



**UTM**  
UNIVERSITI TEKNOLOGI MALAYSIA

**SECD2523  
(DATABASE)**

**SECTION 10**

**PHASE 3  
PROJECT: UNILAUNDRY**

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## **1.0 INTRODUCTION**

In the context of university life, laundry is one of the important services for students to maintain their personal hygiene. However, the existing system is not efficient enough which is why we came up with a proposed solution to increase the efficiency of the current laundry system in UTM. This is by creating a computerized system that eases both users and administrators using our proposed laundry system. We decided to develop this system because, in the context of today's fast-paced learning environment, colleges and universities are always looking for ways to improve the lives of their students by offering resources that foster both personal and intellectual development. We made the decision to create this system because colleges and universities are constantly seeking methods to improve the quality of life of their students by providing resources that support both intellectual and personal development in the context of today's fast-paced learning environment. With the help of this cutting-edge system, we hope to offer our students a dependable and practical solution that will improve their lives and, in the end, their university experience.

The problem of our current system is that students must wait for extended periods of time under our client's existing manual system. The reason for this is that there aren't enough machines, so students have to wait in line for a long period, especially during peak periods. This causes delays and inconveniences. In addition, some users leave their clothes unattended, which results in longer than usual wait times for other users. As a result, our goal is to lessen these issues by developing a system that addresses them. Finally, but just as importantly, we want to support administrators in their efforts to develop a self-service laundry system that is more efficient, well-maintained, and satisfies the requirements and expectations of its users, especially UTM students.

## **2.0 OVERVIEW OF THE PROJECT**

The need to solve the underlying inefficiencies in the UTM laundry system is the driving force behind our initiative, UniLaundry. We suggest creating a complex computerised system that would not only speed laundry procedures but also adapt to the changing demands of the university community, taking into account the difficulties administrators and students have with the current manual setup. We decided to start UniLaundry because we are dedicated to improving the lives of UTM students, especially in the fast-paced studying atmosphere that is common in today's educational institutions. By offering a user-friendly, efficient, and technologically sophisticated washing system, we hope to provide a holistic solution that promotes both intellectual and personal growth.

The goal of UniLaundry is to be a revolutionary strategy that solves the long-standing problems with the present arrangement, not merely a laundry management system. The proposal highlights the key objectives, benefits, and features of UniLaundry, highlighting its potential to accommodate a range of student needs, foster a feeling of community, and support the university's environmental initiatives. Long wait times, uneven service, and consumer confusion are among the problems UniLaundry seeks to address with features including a user-friendly booking system, a variety of payment options, and real-time monitoring. It also hopes to assist administrators in their quest for a self-serve laundry system that is effective, hygienic, and meets UTM student standards, thereby transforming the university experience as a whole.

We will elaborate on the logically enhanced Entity-Relationship Diagram (ERD), improved ERD, conceptual ERD, and concurrent changes to various elements throughout this phase. Formulating the final logical ERD and adhering to the normalisation procedure that results in the Boyce-Codd Normal Form (BCNF) relations is our ultimate goal. In order to provide thorough insights into the main data entities, characteristics, and their relationships, the data dictionary will be revised to be consistent with the normalised relations. In conclusion, SQL statements will be produced to help convert requirements into detailed and accurate system design specifications.

