

Project Final Report

SuperClean

ISOM3260 - Database Design and Administration

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INTRODUCTION

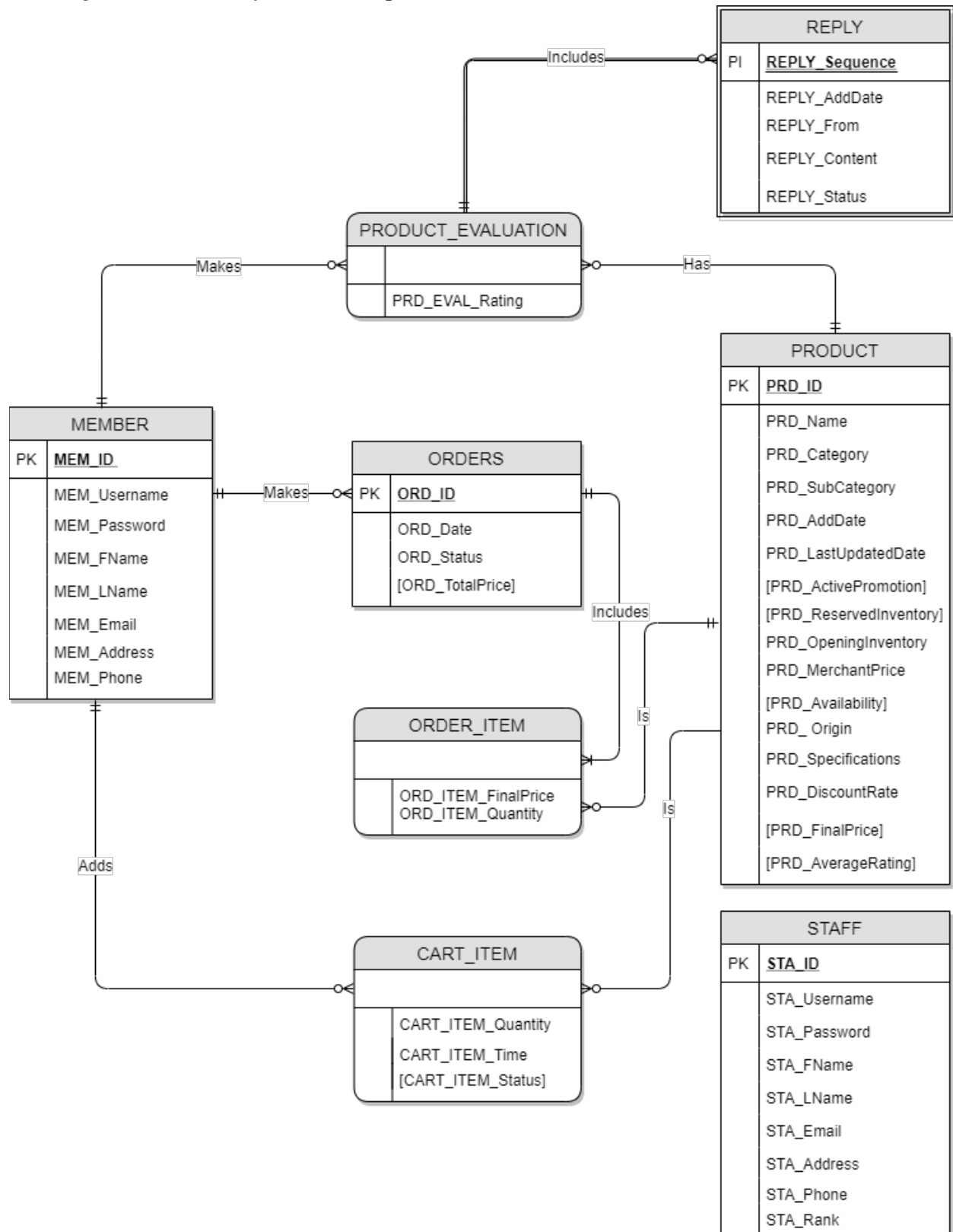
SuperClean is a newly established company based in Hong Kong that sells hygiene products. Broadly speaking, two categories of users can be summarized as Customers (Members) and Staff (Staff and Managers); their main objective being to purchase the hygiene products and to manage the platform respectively.

