	No	PK, FK	STOCK
	stamp_design	Design of stamps	VARCHAR2(15)	Festivals	No		
	stamp_size	Size of the stamp	VARCHAR2(7)	40*30	No		
	stamp_sellPrice	Selling price of stamps	NUMBER (4,2)	0.8	No		

Module 4

Table name	Attribute name	Contents	Data type	Format	Nullable	PK or FK	Reference table
Courier	courier_code	ID of Courier	varchar2 (6)	PMR001	No	PK	
	post_id	The id of the post office	varchar2 (2)	PM	No	FK	Post information

	region_code	The code of region	varchar2 (4)	R001	No	FK	Region
Post information	post_id	ID of the post office	varchar2 (2)	PM	No	PK	
	courier_name	Courier's name	varchar2 (15)	Pos Malaysia	No	FK	Courier
Delivery person	deliveryP_ID	ID of delivery person	varchar2 (9)	PMR001D01	No	PK	
	deliveryP_gender	Gender of delivery person	char(1)	M	No		
	deliveryP_DOB	Date of birth	Date	12/29/1971	No		
	deliveryP_hp	Handphone number	varchar2 (12)	012-7677855	No		
	vehicle_id	ID of the vehicle	varchar2 (2)	V6	No	FK	vehicle
	deliveryP_name	Name of delivery person	Varchar 2(30)	Ali bin Abu	No		
	courier_code	Courier's ID	varchar2 (6)	PMR001	No	FK	Courier

Package	package_id	Package's ID	Number(5,0)	14225	No	PK	
	deliveryP_id	Delivery person 's ID	varchar2 (9)	PMR001 D01	No	FK	Delivery person
Vehicle	vehicle_id	Vehicle ID	varchar2 (2)	V6	No	PK	
	deliveryP_id	Delivery person ID	varchar2 (20)	PMR001 D01	No	FK	Delivery person
	vehicle_type	The types of vehicles	varchar2 (6)	VIEW C2	No		

Database implementation

Module 1

Table	SQL Statement
Employee	CREATE TABLE EMPLOYEE (EMPLOYEE_ID VARCHAR2(10) NOT NULL PRIMARY KEY, EMPLOYEE_NAME VARCHAR2(50) NOT NULL, EMPLOYEE_NUM VARCHAR2(15) NOT NULL, EMPLOYEE_ADDRESS VARCHAR2(300) NOT NULL, JOB_CODE VARCHAR2(5) NOT NULL, CONSTRAINT JOB_CODE_FK FOREIGN KEY (JOB_CODE) REFERENCES JOBSCOPE(JOB_CODE) ON DELETE CASCADE);
Members	CREATE TABLE MEMBERS (MEMBER_ID VARCHAR2(5) NOT NULL PRIMARY KEY , MEMBER_EMAIL VARCHAR2(50)NOT NULL,

	MEMBER_PW VARCHAR2(28)NOT NULL, EMPLOYEE_ID VARCHAR2(5) NOT NULL, REGION_CODE VARCHAR2(5) NOT NULL, CONSTRAINT EMPLOYEE_ID_FK FOREIGN KEY (EMPLOYEE_ID) REFERENCES EMPLOYEE(EMPLOYEE_ID) ON DELETE CASCADE, CONSTRAINT REGION_CODE_FK FOREIGN KEY (REGION_CODE) REFERENCES REGION(REGION_CODE) ON DELETE CASCADE);
Region	CREATE TABLE REGION (REGION_CODE VARCHAR2(5) NOT NULL PRIMARY KEY, REGION_STATE VARCHAR2(20)NOT NULL, REGION_CITY VARCHAR2(50)NOT NULL, REGION_POSTAL NUMBER(8)NOT NULL);
Jobscope	CREATE TABLE JOBSCOPE (JOB_CODE VARCHAR2(5) NOT NULL PRIMARY KEY, JOB_NAME VARCHAR2(10) NOT NULL, JOB_DESC VARCHAR2(500) NOT NULL);
Account	CREATE TABLE ACCOUNT (ACCOUNT_ID VARCHAR2(10)NOT NULL PRIMARY KEY, ACCOUNT_EMAIL VARCHAR2(50) NOT NULL, ACCOUNT_PW VARCHAR2(15) NOT NULL, EMPLOYEE_ID VARCHAR2(5) NOT NULL, CONSTRAINT EMPLOYEE_ID_FK1 FOREIGN KEY (EMPLOYEE_ID) REFERENCES EMPLOYEE(EMPLOYEE_ID) ON DELETE CASCADE);