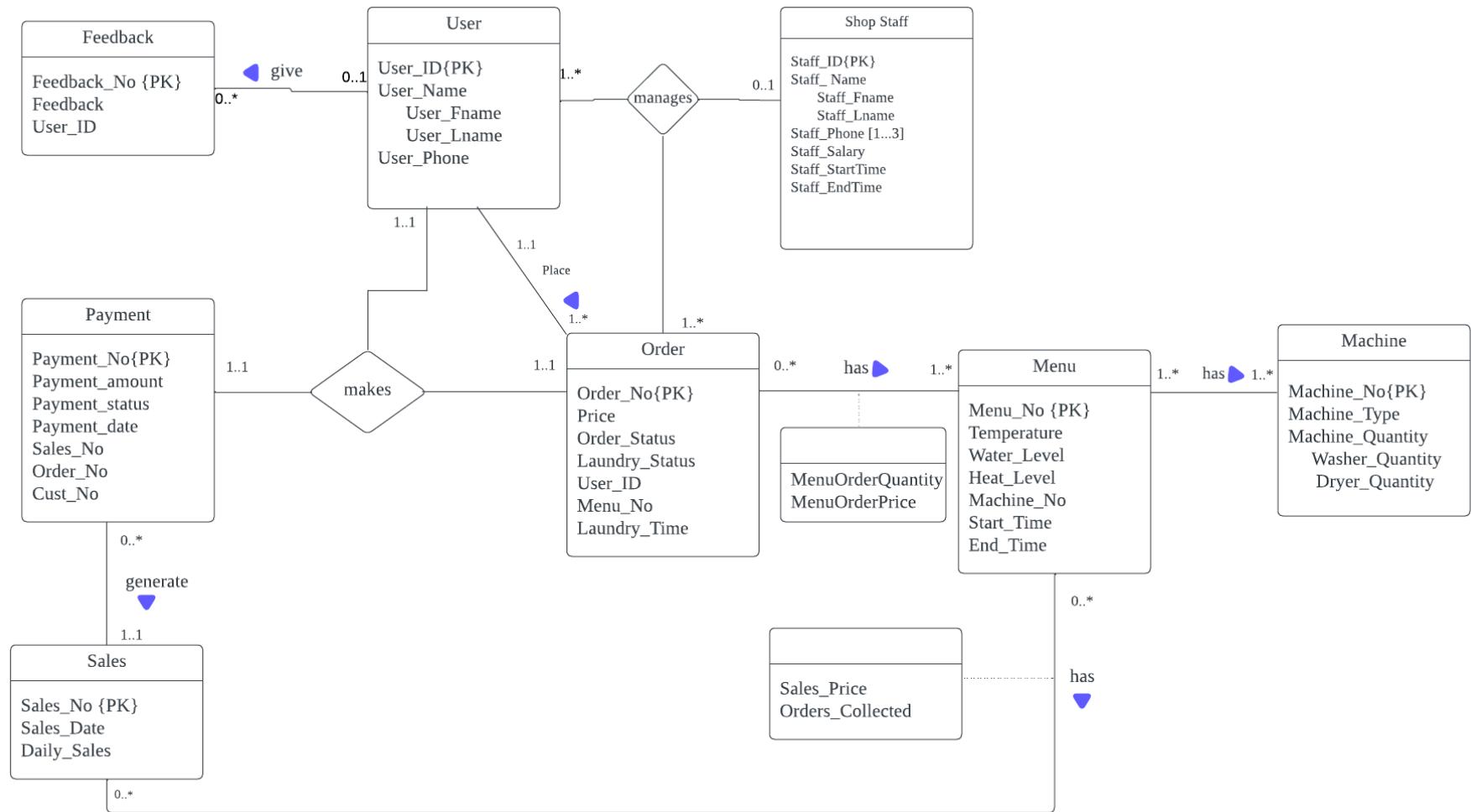
## **3.0 DATABASE CONCEPTUAL DESIGN**

### **3.1 Updated Business Rule**

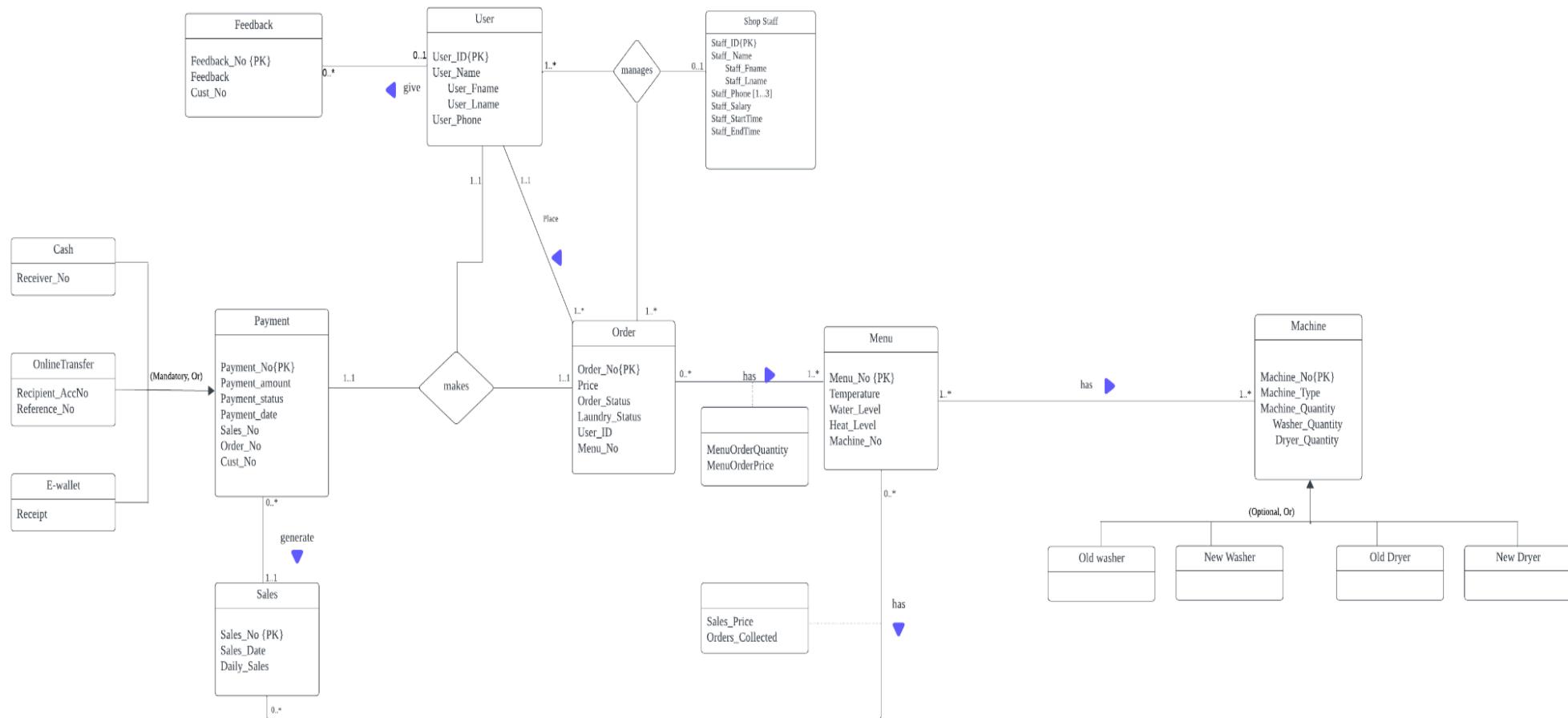
1. The UniLaundry is open 24 hours and operates as a self-service facility.
2. The users are required to install the UniLaundry application to access the services provided by the UniLaundry system.
3. The users need to create a user account by providing their essential details, including full name, email address and phone number during the registration process.
4. The owner is required to use a specific username and password to secure access and prevent unauthorized users.
5. The users are required to book a slot by selecting a specific date and time during the booking session.
6. The UniLaundry only offers two essential services which are laundry and dryer.
7. The users have the flexibility to book any quantity of laundry or dryer services as the system does not have maximum or minimum booking quantities.
8. The UniLaundry only accepts online banking and e-wallet as their payment method.
9. The users can only access the laundry and dryer machines by entering the unique security code that will be sent after the payment.
10. The users have the option to cancel the booking by using a cancellation feature with a reasonable reason option provided.
11. Each booking slot is allocated for 40 minutes duration, allowing for flexibility in the length for each session, although the machines will be operational for 25 minutes for each slot time.
12. The users have an option to give their rating and review after using the laundry system.

## 3.2 Conceptual ERD

### 3.2.1 ERD

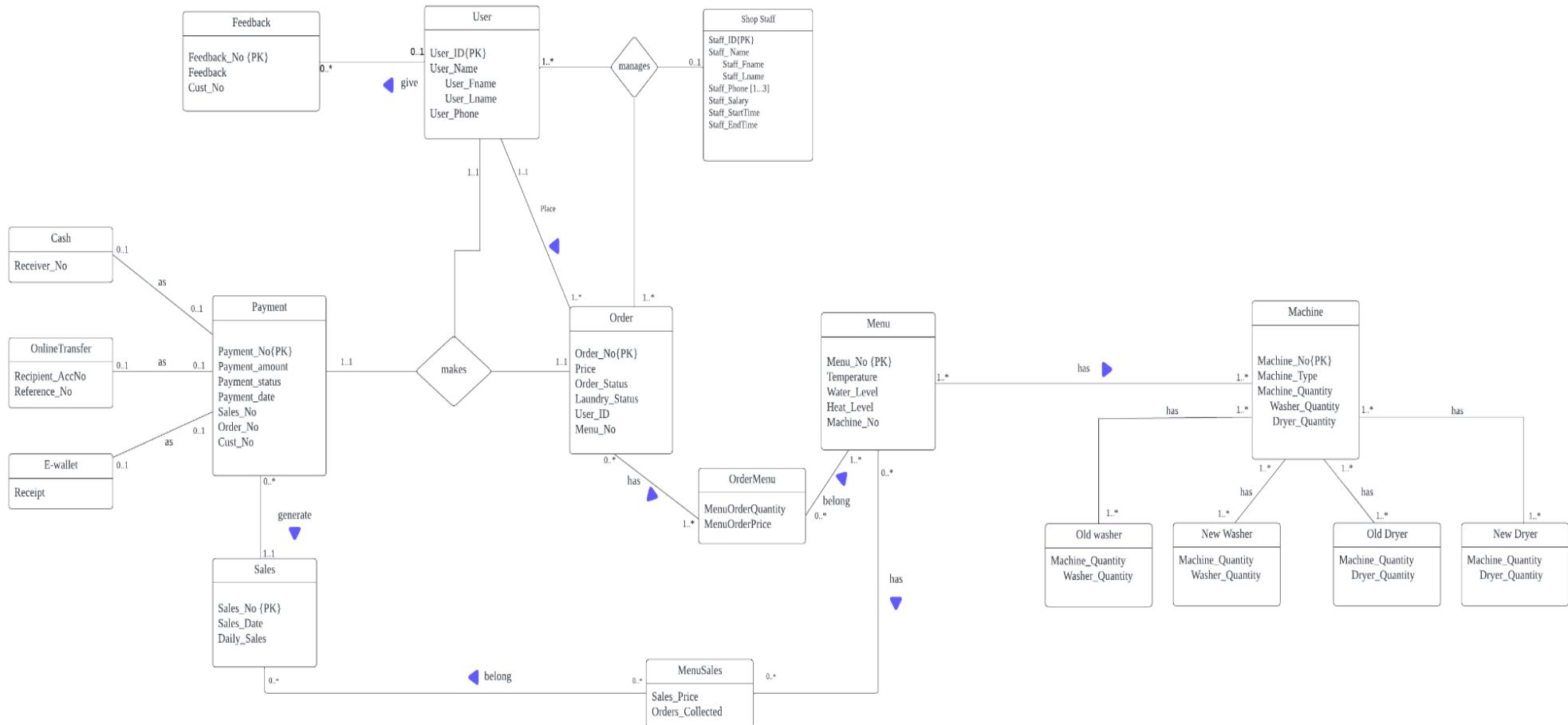


### 3.2.2 Enhanced ERD



## 4.0 DATABASE LOGICAL DESIGN

### 4.1 Logical ERD



## 4.2 Logical ERD (textual)

### Step 1: Derive Relations for Local Logical Data Model

#### i. Strong Entity Type

1. User (**User\_ID**, User\_FName, User\_LName, User\_Phone)
2. Order (**Order\_No**, Price, Order\_Status, Laundry\_Status, User\_ID, Menu\_No, Laundry\_Time)
3. Menu ( **Menu\_No**, Temperature, Water\_Level, Heat\_Level, Machine\_No, Start\_Time, End\_Time)
4. Machine ( **Machine\_No**, Machine\_Type, Machine\_Quantity, Washer\_Quantity, Dryer\_Quantity)
5. Payment ( **Payment\_No**, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No, Order\_No, User\_ID)
6. Sales ( **Sales\_No**, Sales\_Date, Daily\_Sale)
7. Shop Staff ( **Staff\_ID**, Staff\_Fname, Staff\_Lname, Staff\_Phone, Staff\_Salary, Staff\_StartTime, Staff\_EndTime)
8. Feedback (**Feedback\_No**, Feedback, User\_ID)

#### iii. One-to-many ( 1:\* ) binary relationship types

1. Relationship place between User and Order

Parent: User

Child: Order

User (**User\_ID**, User\_FName, User\_LName, User\_Phone)

Order (**Order\_No**, Price, Order\_Status, Laundry\_Status, User\_ID, Menu\_No, Laundry\_Time)

2. Relationship Gives between Customer and Feedback

Parent: Customer

Child: Feedback

User (**User\_ID**, User\_FName, User\_LName, User\_Phone)

Feedback (**Feedback\_No**, Feedback, User\_ID)

3. Relationship Generates between Sales and Payment

Parent: Sales

Child: Payment

Sales ( **Sales\_No**, Sales\_Date, Daily\_Sale)

Payment ( **Payment\_No**, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No, Order\_No, User\_No)

#### iv. One-to-one( 1:1 ) binary relationship types

##### Mandatory Participation on Both Sided

###### User and Payment

User\_Pay (**User\_ID**, User\_FName, User\_LName, User\_Phone, Payment\_No, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No, Order\_No )

Fk: **Sales\_No** references **Sales(Sales\_No)**

**Order\_No** references **Order(Order\_No)**

###### Order and Payment

Order\_Pay (**Order\_No**, Price, Order\_Status, Laundry\_Status, User\_ID, Menu\_No, Laundry\_Time, Payment\_No, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No)

FK: **User\_ID** references **User (User\_ID)**

**Menu\_No** references **Menu(Menu\_No)**

**Sales\_No** references **Sales(Sales\_No)**

#### v. Superclass/Subclass Relationship Types

1. Machine

Old Washer (**Machine\_No**, Machine\_Type, Washer\_Quantity)