With the platform's business nature as an e-commerce store, the purchasing system requires Customers to register as Members before they can log into the system. Members are able to update their personal information after registration if they need to. On the platform, Members are able to browse the myriad of hygiene products offered and are even recommended newly added products; defined by the product add date as less than 14 days (2 weeks), which is vital to attract and generate greater sales. Through the platform, Members have the option to click into the individual products to view more details, including product evaluation, ratings, and comments. Members can rate each product once, comment and make inquiries on the respective products if they have issues. To assist Members to pinpoint a specific product and make quicker purchasing decisions, they are able to filter the products by Product ID, Product Name, Category, Subcategory, Place of Origin, and Details. Occasionally, Members can enjoy discounts from a variety of products. Once Members have made a decision, they can add the desired products to their carts before making the order. Products and items in the cart are reserved for 24 hours before they expire. Members can also alter the desired quantities in the carts or remove an item from the cart before proceeding to the order. After the order is confirmed, Members can view the status of the current orders and past orders. In simple terms, they should be able to know whether the orders are still under preparation, on delivery or arrived.

The system also allows Staff to log in and perform management duties. Staff can add, delete, or update products. Specifically, Staff can change the discount rate of each individual product whenever there is a promotion. Managers have access to a dashboard that is exclusively used for the analytics of the business, including viewing monthly sales, the top 5 products in terms of order quantity, the top 5 members in terms of sales quantity, order statuses, etc. Under the manager dashboard, it should also display stock-out products for easy referencing. As a Manager, one can also view the comments under each individual product and validate the appropriateness of the comment. In the case where a Manager marks a comment as inappropriate because it violates the company's policies and rules i.e using profanity or malicious act, the respective comment will be removed from the display.

CONCEPTUAL DATA MODEL

ER Diagram - with extra functional requirements included



Entities

Strong Entities

MEMBER

SuperClean online retailing store is serving the objective of offering a remote purchase ordering system to customers. To ensure the good management of the platform and delivery of services, information about each individual customer needs to be saved. The information is inputted during customer registration to the platform. Member username, email, and password are used for administrative purposes - login, retrieving forgotten password, receipt of bill payment, etc. Member name, address, and phone are used for identification and communication by staff and to ensure the delivery of goods to the customer.

ORDERS

Orders are made by members. The company will need to store and track all orders in its database for operation management - accounting and logistics. Management must have access to each member orders history details (date, status, and total amount), which is also used for analysis of sales, customers, and products. Members are also given specific information about their orders history and status of pending ones.

PRODUCT

Product information is saved in the system to enable browsing and ordering by the member. Additionally, both staff and manager will need to be able to make changes on product attributes, add new products, and delete old products from the database.

STAFF

Staff information is saved in the system to enable login. Staff can manage products by adding new products, changing the availability of products, modifying the price of products, etc. Some staff personnel may be managers, which is differentiated by the staff rank saved in the system. Managers have special privileges to access the Manager Dashboard, which can be used for business analytics.

Weak Entities

REPLY
Replies are made by members and staff under each product evaluation. Replies that are deemed inappropriate, determined by its reply status, will not be shown. Replies made by members and staff are also differentiated. Without product evaluation there will be no replies, therefore it is a weak entity.

Associative Entities

CART_ITEM
Shopping cart information is temporarily stored based on what customers add to their carts. Members are able to hold products in their shopping cart for 1 hour. Members also can view their shopping carts and make changes. Even when they log off, the cart will still store the items saved until they expire. Whenever Members are ready, they can proceed with the purchase through the shopping cart page. Cart Items are temporary items in each member's cart, capturing the quantity demanded by the member. The item will be deleted after it proceeds as a confirmed order or when expired.

ORDER_ITEM
Order Items are items in each respective order, capturing the final price at which the order is made and quantity demanded by the member.

PRODUCT EVALUATION
Product evaluations of products are the comments and ratings (rated out of 5) made by the members.