Module 2

Table	SQL statement
Postcard	CREATE TABLE POSTCARD(POSTCARD_ID VARCHAR2(10) NOT NULL , MEMBER_ID VARCHAR2(5) NOT NULL , POSTCARD_RECEIVER VARCHAR2(5) NOT NULL, COURIER_CODE VARCHAR2(6) NOT NULL, DELIVERYP_ID VARCHAR2(9) NOT NULL, CONSTRAINT POSTCARD_PK PRIMARY KEY(POSTCARD_ID),

	CONSTRAINT POSTCARD_FK1 FOREIGN KEY(MEMBER_ID) REFERENCES MEMBERS(MEMBER_ID) ON DELETE CASCADE, CONSTRAINT POSTCARD_FK2 FOREIGN KEY(POSTCARD_RECEIVER) REFERENCES MEMBERS(MEMBER_ID) ON DELETE CASCADE, CONSTRAINT POSTCARD_FK3 FOREIGN KEY(COURIER_CODE) REFERENCES COURIER(COURIER_CODE) ON DELETE CASCADE, CONSTRAINT POSTCARD_FK4 FOREIGN KEY(DELIVERYP_ID) REFERENCES DELIVERY_PERSON(DELIVERYP_ID) ON DELETE CASCADE);
Postcrossing record	CREATE TABLE POSTCROSSING_RECORD(MEMBER_ID VARCHAR2(5) NOT NULL, RECORD_TOTALNUMSENT NUMBER(4)NOT NULL, RECORD_TOTALNUMRECEIVED NUMBER(4)NOT NULL , CONSTRAINT PR_PK PRIMARY KEY(MEMBER_ID), CONSTRAINT PR_FK FOREIGN KEY(MEMBER_ID) REFERENCES MEMBERS(MEMBER_ID) ON DELETE CASCADE);
Postcard track	CREATE TABLE POSTCARD_TRACK(POSTCARD_ID VARCHAR2(10) PRIMARY KEY NOT NULL, MEMBER_ID VARCHAR2(5)NOT NULL, PTRACK_RECEIVEDDATE DATE NOT NULL, PTRACK_SENTDATE DATE NOT NULL, PTRACKSTATUS VARCHAR2(10)NOT NULL, CONSTRAINT PT_FK1 FOREIGN KEY (POSTCARD_ID) REFERENCES POSTCARD (POSTCARD_ID) ON DELETE CASCADE, CONSTRAINT PT_FK2 FOREIGN KEY (MEMBER_ID) REFERENCES MEMBERS (MEMBER_ID) ON DELETE CASCADE, CONSTRAINTS PT_CHECK CHECK (PTRACK_RECEIVEDDATE > PTRACK_SENTDATE));
Package track	CREATE TABLE PACKAGE_TRACK(PACKAGEID NUMBER(5) NOT NULL, PACKTRACK_SENTDATE DATE NOT NULL, PACKTRACK_STATUS VARCHAR2(10) NOT NULL, CONSTRAINT PACK_PK PRIMARY KEY (PACKAGEID), CONSTRAINT PACK_FK FOREIGN KEY (PACKAGEID)REFERENCES PACKAGE(PACKAGE_ID) ON DELETE CASCADE);