New Washer (**Machine\_No**, Machine\_Type, Washer\_Quantity)

Old Dryer (**Machine\_No**, Machine\_Type, Washer\_Quantity)

New Dryer (**Machine\_No**, Machine\_Type, Washer\_Quantity)

2. Payment

Cash ( **Payment\_No**, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No, Order\_No, User\_No)

OnlineTransfer ( **Payment\_No**, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No, Order\_No, User\_No)

E-wallet(**Payment\_No**, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No, Order\_No, User\_No)

**vi. Many-to-many( \*:\* ) binary relationship types**

1. Relationship: Menu has Sales

Menu (**Menu\_No**, Temperature, Water\_Level, Heat\_Level, Machine\_No, Start\_Time, End\_Time)

Sales ( **Sales\_No**, Sales\_Date, Daily\_Sale)

MenuSales (**Menu\_No**, **Sales\_No**, Sales\_Price, Orders\_Collected)

2. Relationship: Machine has Menu

Machine ( **Machine\_No**, Machine\_Type, Machine\_Quantity, Washer\_Quantity, Dryer\_Quantity)

Menu (**Menu\_No**, Temperature, Water\_Level, Heat\_Level, Machine\_No, Start\_Time, End\_Time)

MachineMenu(**Machine\_No**, **Menu\_No**)

3. Relationship: Order has Menu

Order ( **Order\_No**, Price, Order\_Status, Laundry\_Status, User\_ID, Menu\_No, Laundry\_Time)

Menu (**Menu\_No**, Temperature, Water\_Level, Heat\_Level, Machine\_No, Start\_Time, End\_Time)

OrderMenu (**Order\_No**, **Menu\_No**, MenuOrderQuantity, MenuOrderPrice)

**viii. Complex relationship types**

1. Relationship: User makes Payment for Order

User (**User\_ID**, User\_FName, User\_LName, User\_Phone)

Payment ( **Payment\_No**, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No, Order\_No, User\_ID)

Order ( **Order\_No**, Price, Order\_Status, Laundry\_Status, User\_ID, Menu\_No, Laundry\_Time)

OrderPayment(**User\_ID**, **Payment\_No**, **Order\_No**)

2. Relationship: Shop Staff manages Order for User

Shop Staff ( **Staff\_ID**, Staff\_Fname, Staff\_Lname, Staff\_Phone, Staff\_Salary, Staff\_StartTime, Staff\_EndTime)

Order ( **Order\_No**, Price, Order\_Status, Laundry\_Status, User\_ID, Menu\_No, Laundry\_Time)

User (**User\_ID**, User\_FName, User\_LName, User\_Phone)

UserOrder(**Staff\_ID**, **Order\_No**, **User\_ID**)

## **ix. Multi-valued Attributes**

1. Relationship: Shop staff provides their Phone Number

Shop Staff ( **Staff\_ID**, Staff\_Fname, Staff\_Lname, Staff\_Phone, Staff\_Salary, Staff\_StartTime, Staff\_EndTime)

Staff\_Telephone (**Staff\_Phone**, Staff\_ID)

## FINALIZE

1. User (**User\_ID**, User\_FName, User\_LName, User\_Phone)
2. User\_Pay (**User\_ID**, User\_FName, User\_LName, User\_Phone, Payment\_No, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No, Order\_No)
3. UserOrder(**Staff\_ID**, **Order\_No**, **User\_ID**)
4. Order (**Order\_No**, Price, Order\_Status, Laundry\_Status, User\_ID, Menu\_No, Laundry\_Time)
5. OrderPayment(**User\_ID**, **Payment\_No**, **Order\_No**)
6. OrderMenu (**Order\_No**, **Menu\_No**, MenuOrderQuantity, MenuOrderPrice)
7. Order\_Pay (**Order\_No**, Price, Order\_Status, Laundry\_Status, User\_ID, Menu\_No, Laundry\_Time, Payment\_No, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No)
8. Menu (**Menu\_No**, Temperature, Water\_Level, Heat\_Level, Machine\_No, Start\_Time, End\_Time)
9. MenuSales (**Menu\_No**, **Sales\_No**, Sales\_Price, Orders\_Collected)
10. Machine (**Machine\_No**, Machine\_Type, Machine\_Quantity, Washer\_Quantity, Dryer\_Quantity)
11. MachineMenu(**Machine\_No**, **Menu\_No**)
12. Old\_Washer (**Machine\_No**, Machine\_Type, Washer\_Quantity)
13. New\_Washer (**Machine\_No**, Machine\_Type, Washer\_Quantity)
14. Old\_Dryer (**Machine\_No**, Machine\_Type, Dryer\_Quantity)
15. New\_Dryer (**Machine\_No**, Machine\_Type, Dryer\_Quantity)
16. Payment (**Payment\_No**, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No, Order\_No, User\_ID)
17. Cash (**Payment\_No**, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No, Order\_No, User\_No)
18. OnlineTransfer (**Payment\_No**, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No, Order\_No, User\_No)
19. E-wallet(**Payment\_No**, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No, Order\_No, User\_No)
20. Sales (**Sales\_No**, Sales\_Date, Daily\_Sale)
21. Shop Staff (**Staff\_ID**, Staff\_Fname, Staff\_Lname, Staff\_Phone, Staff\_Salary, Staff\_StartTime, Staff\_EndTime)
22. Staff\_Telephone (**Staff\_Phone**, Staff\_ID)
23. Feedback (**Feedback\_No**, Feedback, User\_ID)

## 4.3 Updated Data Dictionary

### 4.3.1 Description of Entity

Entity	Description	Occurrence
User	Holds user's information	Users place machine orders. Users may or may not give feedback. Users make payment for the orders. Users can be associated with multiple sales.
Order	Holds user's order information	Order has a menu provided to the user for placing order. Each user makes a payment after the order status is successful.
Menu	Holds the machine's menu information	Many machines can use each menu. Each machine has one or more menus.
The Machine	Holds the machine's information	Each menu is associated with one or more machines
Payment	Holds payment's information	Payment can be made by one user only.
Sales	Holds sales information	Sales are recorded when payment is done.
Shop_Staff	Holds shop staff's information	Shop staff may or may not manage users. Shop staff may or may not manage orders.
Feedback	Holds user's feedback	Feedback is sent by users.
OrderMenu	Manages the menu items available for ordering	Order has a menu provided to the user for placing an order.
UserOrder	Represents a user's order.	Each user makes order
User_Pay	Handles the payment process initiated by	Each user makes a payment after

	the user.	the order status is successful.
Order_Pay	Manages the payment process for an order.	Each user makes a payment after the order status is successful.
Machine_menu	Controls the menu available on a machine interface.	Each user can view the menu on the machine
OrderPayment	Tracks the payment status for an order.	Users can view whether payment was successful or unsuccessful
MenuSales	Records sales data related to menu items.	Each Menu item may or may not have sales
Cash	Represents cash transactions in the payment process.	Each transaction can be paid through cash.
OnlineTransfer	Manages online transfer transactions in the payment process.	Each transaction can be paid through an online transfer
E-wallet	Handles transactions made through electronic wallets.	Each transaction can be paid through the e-wallet
Old_Washer	Represents an old washing machine.	Each washing process may or may not use the old washer.
New_Washer	Represents a new washing machine.	Each washing process may or may not use the new washer.
Old_Dryer	Represents an old dryer machine.	Each drying process may or may not use an old dryer..
New_Dryer	Represents a new dryer.	Each drying process may or may not use a new dryer.
Staff_Telephone	Refers to telephones used by staff members.	Each user may or may not have more than 1 telephone number.

#### 4.3.2 Description of Relationship

Entity	Multiplicity	Relationship	Multiplicity	Entity
User	0..1	Give	0..*	Feedback
User	1..1	Place	1..*	Order
User	1..1	Makes	1..1	Payment
Sales	1..1	Generate	0..*	Payment
Order	0..*	Has	1..*	Menu
Machine	1..*	Has	1..*	Menu
Menu	0..*	Has	0..*	Sales
Shop Staff	0..1	Manages	1..*	User
Shop Staff	0..1	Manages	1..*	Order
OrderMenu	0..*	Belong to	1..*	Menu
Order	0..*	has	1..*	OrderMenu
MenuSales	0..*	belong	0..*	Sales
Menu	0..*	has	0..*	MenuSales
Cash	0..1	as	0..1	Payment
OnlineTransfer	0..1	as	0..1	Payment
E-wallet	0..1	as	0..1	Payment
Machine	1..*	has	1..*	Old_washer
Machine	1..*	has	1..*	New_Washer
Machine	1..*	has	1..*	Old_Dryer
Machine	1..*	has	1..*	New_Dryer