Business Rules

1. Members are not forced to make purchases after registration.
2. Orders can only be made by Members.
3. Products in Shopping Carts should be stored to be retrieved by Members again.
4. Orders and Shopping Carts can include multiple products.

5. Members can leave ratings and comments or ratings only for any particular product. Staff can reply through the system and the involved member can further discuss with our staff there.
 - a. Members will have to rate the product before leaving comments

Relationship

1. Based on rule 1 & 2, MEMBER shares a mandatory one to optional many relationship with ORDERS.
2. Based on rule 4, ORDERS share an optional many to mandatory many relationship with PRODUCT, which creates an associative entity ORDER ITEM that stores the items in the particular order.
Likewise, for between MEMBER and PRODUCT, another associative entity CART ITEM would be created for items in each member's cart.
3. MEMBER and PRODUCT share an optional many to optional many relationship, which create an associative entity PRODUCT EVALUATION that stores the individual rating of each member towards any specific product.
4. Based on rule 5, PRODUCT EVALUATION shares a mandatory one to optional many relationship with REPLY, which stores the comments and further discussion between staff and the specific MEMBER for the specific product.

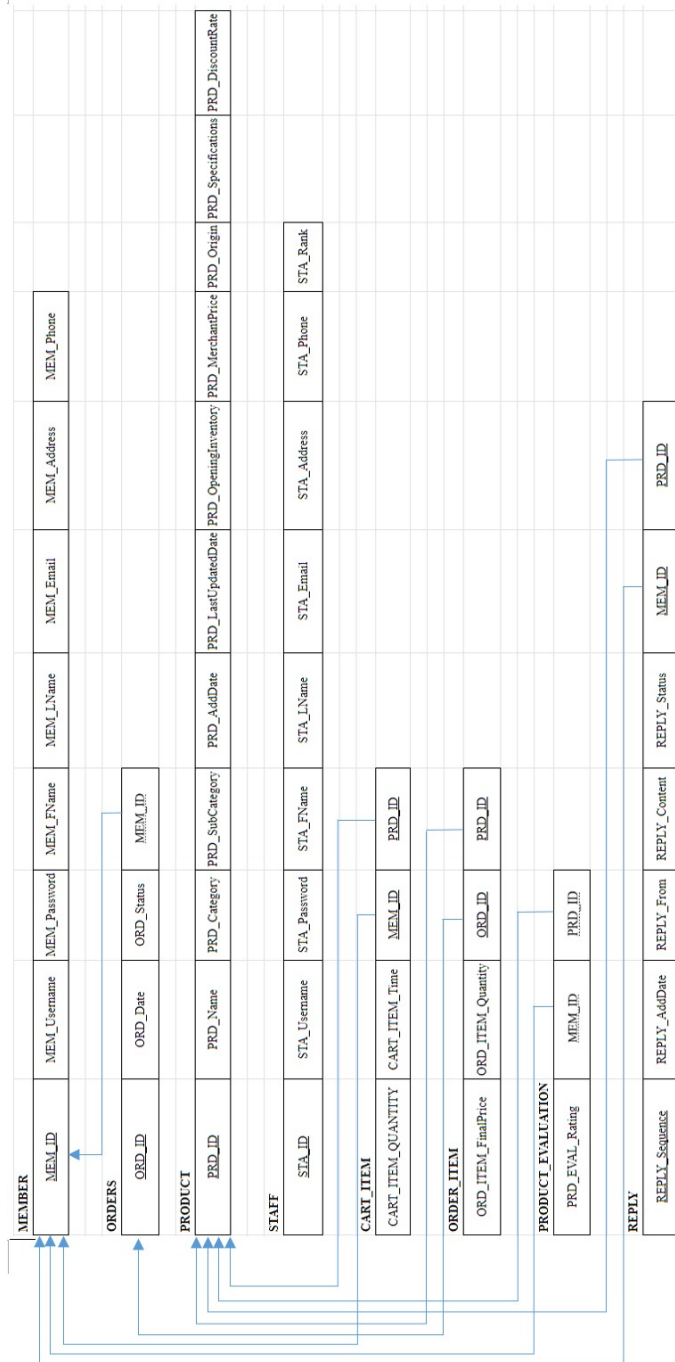
Assumptions

- Customers are required to register as a member before logging in to the system.
 - Member username must contain at least 8 characters.
- Only members can use the system.
 - Browse the products, make orders, etc.
- Items added by members to the shopping cart are identified as consigned by the system to avoid potential out of stock issues at time of check out.
 - The product consignment ensures availability for 1 hour (will reserve for an hour), when added to the cart.
- Payments are processed and verified by external parties automatically.
 - Credit card information is not stored in the database
- Product photographs are added to the system through external partners.
- Newly added items, which are promoted, are items added within the last 14 days.
- As a purchasing system only, accounting and logistics are not handled by the system.
- Members are not expected to know the exact stock in inventory but should know the availability of products.