Module 3

Table	SQL statement

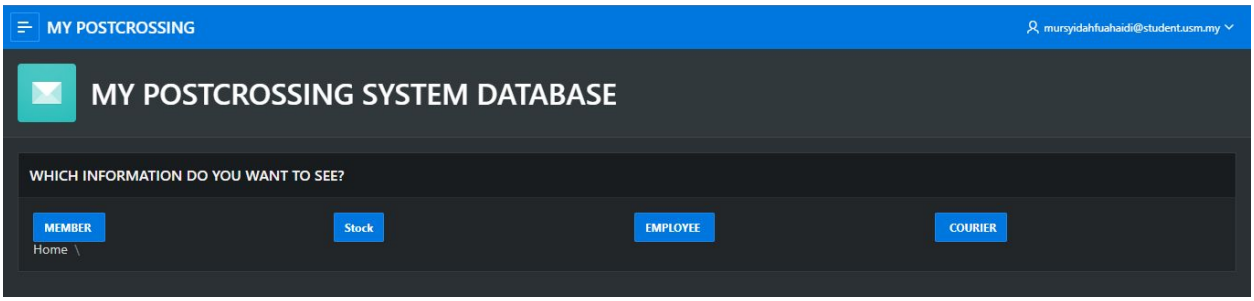
Sales record	CREATE TABLE SALES_RECORD (MEMBER_ID VARCHAR2(4)NOT NULL, EMPLOYEE_ID VARCHAR2(4)NOT NULL, PACKAGE_ID NUMBER(5)NOT NULL, SALES_ITEMPURCHASED NUMBER(2)NOT NULL, CONSTRAINT SALES_RECORD_PK PRIMARY KEY (MEMBER_ID,EMPLOYEE_ID), CONSTRAINT SALES_RECORD_MEM_FK FOREIGN KEY (MEMBER_ID) REFERENCES MEMBERS (MEMBER_ID), CONSTRAINT SALES_RECORD_EMP_FK FOREIGN KEY (EMPLOYEE_ID) REFERENCES EMPLOYEE (EMPLOYEE_ID) , CONSTRAINT SALES_RECORD_PACK_FK FOREIGN KEY (PACKAGE_ID) REFERENCES PACKAGE (PACKAGE_ID) ON DELETE CASCADE);
Stock	CREATE TABLE STOCK (ITEM_CODE VARCHAR2(5) NOT NULL, ITEM_QUANTITY NUMBER(3)NOT NULL, CONSTRAINT STOCK_PK PRIMARY KEY (ITEM_CODE));
Postcard_details	CREATE TABLE POSTCARD_DETAILS (ITEM_CODE VARCHAR2(5) NOT NULL, POSTCARD_DESIGN VARCHAR2(15)NOT NULL, POSTCARD_SIZE VARCHAR2(10)NOT NULL, POSTCARD_SELLPRICE NUMBER(4,2) NOT NULL, CONSTRAINT POSTCARD_DETAILS_PK PRIMARY KEY (ITEM_CODE), CONSTRAINT POSTCARD_DETAILS_FK FOREIGN KEY (ITEM_CODE) REFERENCES STOCK (ITEM_CODE) ON DELETE CASCADE);
Stamp_details	CREATE TABLE STAMP_DETAILS (ITEM_CODE VARCHAR2(5) NOT NULL, STAMP_DESIGN VARCHAR2(15)NOT NULL, STAMP_SIZE VARCHAR2(7) NOT NULL, STAMP_SELLPRICE NUMBER(4,2) NOT NULL, CONSTRAINT STAMP_DETAILS_PK PRIMARY KEY (ITEM_CODE), CONSTRAINT STAMP_DETAILS_FK FOREIGN KEY (ITEM_CODE) REFERENCES STOCK (ITEM_CODE));