### 4.3.3 Description Attributes

Entity	Attributes	Description	Data Type	Null	Multi-Valued
User	User_ID	Uniquely Identifies a user {PK}	NUMBER (5)	No	No
	User_Name User_Fname User_Lname	Name of the user First Name of the user Last Name of the user	VARCHAR2 (30) VARCHAR2 (15) VARCHAR2 (15)	No No No	No No No
	User_Phone	Phone number of the user	VARCHAR2 (11)	No	No
Order	Order_No	Uniquely Identifies Order {PK}	NUMBER (4)	No	No
	Price	Price of order	NUMBER(10, 2)	No	No
	Order_Status	Status of user's order	VARCHAR2 (50)	No	No
	Laundry_Status	Status of Laundry	VARCHAR2 (50)	No	No
	User_ID	Foreign Key of order which uniquely identifies a user.	VARCHAR2 (5)	No	No
	Menu_No	Foreign Key of order which identify a menu {FK}	VARCHAR2 (10)	No	No
	Laundry_Time	Time of laundry of user	TIMESTAMP	No	No
Menu	Menu_No	Uniquely identifies a menu	NUMBER(10)	No	No
	Temperature	Selecting temperature of menu	VARCHAR2 (10)	No	No
	Water_Level	Selecting water level	VARCHAR2	No	No

		of menu	(10)		
	Heat_Level	Selecting heat level of menu	VARCHAR2 (510)	No	No
	Machine_No	Foreign key of menu which uniquely identify a machine	NUMBER (3)	No	No
	Start_Time	Start time of menu	TIMESTAMP	No	No
	End_Time	End time of menu	TIMESTAMP	No	No
Machine	Machine_No	Uniquely identifies a machine	NUMBER (3)	No	No
	Machine_Type	Type of machines available	VARCHAR2 (20)	No	No
	Machine_Quantity	No of machine available No of washing machine available No of dryer machine available	NUMBER (2) NUMBER (2) NUMBER (2)	No No No	No No No
	Washer_Quantity				
	Dryer_Quantity				
Payment	Payment_No	Uniquely identifies a payment {PK}	VARCHAR2 (6)	No	No
	Payment_amount	Amount of payment	NUMBER (10, 2)	No	No
	Payment_status	Status of Payment	VARCHAR2 (20)	No	No
	Payment_date	Payment Transaction date	DATE	No	No
	Sales_No	Foreign key of payment which uniquely identify a sale {FK}	NUMBER (10)	No	No
	Order_No	Foreign key of payment which uniquely identify an order {FK}	NUMBER (10)	No	No

	User_No	Foreign key of payment which uniquely identify a user {FK}	NUMBER (5)	No	No
Sales	Sales_No	Uniquely identifies sales {PK}	NUMBER (10)	No	No
	Sales_Date	Sales date	TIMESTAMP	No	No
	Daily_Sale	Earned profit in a 24-hour period	NUMBER (10, 2)	Yes	No
Shop_Staff	Staff_ID	Uniquely identifies staff {PK}	NUMBER (10)	No	No
	Staff_Name Staff_Fname Staff_Lname	Name of a staff First Name of Staff Last Name of Staff	VARCHAR2 (30) VARCHAR2 (15) VARCHAR2 (15)	No No No	No No No
	Staff_Phone	Phone no of staff	VARCHAR2 (11)	No	Yes
	Staff_Salary	Salary of staff	NUMBER (10, 2)	No	No
	Staff_StartTime	Start Time of Staff working time	TIMESTAMP	No	No
	Staff_EndTime	End Time of staff working time	TIMESTAMP	No	No
	Feedback_No	Uniquely identify a feedback	VARCHAR2 (2)	No	No
Feedback	Feedback	Feedback provided from users about the laundry system	VARCHAR2 (100)	Yes	No
	User_ID	Foreign key of feedback which identifies a user{FK}	VARCHAR2 (5)	No	No

OrderMenu	Order_No	Uniquely Identifies Order {PK}	NUMBER (4)	No	No
	Menu_No	Uniquely identifies a menu {PK}	NUMBER (10)	No	No
	MenuOrderQuantity	Quantity for each menu ordered	NUMBER (3)	No	No
	MenuOrderPrice	Price for each Menu Ordered	NUMBER (10, 2)	No	No
UserOrder	Staff_ID	Uniquely identifies staff {PK}	NUMBER (10)	No	No
	Order_No	Uniquely Identifies Order {PK}	NUMBER (10)	No	No
	User_ID	Uniquely Identifies a user {PK}	NUMBER (5)	No	No
User_Pay	User_ID	Uniquely Identifies a user {PK}	NUMBER (5)	No	No
	User_FName	First Name of the user	VARCHAR2 (15)	No No No	No No No
	User_LName	Last Name of the user	VARCHAR2 (15)	No	No
	User_Phone	Phone number of the user	VARCHAR2 (11)	No	No
	Payment_No	Uniquely identifies a payment {PK}	VARCHAR2 (6)	No	No
	Payment_amount	Amount of payment	NUMBER (10, 2)	No	No

	Payment_status	Status of Payment	VARCHAR2 (50)	No	No
	Payment_Date	Payment Transaction date	DATE	No	No
	Sales_No	Foreign key of payment which uniquely identify a sale {FK}	NUMBER (10)	No	No
	Order_No	Foreign key of payment which uniquely identify an order {FK}	NUMBER(10)	No	No
Order_Pay	Order_No	Uniquely Identifies Order {PK}	NUMBER (4)	No	No
	Price	Price of order	NUMBER (10, 2)	No	No
	Order_Status	Status of user's order	VARCHAR2 (50)	No	No
	Laundry_Status	Status of Laundry	VARCHAR2 (50)	No	No
	User_ID	Foreign Key of order which uniquely identifies a user.	NUMBER (5)	No No No	No No No
	Menu_No	Foreign Key of order which identify a menu {FK}	NUMBER(10)	No	No
	Laundry_Time	Time of laundry of user	VARCHAR2 (10)	No	No
	Payment_No	Uniquely identifies a payment {PK}	VARCHAR2 (6)	No	No

	Payment_amount	Amount of payment	NUMBER (10, 2)	No	No
	Payment_status	Status of Payment	VARCHAR2 (20)	No	No
	Payment_Date	Payment Transaction date	DATE	No	No
	Sales_No	Foreign key of payment which uniquely identify a sale {FK}	NUMBER (10)	No	No
OrderPayment	User_ID	Uniquely Identifies a user {PK}	NUMBER (5)	No	No
	Payment_No	Uniquely identifies a payment {PK}	VARCHAR2 (6)	No	No
	Order_No	Uniquely Identifies Order {PK}	VARCHAR2 (4)	No	No
MenuSales	Menu_No	Uniquely identifies a menu	NUMBER (10)	No	No
	Sales_No	Uniquely identifies sales {PK}	NUMBER (10)	No	No
	Sales_Price	Total amount of sales	NUMBER (10,2)	No No No	No No No
	Orders_Collected	Total amount of orders collected	NUMBER (3)	No	No
Cash	Payment_No	Uniquely identifies a payment {PK}	VARCHAR2 (6)	No	No
	Payment_amount	Amount of payment	NUMBER (10, 2)	No	No

	Payment_status	Status of Payment	VARCHAR2(20)	No	No
	Payment_Date	Payment Transaction date	DATE	No	No
	Sales_No	Foreign key of payment which uniquely identify a sale {FK}	NUMBER(10)	No	No
	Order_No	Foreign key of payment which uniquely identify an order {FK}	NUMBER(10)	No	No
	User_No	Foreign key of payment which uniquely identify a user {FK}	NUMBER(5)	No	No
MachineMenu	Machine_No	Uniquely identifies a machine	NUMBER(3)	No	No
	Menu_No	Uniquely identifies a menu	NUMBER(10)	No	No
OnlineTransfer	Payment_No	Uniquely identifies a payment {PK}	VARCHAR2(6)	No	No
	Payment_amount	Amount of payment	NUMBER(10, 2)	No	No
	Payment_status	Status of Payment	VARCHAR2(20)	No No No	No No No
	Payment_Date	Payment Transaction date	DATE	No	No
	Sales_No	Foreign key of payment which uniquely identify a sale {FK}	NUMBER(10)	No	No

	Order_No	Foreign key of payment which uniquely identify an order {FK}	NUMBER (10)	No	No
	User_No	Foreign key of payment which uniquely identify a user {FK}	NUMBER (5)	No	No
E-wallet	Payment_No	Uniquely identifies a payment {PK}	VARCHAR2 (6)	No	No
	Payment_amount	Amount of payment	NUMBER (10, 2)	No	No
	Payment_status	Status of Payment	VARCHAR2 (20)	No	No
	Payment_Date	Payment Transaction date	DATE	No	No
	Sales_No	Foreign key of payment which uniquely identify a sale {FK}	NUMBER (10)	No	No
	Order_No	Foreign key of payment which uniquely identify an order {FK}	NUMBER (10)	No	No
	User_No	Foreign key of payment which uniquely identify a user {FK}	NUMBER (5)	No	No
Old_Washer	Machine_No	Uniquely identifies a machine	NUMBER (3)	No	No
	Machine_Type	Type of machines available	VARCHAR2 (20)	No No No	No No No