- All members and staff set passwords according to criteria.
 - At least 1 uppercase, lowercase, number, special character.

- Must contain at least 8 characters.
- Staff cannot reset their password or register a new account by themselves.
- All customers are located in Hong Kong and all addresses are HK local.
- All information is stored in English.

LOGICAL DATA MODEL

Referential Integrity



Functional Dependency

MEMBER									
<u>MEM_ID</u>	MEM_Username	MEM_Password	MEM_FName	MEM_LName	MEM_Email	MEM_Address	MEM_Phone		
ORDERS									
<u>ORD_ID</u>	ORD_Date	ORD_Status	<u>MEM_ID</u>						
PRODUCT									
<u>PRD_ID</u>	PRD_Name	PRD_Category	PRD_SubCategory	PRD_AddDate	PRD_LastUpdatedDate	PRD_OpeningInventory	PRD_MerchantPrice	PRD_Origin	PRD_Specifications
									PRD_DiscountRate
STAFF									
<u>STA_ID</u>	STA_Username	STA_Password	STA_FName	STA_LName	STA_Email	STA_Address	STA_Phone	STA_Rank	
CART_ITEM									
<u>CART_ITEM_QUANTITY</u>	CART_ITEM_Time	<u>MEM_ID</u>	<u>PRD_ID</u>						
ORDER_ITEM									
<u>ORD_ITEM_FinalPrice</u>	ORD_ITEM_Quantity	<u>ORD_ID</u>	<u>PRD_ID</u>						
PRODUCT_EVALUATION									
<u>PRD_EVAL_Rating</u>	MEM_ID	<u>PRD_ID</u>							
REPLY									
<u>REPLY_Sequence</u>	REPLY_AddDate	REPLY_From	REPLY_Content	REPLY_Status	<u>MEM_ID</u>	<u>PRD_ID</u>			

DATA DICTIONARY

Attributes, Primary Key, Foreign Key, Partial Identifier

Strong Entities

MEMBER	Description	Data Type	Length
<u>MEM_ID</u> (Primary Key)	Unique identifier of member, which is system generated	NUMERIC	8
MEM_Username	Member log in to the system using an unique username	VARCHAR2	30
MEM_Password	Member log in to the system using a password that will be matched to the username	VARCHAR2	30
MEM_FName	Member first name	VARCHAR2	30
MEM_LName	Member last name	VARCHAR2	30
MEM_Email	Member email address	VARCHAR2	30
MEM_Address	Member residence address	VARCHAR2	100
MEM_Phone	Member personal phone number	VARCHAR2	8

ORDERS	Description	Data Type	Length
<u>ORD_ID</u> (Primary Key)	Unique identifier of order, which is system generated	NUMERIC	8
MEM_ID (Foreign Key)	Unique identifier of member, which is system generated	NUMERIC	8
ORD_Date	Date of the order after payment is confirmed, which is system generated	DATE	19
ORD_Status	Status of the order delivery	VARCHAR2	23
[ORD_Total]	Derived attributes of the total amount of the order	NUMERIC	10