Module 4

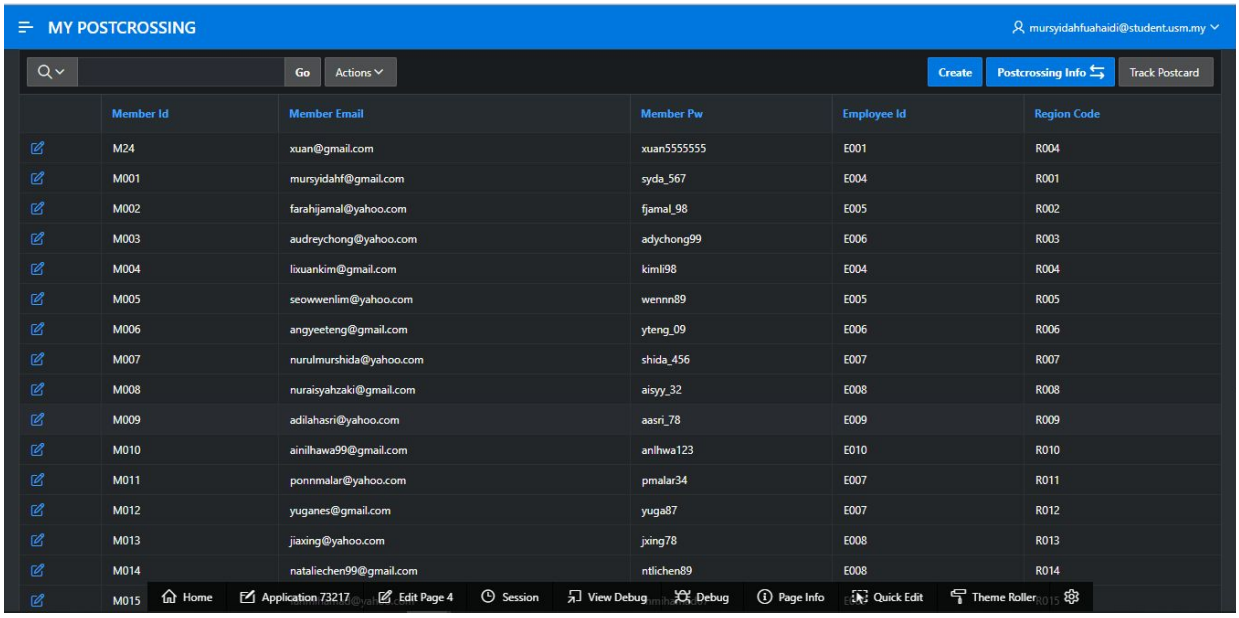
Table	SQL Command

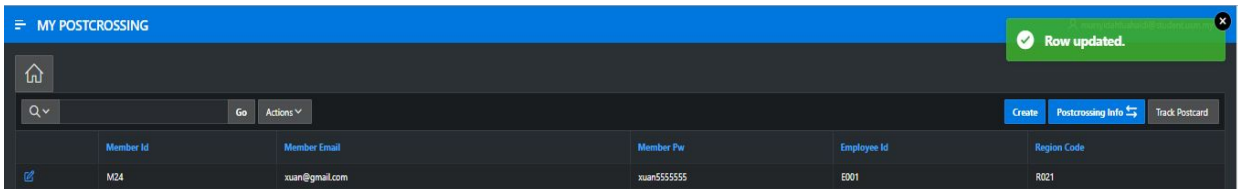
Courier	CREATE TABLE COURIER (COURIER_CODE VARCHAR2(6) NOT NULL, POST_ID VARCHAR2(2) NOT NULL, REGION_CODE VARCHAR2(4) NOT NULL, CONSTRAINT COURIER_PK PRIMARY KEY (COURIER_CODE), CONSTRAINT COURIER_ID_FK FOREIGN KEY (POST_ID) REFERENCES POST_INFORMATION (POST_ID) ON DELETE CASCADE, CONSTRAINT COURIER_REG_FK FOREIGN KEY (REGION_CODE) REFERENCES REGION (REGION_CODE) ON DELETE CASCADE);
Post Information	CREATE TABLE POST_INFORMATION (POST_ID VARCHAR2(2) NOT NULL, COURIER_NAME VARCHAR2(15)NOT NULL, CONSTRAINT POST_INFO_PK PRIMARY KEY (POST_ID));
Delivery person	CREATE TABLE DELIVERY_PERSON (DELIVERYP_ID VARCHAR2(9)NOT NULL, DELIVERYP_NAME VARCHAR2(30)NOT NULL, DELIVERYP_GENDER CHAR(1)NOT NULL, DELIVERYP_DOB DATE NOT NULL, DELIVERYP_HP VARCHAR2(12) NOT NULL, VEHICLE_ID VARCHAR2(2) NOT NULL, COURIER_CODE VARCHAR2(6) NOT NULL, CONSTRAINT DEL_PK PRIMARY KEY (DELIVERYP_ID), CONSTRAINT DEL_VEH_FK FOREIGN KEY (VEHICLE_ID) REFERENCES VEHICLE (VEHICLE_ID) ON DELETE CASCADE, CONSTRAINT DEL_COUR_FK FOREIGN KEY (COURIER_CODE) REFERENCES COURIER (COURIER_CODE) ON DELETE CASCADE);
Package	CREATE TABLE PACKAGE (PACKAGE_ID NUMBER(5) NOT NULL, DELIVERYP_ID VARCHAR2(9) NOT NULL, CONSTRAINT PACKAGE_PK PRIMARY KEY (PACKAGE_ID), CONSTRAINT PACK_DEL_FK FOREIGN KEY (DELIVERYP_ID) REFERENCES DELIVERY_PERSON (DELIVERYP_ID) ON DELETE CASCADE);
Vehicle	CREATE TABLE VEHICLE (VEHICLE_ID VARCHAR2(20) NOT NULL, DELIVERYP_ID VARCHAR2(9) NOT NULL, VEHICLE_TYPE VARCHAR2(20) NOT NULL, CONSTRAINT VEHICLE_PK PRIMARY KEY (VEHICLE_ID), CONSTRAINT VEHICLE_FK FOREIGN KEY (DELIVERYP_ID)REFERENCES DELIVERY_PERSON(DELIVERYP_ID));