	Washer_Quantity	No of washing machine available	NUMBER (2)	No	No
New_Washer	Machine_No	Uniquely identifies a machine	NUMBER (3)	No	No
	Machine_Type	Type of machines available	VARCHAR2 (20)	No	No
	Washer_Quantity	No of washing machine available	NUMBER (2)	No	No
Old_Dryer	Machine_No	Uniquely identifies a machine	NUMBER (3)	No	No
	Machine_Type	Type of machines available	VARCHAR2 (20)	No	No
	Dryer_Quantity	No of drying machine available	NUMBER (2)	No	No
New_Dryer	Machine_No	Uniquely identifies a machine	NUMBER (3)	No	No
	Machine_Type	Type of machines available	VARCHAR2 (20)	No	No
	Dryer_Quantity	No of drying machine available	NUMBER (2)	No	No
Staff_Telephone	Staff_Phone	Uniquely identify a phone number of staff {PK}	VARCHAR2(11)	No	Yes
	Staff_ID	Foreign key of staff's telephone which uniquely identify a staff {FK}	NUMBER (10)	No	No

#### 4.4 Normalization

1. User (User\_ID, User\_FName, User\_LName, User\_Phone)

**fd1:** User\_ID → User\_Fname, User\_Lname, User\_Phone (Primary Key)

**1NF, 2NF, 3NF, BCNF:** User (User\_ID, User\_Fname, User\_Lname, User\_Phone)

2. User\_Pay (User\_ID, User\_FName, User\_LName, User\_Phone, Payment\_No, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No, Order\_No)

**fd1:** User\_ID → User\_FName, User\_LName, User\_Phone, Payment\_No, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No, Order\_No (Primary Key)

**1NF, 2NF, 3NF, BCNF:** User\_Pay (User\_ID, User\_FName, User\_LName, User\_Phone, Payment\_No, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No, Order\_No)

3. UserOrder (Staff\_ID, Order\_No, User\_ID)

**fd1:** Staff\_ID, Order\_No → User\_ID (Primary Key)

**1NF, 2NF, 3NF, BCNF:** UserOrder (Staff\_ID, Order\_No, User\_ID)

4. Order (Order\_No, Price, Order\_Status, Laundry\_Status, User\_ID, Menu\_No, Laundry\_Time)

**fd1:** Order\_No → Price, Order\_Status, Laundry\_Status, User\_ID, Menu\_No, Laundry\_Time (Primary Key)

**1NF, 2NF, 3NF, BCNF:** Order (Order\_No, Price, Order\_Status, Laundry\_Status, User\_ID, Menu\_No, Laundry\_Time)

5. OrderPayment (User\_ID, Payment\_No, Order\_No)

**fd1:** User\_ID, Payment\_No, Order\_No → Null (Composite Key)

**1NF, 2NF, 3NF, BCNF:** OrderPayment (User\_ID, Payment\_No, Order\_No)

6. OrderMenu (Order\_No, Menu\_No, MenuOrderQuantity, MenuOrderPrice)

**fd1:** Order\_No, Menu\_No → MenuOrderQuantity, MenuOrderPrice (Primary Key)

**1NF, 2NF, 3NF, BCNF:** OrderMenu (Order\_No, Menu\_No, MenuOrderQuantity, MenuOrderPrice)

7. Order\_Pay (Order\_No, Price, Order\_Status, Laundry\_Status, User\_ID, Menu\_No, Laundry\_Time, Payment\_No, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No)
- fd1:** Order\_No → Price, Order\_Status, Laundry\_Status, User\_ID, Menu\_No, Laundry\_Time, Payment\_No, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No (Primary Key)
- 1NF, 2NF, 3NF, BCNF:** Order\_Pay (Order\_No, Price, Order\_Status, Laundry\_Status, User\_ID, Menu\_No, Laundry\_Time, Payment\_No, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No)
8. Menu (Menu\_No, Temperature, Water\_Level, Heat\_Level, Machine\_No, Start\_Time, End\_Time)
- fd1:** Menu\_No → Temperature, Water\_Level, Heat\_Level, Machine\_No, Start\_Time, End\_Time (Primary Key)
- 1NF, 2NF, 3NF, BCNF:** Menu (Menu\_No, Temperature, Water\_Level, Heat\_Level, Machine\_No, Start\_Time, End\_Time)
9. MenuSales (Menu\_No, Sales\_No, Sales\_Price, Orders\_Collected)
- fd1:** Menu\_No, Sales\_No → Sales\_Price, Orders\_Collected (Primary Key)
- 1NF, 2NF, 3NF, BCNF:** MenuSales (Menu\_No, Sales\_No, Sales\_Price, Orders\_Collected)
10. Machine (Machine\_No, Machine\_Type, Machine\_Quantity, Washer\_Quantity, Dryer\_Quantity)
- fd1:** Machine\_No → Machine\_Type, Machine\_Quantity, Washer\_Quantity, Dryer\_Quantity (Primary Key)
- 1NF, 2NF, 3NF, BCNF:** Machine (Machine\_No, Machine\_Type, Machine\_Quantity, Washer\_Quantity, Dryer\_Quantity)

11. MachineMenu (Machine\_No, Menu\_No)

**fd1:** Machine\_No, Menu\_No → Null (Composite Key)

**1NF, 2NF, 3NF, BCNF:** MachineMenu (Machine\_No, Menu\_No)

12. Old Washer (Machine\_No, Machine\_Type, Washer\_Quantity)

**fd1:** Machine\_No → Machine\_Type, Washer\_Quantity (Primary Key)

**1NF, 2NF, 3NF, BCNF:** Old\_Washer (Machine\_No, Machine\_Type, Washer\_Quantity)

13. New Washer (Machine\_No, Machine\_Type, Washer\_Quantity)

**fd1:** Machine\_No → Machine\_Type, Washer\_Quantity (Primary Key)

**1NF, 2NF, 3NF, BCNF:** New\_Washer (Machine\_No, Machine\_Type, Washer\_Quantity)

14. Old Dryer (Machine\_No, Machine\_Type, Washer\_Quantity)

**fd1:** Machine\_No → Machine\_Type, Washer\_Quantity (Primary Key)

**1NF, 2NF, 3NF, BCNF:** Old\_Dryer (Machine\_No, Machine\_Type, Washer\_Quantity)

15. New Dryer (Machine\_No, Machine\_Type, Washer\_Quantity)

**fd1:** Machine\_No → Machine\_Type, Washer\_Quantity (Primary Key)

**1NF, 2NF, 3NF, BCNF:** New\_Dryer (Machine\_No, Machine\_Type, Washer\_Quantity)

16. Payment (Payment\_No, Payment\_amount, Payment\_status, Payment\_date, Sales\_No, Order\_No, User\_ID)

**fd1:** Payment\_No → Payment\_amount, Payment\_status, Payment\_date, Sales\_No, Order\_No, User\_ID (Primary Key)

**1NF, 2NF, 3NF, BCNF:** Payment (Payment\_No, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No, Order\_No, User\_ID)

17. Cash (Payment\_No, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No, Order\_No, User\_No)

**fd1:** Payment\_No → Payment\_amount, Payment\_status, Payment\_Date, Sales\_No, Order\_No, User\_No

**1NF, 2NF, 3NF, BCNF:** Cash (Payment\_No, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No, Order\_No, User\_No)

18. Online\_Transfer (Payment\_No, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No, Order\_No, User\_No)

**fd1:** Payment\_No → Payment\_amount, Payment\_status, Payment\_Date, Sales\_No, Order\_No, User\_No (Primary Key)

**1NF, 2NF, 3NF, BCNF:** Online\_Transfer (Payment\_No, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No, Order\_No, User\_No)

19. E-wallet (Payment\_No, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No, Order\_No, User\_No)

**fd1:** Payment\_No → Payment\_amount, Payment\_status, Payment\_Date, Sales\_No, Order\_No, User\_No (Primary Key)

**1NF, 2NF, 3NF, BCNF:** E\_wallet (Payment\_No, Payment\_amount, Payment\_status, Payment\_Date, Sales\_No, Order\_No, User\_No)

20. Sales (Sales\_No, Sales\_Date, Daily\_Sale)

**fd1:** Sales\_No → Sales\_Date, Daily\_Sale (Primary Key)

**1NF, 2NF, 3NF, BCNF:** Sales (Sales\_No, Sales\_Date, Daily\_Sale)

21. Shop\_Staff (Staff\_ID, Staff\_Fname, Staff\_Lname, Staff\_Phone, Staff\_Salary, Staff\_StartTime, Staff\_EndTime)

**fd1:** Staff\_ID → Staff\_Fname, Staff\_Lname, Staff\_Phone, Staff\_Salary, Staff\_StartTime, Staff\_EndTime (Primary Key)

**1NF, 2NF, 3NF, BCNF:** Shop\_Staff (Staff\_ID, Staff\_Fname, Staff\_Lname, Staff\_Phone, Staff\_Salary, Staff\_StartTime, Staff\_EndTime)