PRODUCT	Description	Data Type	Length
<u>PRD_ID</u> (Primary Key)	Unique identifier of product, which is system generated	NUMERIC	8
PRD_Name	Product name	VARCHAR2	400
PRD_Category	Product category	VARCHAR2	60
PRD_SubCategory	Product sub category	VARCHAR2	60
PRD_AddDate	Date on which the product has been added to the database	DATE	19
PRD_LastUpdatedDate	Date of last update of product by staff (when product is first added to the system, LastUpdatedDate is the AddDate, until modified later)	DATE	19
[PRD_ActivePromotion]	Derived attribute of the newly added items, which are items that are added 14 days or less than the current date	DATE	19
PRD_MerchantPrice	Pre-discounted merchant selling price of product	NUMERIC	7
PRD_OpeningInventory	Exact number of product inventory / stock	NUMERIC	6
[PRD_ReservedInventory]	Derived attributes of the number of products currently in consignment (not available for purchase) due to members adding products to their respective shopping cart	NUMERIC	6
[PRD_Availability]	Derived attribute of the availability of product inventory / stock	VARCHAR2	6
PRD_Origin	Product origin	VARCHAR2	40
PRD_Specifications	Product specifications / details	VARCHAR2	150
PRD_DiscountRate	Product discount rate (default value of the discount rate is 1.00)	NUMERIC	3
[PRD_FinalPrice]	Derived attribute of the final selling price of product (PRD_MerchantPrice * PRD_DiscountRate = PRD_FinalPrice)	NUMERIC	7

[PRD_AverageRating]	Derived attributes of the average of the ratings made by each individual customer.	NUMERIC	2
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STAFF	Description	Data Type	Length
<u>STA_ID</u> (Primary Key)	Unique identifier of staff, which is system generated	NUMERIC	8
STA_Username	Staff log in to the system using an unique username	VARCHAR2	30
STA_Password	Staff log in to the system using a password that will be matched to the username	VARCHAR2	30
STA_FName	Staff first name	VARCHAR2	30
STA_LName	Staff last name	VARCHAR2	30
STA_Email	Staff email address	VARCHAR2	30
STA_Address	Staff residence address	VARCHAR2	100
STA_Phone	Staff personal phone number	VARCHAR2	8
STA_Rank	Staff rank (either Staff or Manager)	VARCHAR2	7

Weak Entity

REPLY	Description	Data Type	Length
MEM_ID (Foreign Key)	Unique identifier of shopping cart, which is system generated	NUMERIC	8
PRD_ID (Foreign Key)	Unique identifier of product, which is system generated	NUMERIC	8
<u>REPLY_Sequence</u> (Partial Identifier)	The sequential order of all the replies for a specific product evaluation entry, determined by the REPLY_AddDate.	NUMERIC	6
REPLY_AddDate	The exact time the comment is inserted into the database.	DATE	19

REPLY_From	Classification of the source of the comment (“customer”, “staff”) Replies from customers on a comment are marked as “customer XX” - based on the Member ID.	VARCHAR2	18
REPLY_Content	Comments given by a customer for a specific product and the corresponding replies from staff and the customer.	VARCHAR2	1000
REPLY_Status	Classification of the comments (“Appropriate” or ” Inappropriate”)	VARCHAR2	13

Associative Entity

CART ITEM	Description	Data Type	Length
PRD_ID (Foreign Key)	Unique identifier of product, which is system generated	NUMERIC	8
MEM_ID (Foreign Key)	Unique identifier of shopping cart, which is system generated	NUMERIC	8
CART_ITEM_Quantity	Quantity of the desired product put into the member’s shopping cart.	NUMERIC	6
CART_ITEM_Time	When products are added to the cart, the exact time and date is recorded and stored	DATE	19
[CART_ITEM_Status]	Derived attribute that differentiates between “reserved” and “expired” products in the cart based when the products are added to the cart. If CART_Time > 1 hour, then the CART_Status will be “expired”	VARCHAR2	8

ORDER ITEM	Description	Data Type	Length
PRD_ID (Foreign Key)	Unique identifier of product, which is system generated	NUMERIC	8
ORD_ID (Foreign Key)	Unique identifier of shopping cart, which is system generated	NUMERIC	8