Front-end system design and implementation

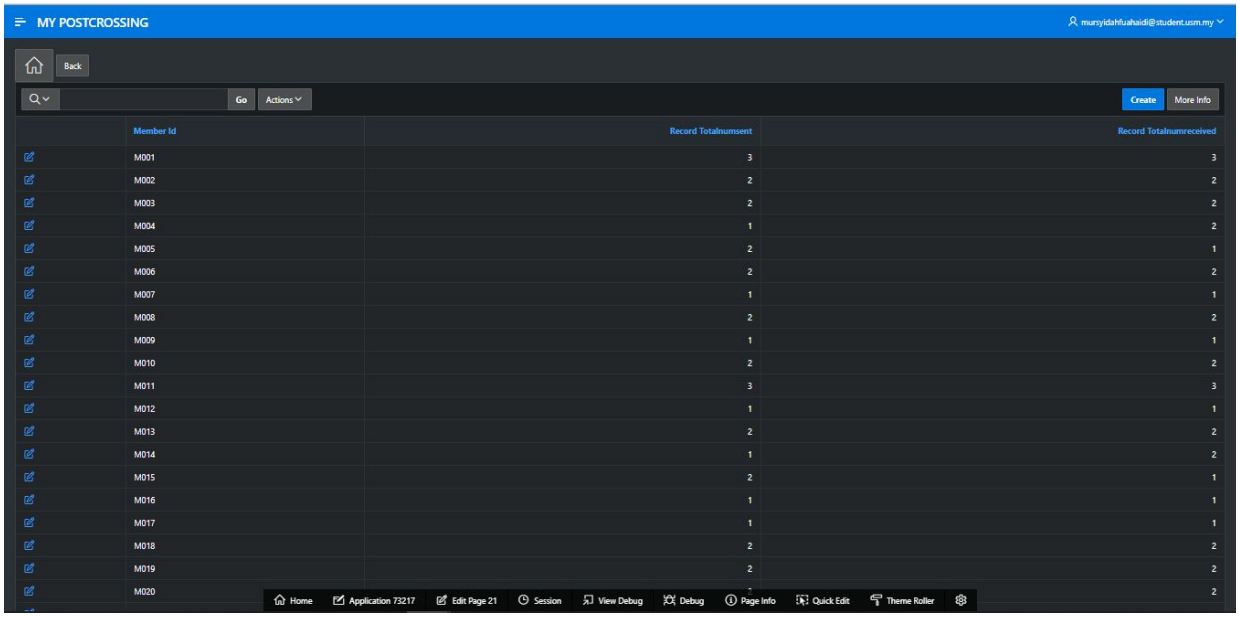


The figure above shows the home page of this database application. It contains four buttons that can link to another interfaces by click.