22. Staff\_Telephone (Staff\_Phone, Staff\_ID)

**fd1:** Staff\_Phone → Staff\_ID (Primary Key)

**1NF, 2NF, 3NF, BCNF:** Staff\_Telephone (Staff\_Phone, Staff\_ID)

23. Feedback (Feedback\_No, Feedback, User\_ID)

**fd1:** Feedback\_No → Feedback, User\_ID (Primary Key)

**1NF, 2NF, 3NF, BCNF:** Feedback (Feedback\_No, Feedback, User\_ID)

\***Underline word is primary key (PK)**

## 5.0 RELATIONAL DATABASE SCHEMAS (AFTER NORMALIZATION)

The relational database schemas for UniLaundry system, denoted as:

User	( <u>User_ID</u> , User_Fname, User_Lname, User_Phone)
User_Pay	( <u>User_ID</u> , User_FName, User_LName, User_Phone, Payment_No, Payment_amount, Payment_status, Payment_Date, Sales_No, Order_No )
Order	( <u>Order_No</u> , Price, Order_Status, Laundry_Status, User_ID, Menu_No, Laundry_Time)
UserOrder	( <u>Staff_ID</u> , <u>Order_No</u> , <u>User_ID</u> )
OrderPayment	( <u>User_ID</u> , <u>Payment_No</u> , <u>Order_No</u> )
OrderMenu	( <u>Order_No</u> , <u>Menu_No</u> , MenuOrderQuantity, MenuOrderPrice)
Order_Pay	( <u>Order_No</u> , Price, Order_Status, Laundry_Status, User_ID, Menu_No, Laundry_Time, Payment_No, Payment_amount, Payment_status, Payment_Date, Sales_No)
Menu	( <u>Menu_No</u> , Temperature, Water_Level, Heat_Level, Machine_No, Start_Time, End_Time)
MenuSales	( <u>Menu_No</u> , <u>Sales_No</u> , Sales_Price, Orders_Collected)
Machine	( <u>Machine_No</u> , Machine_Type, Machine_Quantity, Washer_Quantity, Dryer_Quantity)
MachineMenu	( <u>Machine_No</u> , <u>Menu_No</u> )
Old Washer	( <u>Machine_No</u> , Machine_Type, Washer_Quantity)
New Washer	( <u>Machine_No</u> , Machine_Type, Washer_Quantity)
Old Dryer	( <u>Machine_No</u> , Machine_Type, Washer_Quantity)

New Washer	( <u>Machine_No</u> , Machine_Type, Washer_Quantity)
Payment	( <u>Payment_No</u> , Payment_Amount, Payment_Status, Payment_Date, Sales_No, Order_No, User_No)
Cash	( <u>Payment_No</u> , Payment_amount, Payment_status, Payment_Date, Sales_No, Order_No, User_No)
Online Transfer	( <u>Payment_No</u> , Payment_amount, Payment_status, Payment_Date, Sales_No, Order_No, User_No)
E-wallet	( <u>Payment_No</u> , Payment_amount, Payment_status, Payment_Date, Sales_No, Order_No, User_No)
Sales	( <u>Sales_No</u> , Sales_Date, Daily_Sale)
Shop Staff	( <u>Staff_ID</u> , Staff_Fname, Staff_Lname, Staff_Phone, Staff_Salary, Staff_StartTime, Staff_EndTime)
Staff_Telephone	( <u>Staff_Phone</u> , Staff_ID)
Feedback	( <u>Feedback_No</u> , Feedback, User_ID)

\*Underline word is primary key (PK)

**User**

User_ID	User_Fname	User_Lname	User_Phone
---------	------------	------------	------------

**User\_Pay**

User_ID	User_Fname	User_Lname	User_Phone	Payment_No
Payment_amount	Payment_status	Payment_Date	Sales_No	Order_No

**UserOrder**

Staff_ID	Order_No	User_ID
----------	----------	---------

**Order**

Order_No	Price	Order_Status	Laundry_Status	User_ID	Menu_No	Laundry_Time
----------	-------	--------------	----------------	---------	---------	--------------

**OrderPayment**

User_ID	Order_No	User_ID
---------	----------	---------

**OrderMenu**

Order_No	Menu_No	MenuOrderQuantity	MenuOrderPrice
----------	---------	-------------------	----------------

**Order\_Pay**

Order_No	Price	Order_Status	Laundry_Status	User_ID	Menu_No
Laundry_Time	Payment_No	Payment_amount	Payment_status	Payment_Date	Sales_No

**Menu**

Menu_No	Temperature	Water_Level	Heat_Level	Machine_No	Start_Time	End_Time
---------	-------------	-------------	------------	------------	------------	----------

**MenuSales**

Menu_No	Sales_No	Sales_Price	Orders_Collected
---------	----------	-------------	------------------

**Machine**

Machine_No	Machine_Type	Washer_Quantity	Dryer_Quantity
------------	--------------	-----------------	----------------

**MachineMenu**

Machine_No	Menu_No
------------	---------

**Old Washer**

Machine_No	Machine_Type	Washer_Quantity
------------	--------------	-----------------

**New Washer**

Machine_No	Machine_Type	Washer_Quantity
------------	--------------	-----------------

**Old Dryer**

Machine_No	Machine_Type	Dryer_Quantity
------------	--------------	----------------

**New Dryer**

Machine_No	Machine_Type	Dryer_Quantity
------------	--------------	----------------

**Payment**

Payment_No	Payment_Amount	Payment_Status	Payment_Date	Sales_No	Order_No	User_No
------------	----------------	----------------	--------------	----------	----------	---------

**Cash**

Payment_No	Payment_amount	Payment_status	Payment_Date	Sales_No	Order_No	User_No
------------	----------------	----------------	--------------	----------	----------	---------

**OnlineTransfer**

Payment_No	Payment_amount	Payment_status	Payment_Date	Sales_No	Order_No	User_No
------------	----------------	----------------	--------------	----------	----------	---------

**E-wallet**

Payment_No	Payment_amount	Payment_status	Payment_Date	Sales_No	Order_No	User_No
------------	----------------	----------------	--------------	----------	----------	---------

**Sales**

Sales_No	Payment_No	Order_No
----------	------------	----------

**Shop Staff**

Staff_ID	Staff_Fname	Staff_Lname	Staff_Phone	Staff_Salary	Staff_StartTime	Staff_EndTime
----------	-------------	-------------	-------------	--------------	-----------------	---------------