ORD_ITEM_FinalPrice	Final unit price of the order item at payment.	NUMERIC	10
ORD_ITEM_Quantity	Quantity transacted for the order item.	NUMERIC	7

PRODUCT EVALUATION	Description	Data Type	Length
MEM_ID (Foreign Key)	Unique identifier of shopping cart, which is system generated	NUMERIC	8
PRD_ID (Foreign Key)	Unique identifier of product, which is system generated	NUMERIC	8
PRD_EVAL_Rating	Rating (out of 5) given by a customer for a specific product	NUMERIC	2,1

FUNCTIONAL REQUIREMENTS

Set X	Set Y	Set Z	Set T
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Data Requirement

- d1. Member details (member id, username, password, first name, last name, email, address, city, phone number)
- d2. Product details (product id, product name, category, subcategory, merchant price, opening inventory, reserved inventory, availability, origin, specifications, discount rate, final price, average rating)
- d3. Order details (order id, date, status order total price)
- d4. Staff login (staff id, username, password, first name, email, address, phone number, rank)
- d5. Cart Item (item quantity, time, status)
- d6. Order item (final price, quantity)
- d7. Product evaluation (rating, comments)

Process Requirement

Staff

- s1. Allow staff to insert new product information
- s2. Allow staff to update product information

- s3. Allow staff to update order status for orders
- s4. Allow staff to modify the discount rate of each product
- s5. Allow staff to reply to comments under each product

Manager

- s6. Allow manager to display “Manager Dashboard” (refer below for the manager dashboard requirement)
- s7. Allow manager to flag and hide inappropriate comments

Customer/Member

- c1. Allow customers to register as a member
- c2. Allow customers to retrieve the login password and reset the login password via email in case they have forgotten.
- m3. Allow members to update their personal information
- m4. Allow members to search products and view product details
- m5. Allow members to filter products based on price, category, and time (i.e new arrivals)
- m6. Allow members to add products into shopping cart for later retrieval
- m7. Allow members to view the total price and edit the shopping cart
- m8. Allow members to delete shopping cart lines
- m9. Allow members to make purchase
- m10. Allow members to view his/her own order history
- m11. Allow members to view order status, such that the customer knows whether the orders are still under preparation, on delivery, or have arrived when they view the order records
- m12. Allow members to enjoy discounts when purchasing products
- m13. Allow members to rate and comment products
- m14. Allow members to see the average rating and all comments
- m15. Allow members to view the availability of products
- t1. Allow members to view newly inserted products automatically

Manager Dashboard Requirement

- r1. Show total amount of daily and monthly sales
- r2. Show all sales order of today (And be able to view detail of each sales order)
- r3. Show the 5 most popular products and each of the product sales (in terms of quantity)
- r4. Show the top 5 members and their individual sales amounts
- r5. Show sales of a particular product, in terms of quantity sold
- r6. Show stock-out products
- r7. Show the number of orders of different statuses
- r8. Show the discounted products
- r9. Show the comments of the different products

CONCLUSION

As of now, the developed system is still at its preliminary stages. While the essential functions of the system have been tested to ensure full functionality, there are still some functions that could be added to enhance the overall user experience. For example, it would be more considerate and user-friendly to include pictures for each of the products listed. By doing so, Members are able to visualize and get a sense of how the product looks like before making a purchase. Similarly, comments and replies from users should allow Members to attach an image. That way, other Members can get an even better sense of how the products appear in hand. Also, in case Members encounter issues when using the system, a customer service function would have to be implemented. Perhaps a page to allow Members to ask general questions that are not product related, or a FAQ page to showcase generic and common questions asked. Lastly, to enhance user experience, the system should track the last viewed products of each Member and have a page to display the recently viewed on. Members may feel like the products recommended are more catered towards them, creating a sense of personalization, which is vital to uplift sales. Overall, additional functions and features would be pivotal to the success and retainment of customers, to ensure the platform caters to the desired features of its users that will in turn generate greater sales.