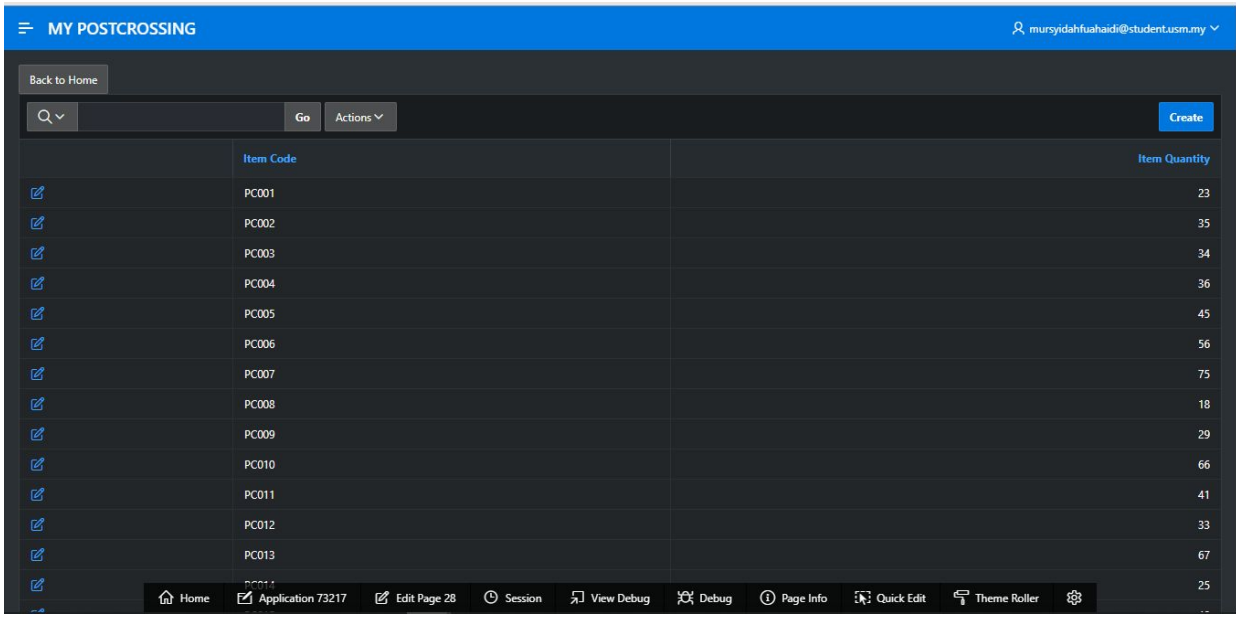


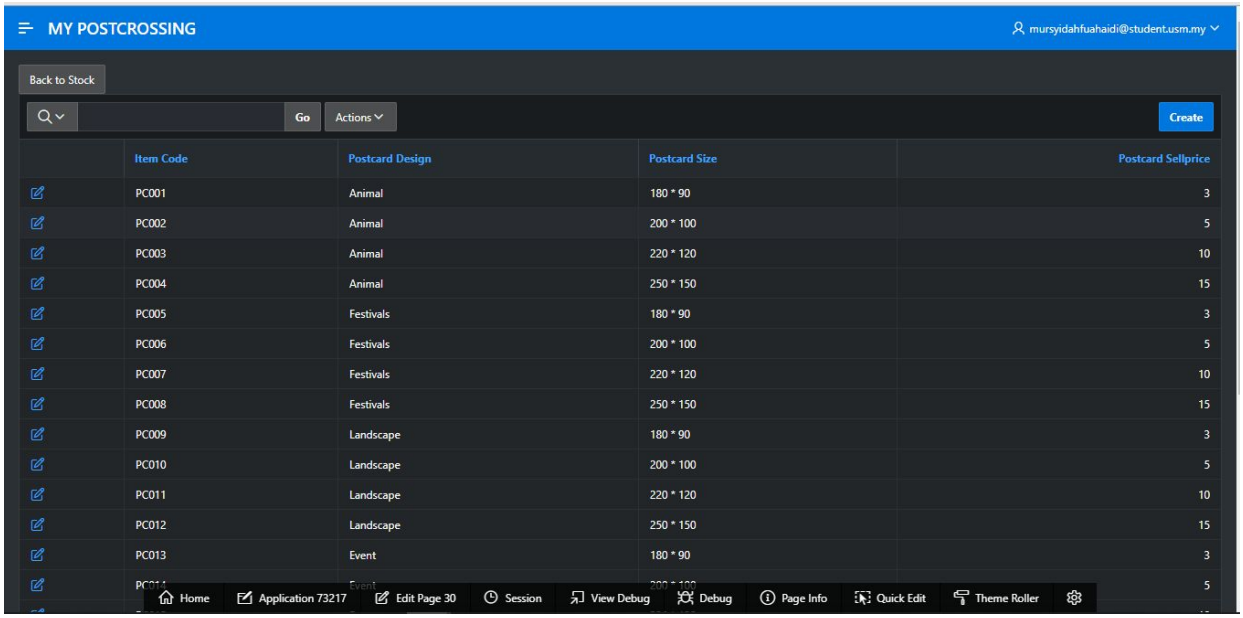
Both figures above show how the user of this database application to update or edit the information. The icon of the pen is used to link to the edit's interface.