**Staff\_Telephone**

Staff_Phone	Staff_ID
-------------	----------

**Feedback**

Feedback_No	Feedback	User_ID
-------------	----------	---------

## 6.0 SQL STATEMENTS (DDL & DML)

### Statement to create a table

```
CREATE TABLE Users (
    User_ID NUMBER(5) PRIMARY KEY,
    User_FName VARCHAR2(15),
    User_LName VARCHAR2(15),
    User_Phone VARCHAR2(11)
);
```

```
CREATE TABLE Machine (
    Machine_No NUMBER(3) PRIMARY KEY,
    Machine_Type VARCHAR2(20),
    Machine_Quantity NUMBER(2),
    Washer_Quantity NUMBER(2),
    Dryer_Quantity NUMBER(2)
);
```

```
CREATE TABLE Menu (
    Menu_No NUMBER(10) PRIMARY KEY,
    Temperature VARCHAR2(10),
    Water_Level VARCHAR2(10),
    Heat_Level VARCHAR2(510),
    Machine_No NUMBER(3),
    Start_Time TIMESTAMP,
    End_Time TIMESTAMP,
    FOREIGN KEY (Machine_No) REFERENCES Machine(Machine_No)
);
```

```
CREATE TABLE MachineMenu (
    Machine_No NUMBER(3),
```

```
    Menu_No NUMBER(10),
    PRIMARY KEY (Machine_No, Menu_No),
    FOREIGN KEY (Machine_No) REFERENCES Machine(Machine_No),
    FOREIGN KEY (Menu_No) REFERENCES Menu(Menu_No)
);
```

```
CREATE TABLE OldWasher (
    Machine_No NUMBER(3) PRIMARY KEY,
    Machine_Type VARCHAR2(20),
    Washer_Quantity NUMBER(2)
);
```

```
CREATE TABLE NewWasher (
    Machine_No NUMBER(3) PRIMARY KEY,
    Machine_Type VARCHAR2(20),
    Washer_Quantity NUMBER(2)
);
```

```
CREATE TABLE Old_Dryer (
    Machine_No NUMBER(3) PRIMARY KEY,
    Machine_Type VARCHAR2(20),
    Dryer_Quantity NUMBER(2)
);
```

```
CREATE TABLE New_Dryer (
    Machine_No NUMBER(3) PRIMARY KEY,
    Machine_Type VARCHAR2(20),
    Dryer_Quantity NUMBER(2)
);
```

```
CREATE TABLE ShopStaff (
```

```
Staff_ID NUMBER(10) PRIMARY KEY,  
Staff_Fname VARCHAR2(15),  
Staff_Lname VARCHAR2(15),  
Staff_Phone VARCHAR2(11),  
Staff_Salary NUMBER(10, 2),  
Staff_StartTime TIMESTAMP,  
Staff_EndTime TIMESTAMP  
);
```

```
CREATE TABLE Staff_Telephone (  
    Staff_Phone VARCHAR2(11) PRIMARY KEY,  
    Staff_ID NUMBER(10),  
    FOREIGN KEY (Staff_ID) REFERENCES ShopStaff(Staff_ID)  
);
```

```
CREATE TABLE Feedback (  
    Feedback_No VARCHAR2(2) PRIMARY KEY,  
    Feedback VARCHAR2(100),  
    User_ID NUMBER(5),  
    FOREIGN KEY (User_ID) REFERENCES Users(User_ID)  
);
```

```
CREATE TABLE "Order" (  
    Order_No NUMBER(4) PRIMARY KEY,  
    Price NUMBER(10, 2),  
    Order_Status VARCHAR2(50),  
    Laundry_Status VARCHAR2(50),  
    User_ID NUMBER(5),  
    Menu_No NUMBER(10),  
    Laundry_Time TIMESTAMP,  
    FOREIGN KEY (User_ID) REFERENCES Users(User_ID),
```

```
FOREIGN KEY (Menu_No) REFERENCES Menu(Menu_No)
);
```

```
CREATE TABLE UserOrder (
    Staff_ID NUMBER(10),
    Order_No NUMBER(10),
    User_ID NUMBER(5),
    PRIMARY KEY (Staff_ID, Order_No, User_ID),
    FOREIGN KEY (Order_No) REFERENCES "Order"(Order_No),
    FOREIGN KEY (User_ID) REFERENCES Users(User_ID)
);
```

```
CREATE TABLE OrderMenu (
    Order_No NUMBER(4),
    Menu_No NUMBER(10),
    MenuOrderQuantity NUMBER(3),
    MenuOrderPrice NUMBER(10, 2),
    PRIMARY KEY (Order_No, Menu_No),
    FOREIGN KEY (Order_No) REFERENCES "Order"(Order_No),
    FOREIGN KEY (Menu_No) REFERENCES Menu(Menu_No)
);
```

```
CREATE TABLE Sales (
    Sales_No NUMBER(10) PRIMARY KEY,
    Sales_Date DATE,
    Daily_Sale NUMBER(10, 2)
);
```

```
CREATE TABLE Payment (
    Payment_No VARCHAR2(6) PRIMARY KEY,
    Payment_amount NUMBER(10, 2),
```

```
Payment_status VARCHAR2(20),
Payment_Date DATE,
Sales_No NUMBER(10),
Order_No NUMBER(10),
User_ID NUMBER(5),
FOREIGN KEY (User_ID) REFERENCES Users(User_ID),
FOREIGN KEY (Sales_No) REFERENCES Sales(Sales_No),
FOREIGN KEY (Order_No) REFERENCES "Order"(Order_No)
);
```

```
CREATE TABLE Cash (
Payment_No VARCHAR2(6) PRIMARY KEY,
Payment_amount NUMBER(10, 2),
Payment_status VARCHAR2(20),
Payment_Date DATE,
Sales_No NUMBER(10),
Order_No NUMBER(10),
User_ID NUMBER(5),
FOREIGN KEY (User_ID) REFERENCES Users(User_ID),
FOREIGN KEY (Sales_No) REFERENCES Sales(Sales_No),
FOREIGN KEY (Order_No) REFERENCES "Order"(Order_No)
);
```

```
CREATE TABLE OnlineTransfer (
Payment_No VARCHAR2(6) PRIMARY KEY,
Payment_amount NUMBER(10, 2),
Payment_status VARCHAR2(20),
Payment_Date DATE,
Sales_No NUMBER(10),
Order_No NUMBER(10),
User_ID NUMBER(5),
```

```
FOREIGN KEY (User_ID) REFERENCES Users(User_ID),
FOREIGN KEY (Sales_No) REFERENCES Sales(Sales_No),
FOREIGN KEY (Order_No) REFERENCES "Order"(Order_No)
);
```

```
CREATE TABLE E_wallet (
Payment_No VARCHAR2(6) PRIMARY KEY,
Payment_amount NUMBER(10, 2),
Payment_status VARCHAR2(20),
Payment_Date DATE,
Sales_No NUMBER(10),
Order_No NUMBER(10),
User_ID NUMBER(5),
FOREIGN KEY (User_ID) REFERENCES Users(User_ID),
FOREIGN KEY (Sales_No) REFERENCES Sales(Sales_No),
FOREIGN KEY (Order_No) REFERENCES "Order"(Order_No)
);
```

```
CREATE TABLE OrderPayment (
User_ID NUMBER(5),
Payment_No VARCHAR2(6),
Order_No NUMBER(4),
PRIMARY KEY (User_ID, Payment_No, Order_No),
FOREIGN KEY (User_ID) REFERENCES Users(User_ID),
FOREIGN KEY (Payment_No) REFERENCES Payment(Payment_No),
FOREIGN KEY (Order_No) REFERENCES "Order"(Order_No) -- Renamed to "Order"
);
```

```
CREATE TABLE UsersPay (
User_ID NUMBER(5),
```

```

User_FName VARCHAR2(15),
User_LName VARCHAR2(15),
User_Phone VARCHAR2(11),
Payment_No VARCHAR2(6) PRIMARY KEY,
Payment_amount NUMBER(10, 2),
Payment_status VARCHAR2(50),
Payment_Date DATE,
Sales_No NUMBER(10),
Order_No NUMBER(10),
FOREIGN KEY (User_ID) REFERENCES Users(User_ID)
);

```

```

CREATE TABLE Order_Pay (
Order_Pay_ID NUMBER(4) PRIMARY KEY,
Price NUMBER(10, 2),
Order_Status VARCHAR2(50),
Laundry_Status VARCHAR2(50),
User_ID NUMBER(5),
Menu_No NUMBER(10),
Laundry_Time VARCHAR2(10),
Payment_No VARCHAR2(6),
Payment_amount NUMBER(10, 2),
Payment_status VARCHAR2(20),
Payment_Date DATE,
Sales_No NUMBER(10),
Order_No NUMBER(4),
FOREIGN KEY (User_ID) REFERENCES Users(User_ID),
FOREIGN KEY (Menu_No) REFERENCES Menu(Menu_No),
FOREIGN KEY (Payment_No) REFERENCES Payment(Payment_No),
FOREIGN KEY (Order_No) REFERENCES "Order"(Order_No) -- Renamed to "Order"
);

```

```
CREATE TABLE MenuSales (
    Menu_No NUMBER(10),
    Sales_No NUMBER(10),
    Sales_Price NUMBER(10, 2),
    Orders_Collected NUMBER(3),
    PRIMARY KEY (Menu_No, Sales_No),
    FOREIGN KEY (Menu_No) REFERENCES Menu(Menu_No),
    FOREIGN KEY (Sales_No) REFERENCES Sales(Sales_No)
);
```