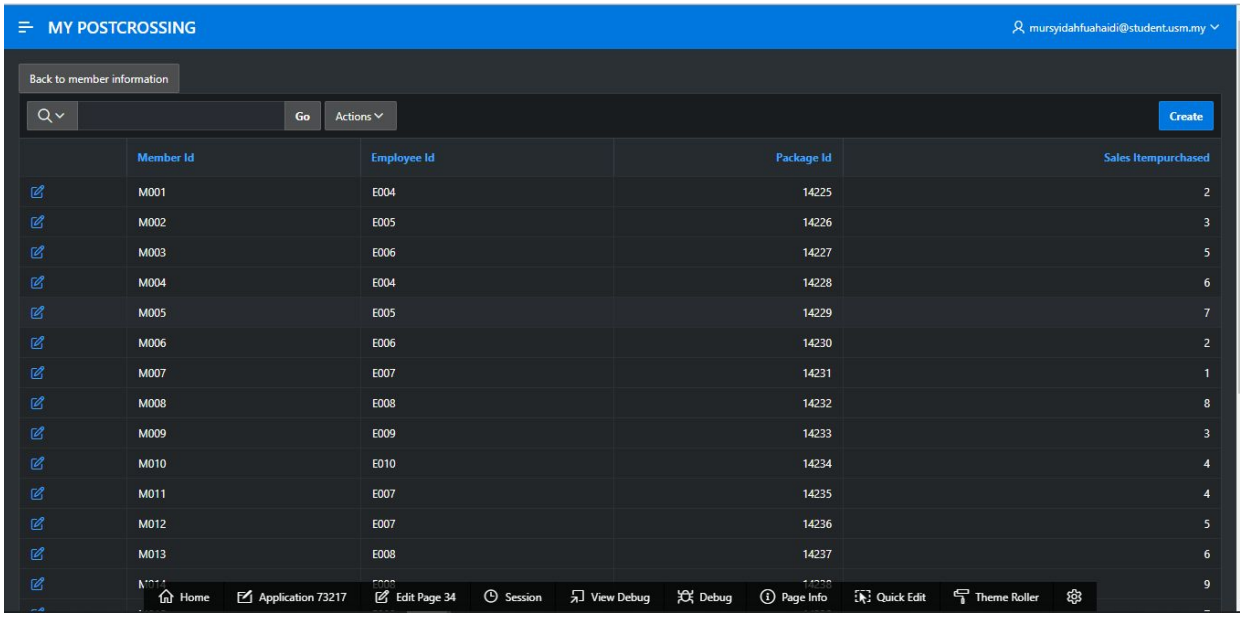


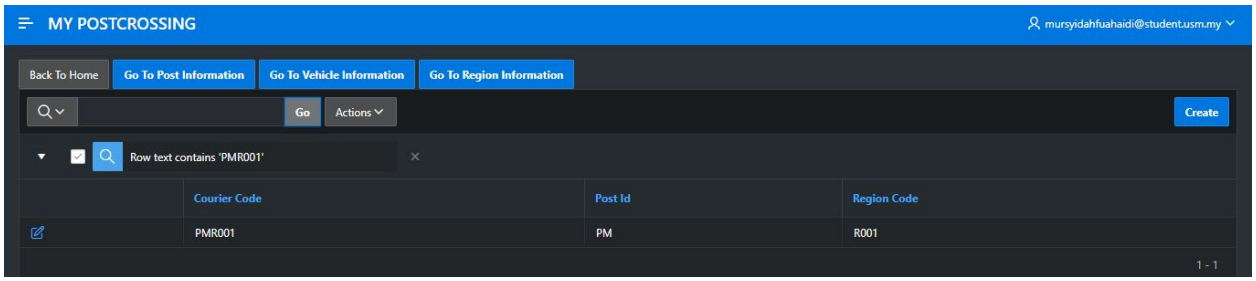
For every editable tables, there was an icon at the beginning of each row and the upper-right corner has the CREATE button which will links to add new information's interface.

Besides, a searching column is provided on many interfaces for searching the specific information. The figures below are some of the examples of the interfaces:

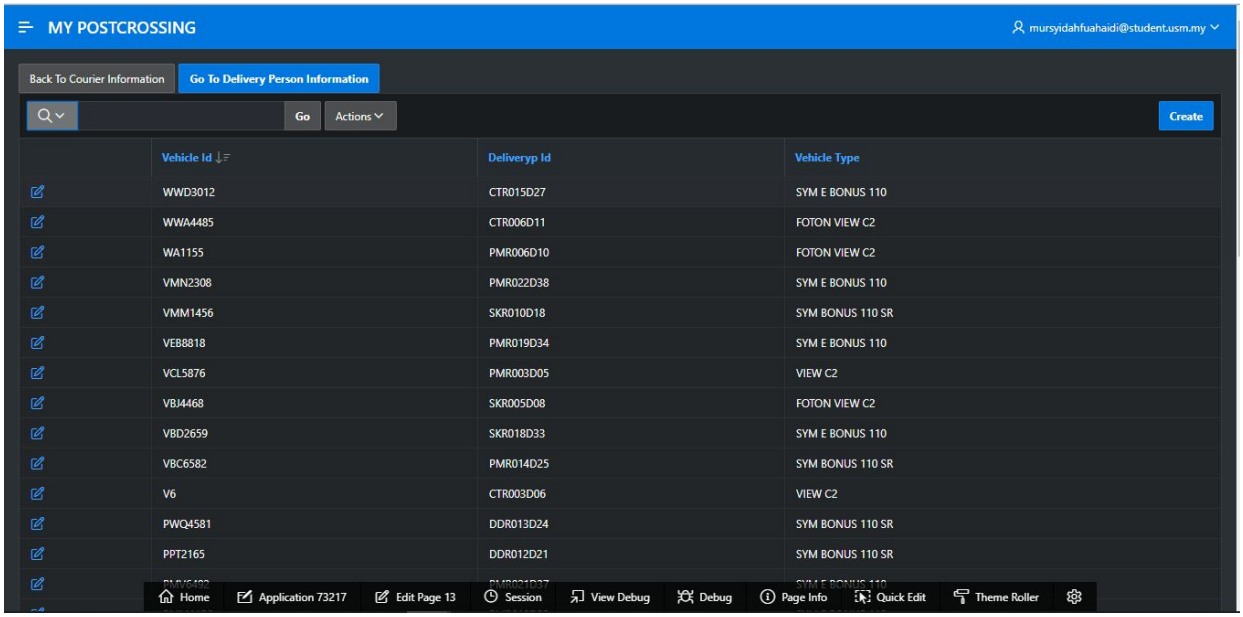








Search for specific row of data by typing in one of the column's data



Sort the order of a specific column and the rest of the data will be sorted according to the sorted column as well

Project problems and pitfalls

Throughout the development of this system, we discover and encounter several problems and challenges. The first problem is the students' lack of experience in Oracle Apex. All of the group members feel unfamiliar with oracle apex as we spend most of our time in tutorial with sql developer. We encounter some technical problems as we do not know and fully understand how Oracle Apex really works. Building the GUI is the hardest part as we encounter many technical problems like we cannot look for the correct button just because we do not know where it is located. However, internet and youtube help us a lot even though most of the videos are simplified and incomplete.

Another ground problem we encountered was during module designing. As there are too many tables and modules, some of us were confused especially during table-linking. The relationships and all the keys must be correct to achieve a right Entity Relationship Diagram. Some of the entities are shared between modules make it more complicated and we ended up labeling the relationship wrongly.

In order to solve the aforementioned problems, we did a lot of research and our references ranging from lecture notes, youtube, sql websites and many more. Even though the references were not helping us completely but they are enough for program executions.

Conclusions

In conclusion, a well integrated system is not easy to be developed. Despite all the problems and challenges that we have encountered, we learn that having a professional knowledge and doing practices are really essential in making any project successful and execute without any problems. Besides, there are an abundance of things that we discovered throughout this project and one of them is how Oracle Apex ease the users with graphical user interfaces in a system. We believe that everything that we had gone through this project will be really beneficial especially in examination. Now, we are able to distinguish better between strong relationship and weak relationship and we can generate better business rules. Last but not least, we hope that the system we have designed will benefit many users.

Future Work

In the near future, we are ambitioned to produce a better, structured and efficient database system for users all around the world. The system that we have now has already accomplished basic functional needs but we believe there are still many spaces to be improved and many vacants to be filled. An astounding GUI system is one of our goals because friendly user interface will definitely attract people more and invite many people to use our system. We aim to maximize the functionalities of our system in order to reach everyone ranging from students to older people. Last but not least, realizing that security is really vital for the lasting of a system, we will try to implement a really tight security like a better login system to ensure data privacy.

Group Project: Oracle Credentials

Oracle SQL Developer

Username:

Password:

Oracle APEX

☐ School Server

☐ Cloud

Workspace:

Username:mursyidahfuahaidi@student.usm.my

Password : Yeohlixuan_99