### **Statement to insert a value in a table**

```
INSERT INTO Users (User_ID, User_FName, User_LName, User_Phone)
VALUES (1, 'Ahmad', 'Azzim', '019558188');
```

```
INSERT INTO Users (User_ID, User_FName, User_LName, User_Phone)
VALUES (2, 'Akhmal', 'Affendi', '0123345678');
```

```
INSERT INTO Users (User_ID, User_FName, User_LName, User_Phone)
VALUES (3, 'Mohd', 'Adam', '0193345678');
```

```
INSERT INTO Machine (Machine_No, Machine_Type, Machine_Quantity, Washer_Quantity,
Dryer_Quantity)
VALUES (1, 'Washing Machine', 6, 3, 3);
```

```
INSERT INTO Menu (Menu_No, Temperature, Water_Level, Heat_Level, Machine_No,
Start_Time, End_Time)
VALUES (101, 'Hot', 'High', 'High Heat', 1, TO_TIMESTAMP('2024-01-20 12:00:00',
'YYYY-MM-DD HH24:MI:SS'), TO_TIMESTAMP('2024-01-20 13:00:00', 'YYYY-MM-DD
HH24:MI:SS'));
```

```
INSERT INTO MachineMenu (Machine_No, Menu_No)
VALUES (1, 101);
```

```
INSERT INTO OldWasher (Machine_No, Machine_Type, Washer_Quantity)
VALUES (3, 'Old Washing Machine', 3);
```

```
INSERT INTO OldWasher (Machine_No, Machine_Type, Washer_Quantity)
VALUES (1, 'Old Washing Machine', 3);
```

```
INSERT INTO NewWasher (Machine_No, Machine_Type, Washer_Quantity)
VALUES (2, 'New Washing Machine', 3);
```

```
INSERT INTO NewWasher (Machine_No, Machine_Type, Washer_Quantity)
VALUES (3, 'New Washing Machine', 3);
```

```
INSERT INTO Old_Dryer (Machine_No, Machine_Type, Dryer_Quantity)
VALUES (1, 'Old Dryer', 3);
```

```
INSERT INTO Old_Dryer (Machine_No, Machine_Type, Dryer_Quantity)
VALUES (3, 'Old Dryer', 3);
```

```
INSERT INTO New_Dryer (Machine_No, Machine_Type, Dryer_Quantity)
VALUES (3, 'New Dryer', 3);
```

```
INSERT INTO ShopStaff (Staff_ID, Staff_Fname, Staff_Lname, Staff_Phone, Staff_Salary,
Staff_StartTime, Staff_EndTime)
VALUES (1001, 'John', 'Doe', '0123456789', 2000.00, TO_TIMESTAMP('2024-01-24 08:00:00',
'YYYY-MM-DD HH24:MI:SS'), TO_TIMESTAMP('2024-01-24 17:00:00', 'YYYY-MM-DD
HH24:MI:SS'));
```

```
INSERT INTO Staff_Telephone (Staff_Phone, Staff_ID)
VALUES ('0123456789', 1001);
```

```
INSERT INTO Feedback (Feedback_No, Feedback, User_ID)
VALUES ('01', 'Great service!', 1);
```

```
INSERT INTO Feedback (Feedback_No, Feedback, User_ID)
VALUES ('02', 'Good!', 2);
```

```
INSERT INTO Feedback (Feedback_No, Feedback, User_ID)
VALUES ('03', 'Moderate', 3);
```

```
INSERT INTO "Order" (Order_No, Price, Order_Status, Laundry_Status, User_ID, Menu_No, Laundry_Time)
```

```
VALUES (1, 10.00, 'Pending', 'Not Started', 1, 101, TO_TIMESTAMP('2024-01-20 12:00:00', 'YYYY-MM-DD HH24:MI:SS'));
```

```
INSERT INTO "Order" (Order_No, Price, Order_Status, Laundry_Status, User_ID, Menu_No, Laundry_Time)
```

```
VALUES (2, 6.00, 'Pending', 'In Process', 2, 101, TO_TIMESTAMP('2024-01-21 12:00:00', 'YYYY-MM-DD HH24:MI:SS'));
```

```
INSERT INTO "Order" (Order_No, Price, Order_Status, Laundry_Status, User_ID, Menu_No, Laundry_Time)
```

```
VALUES (3, 4.00, 'Complete', 'Ready to Collect', 3, 101, TO_TIMESTAMP('2024-01-21 12:00:00', 'YYYY-MM-DD HH24:MI:SS'));
```

```
INSERT INTO UserOrder (Staff_ID, Order_No, User_ID)
```

```
VALUES (1001, 1, 1);
```

```
INSERT INTO UserOrder (Staff_ID, Order_No, User_ID)
```

```
VALUES (1001, 2, 2);
```

```
INSERT INTO UserOrder (Staff_ID, Order_No, User_ID)
```

```
VALUES (1001, 3, 3);
```

```
INSERT INTO OrderMenu (Order_No, Menu_No, MenuOrderQuantity, MenuOrderPrice)
```

```
VALUES (1, 101, 2, 10.00);
```

```
INSERT INTO OrderMenu (Order_No, Menu_No, MenuOrderQuantity, MenuOrderPrice)
```

```
VALUES (2, 101, 1, 6.00);
```

```
INSERT INTO OrderMenu (Order_No, Menu_No, MenuOrderQuantity, MenuOrderPrice)
VALUES (3, 101, 1, 4.00);
```

```
INSERT INTO Sales (Sales_No, Sales_Date, Daily_Sale)
VALUES (1, TO_DATE('2024-01-20', 'YYYY-MM-DD'), 500.00);
```

```
INSERT INTO Payment (Payment_No, Payment_amount, Payment_status, Payment_Date,
Sales_No, Order_No, User_ID)
VALUES ('PAY001', 10.00, 'Paid', TO_DATE('2024-01-21', 'YYYY-MM-DD'), 1, 1, 1);
```

```
INSERT INTO Payment (Payment_No, Payment_amount, Payment_status, Payment_Date,
Sales_No, Order_No, User_ID)
VALUES ('PAY002', 6.00, 'Paid', TO_DATE('2024-01-21', 'YYYY-MM-DD'), 1, 2, 2);
```

```
INSERT INTO Payment (Payment_No, Payment_amount, Payment_status, Payment_Date,
Sales_No, Order_No, User_ID)
VALUES ('PAY003', 4.00, 'Paid', TO_DATE('2024-01-21', 'YYYY-MM-DD'), 1, 3, 3);
```

```
INSERT INTO Cash (Payment_No, Payment_amount, Payment_status, Payment_Date,
Sales_No, Order_No, User_ID)
VALUES ('PAY001', 10.00, 'Paid', TO_DATE('2024-01-20', 'YYYY-MM-DD'), 1, 1, 1);
```

```
INSERT INTO OnlineTransfer (Payment_No, Payment_amount, Payment_status,
Payment_Date, Sales_No, Order_No, User_ID)
VALUES ('PAY002', 6.00, 'Paid', TO_DATE('2024-01-21', 'YYYY-MM-DD'), 1, 2, 2);
```

```
INSERT INTO E_wallet (Payment_No, Payment_amount, Payment_status, Payment_Date,
Sales_No, Order_No, User_ID)
VALUES ('PAY004', 4.00, 'Paid', TO_DATE('2024-01-21', 'YYYY-MM-DD'), 1, 3, 3);
```

```
INSERT INTO OrderPayment (User_ID, Payment_No, Order_No)
```

```
VALUES (1, 'PAY001', 1);
```

```
INSERT INTO OrderPayment (User_ID, Payment_No, Order_No)  
VALUES (2, 'PAY002', 2);
```

```
INSERT INTO OrderPayment (User_ID, Payment_No, Order_No)  
VALUES (3, 'PAY003', 3);
```

```
INSERT INTO UsersPay (User_ID, User_FName, User_LName, User_Phone, Payment_No,  
Payment_amount, Payment_status, Payment_Date, Sales_No, Order_No)  
VALUES (1, 'Ahmad', 'Azzim', '0189118001', 'PAY001', 10.00, 'Paid', TO_DATE('2024-01-20',  
'YYYY-MM-DD'), 1, 1);
```

```
INSERT INTO UsersPay (User_ID, User_FName, User_LName, User_Phone, Payment_No,  
Payment_amount, Payment_status, Payment_Date, Sales_No, Order_No)  
VALUES (2, 'Akmal', 'Affendi', '012345678', 'PAY002', 6.00, 'Paid', TO_DATE('2024-01-21',  
'YYYY-MM-DD'), 1, 2);
```

```
INSERT INTO UsersPay (User_ID, User_FName, User_LName, User_Phone, Payment_No,  
Payment_amount, Payment_status, Payment_Date, Sales_No, Order_No)  
VALUES (3, 'Mohd', 'Adam', '0193345678', 'PAY003', 4.00, 'Paid', TO_DATE('2024-01-21',  
'YYYY-MM-DD'), 1, 3);
```

```
INSERT INTO Order_Pay (Order_Pay_ID, Price, Order_Status, Laundry_Status, User_ID,  
Menu_No, Laundry_Time, Payment_No, Payment_amount, Payment_status, Payment_Date,  
Sales_No, Order_No)  
VALUES (1, 10.00, 'Pending', 'Not Started', 1, 101, '2024-01-20', 'PAY001', 10.00, 'Paid',  
TO_DATE('2024-01-20', 'YYYY-MM-DD'), 1, 1);
```

```
INSERT INTO Order_Pay (Order_Pay_ID, Price, Order_Status, Laundry_Status, User_ID,
Menu_No, Laundry_Time, Payment_No, Payment_amount, Payment_status, Payment_Date,
Sales_No, Order_No)
VALUES (2, 6.00, 'Pending', 'In Process', 2, 101, '2024-01-21', 'PAY002', 6.00, 'Paid',
TO_DATE('2024-01-20', 'YYYY-MM-DD'), 1, 2);
```

```
INSERT INTO Order_Pay (Order_Pay_ID, Price, Order_Status, Laundry_Status, User_ID,
Menu_No, Laundry_Time, Payment_No, Payment_amount, Payment_status, Payment_Date,
Sales_No, Order_No)
VALUES (3, 4.00, 'Complete', 'Ready to Collect', 3, 101, '2024-01-21', 'PAY001', 4.00, 'Paid',
TO_DATE('2024-01-21', 'YYYY-MM-DD'), 1, 3);
```

```
INSERT INTO MenuSales (Menu_No, Sales_No, Sales_Price, Orders_Collected)
VALUES (101, 1, 1820.00, 340);
```

## 6.1 Test Query

### 1. View Cash

Results						
PAYMENT_NO	PAYMENT_AMOUNT	PAYMENT_STATUS	PAYMENT_DATE	SALES_NO	ORDER_NO	USER_ID
PAY001	10	Paid	01/20/2024	1	1	1
1 rows returned in 0.01 seconds <a href="#">Download</a>						

### 2. View E-Wallet

Results						
PAYMENT_NO	PAYMENT_AMOUNT	PAYMENT_STATUS	PAYMENT_DATE	SALES_NO	ORDER_NO	USER_ID
PAY004	4	Paid	01/21/2024	1	3	3

### 3. View Feedback

Results						
FEEDBACK_NO	FEEDBACK	USER_ID				
01	Great service!	1				
02	Good!	2				
03	Moderate	3				

### 4. View Machine

Results				
MACHINE_NO	MACHINE_TYPE	MACHINE_QUANTITY	WASHER_QUANTITY	DRYER_QUANTITY
1	Washing Machine	6	3	3

## 5. View Machine Menu

Results		Explain	Describe	Saved SQL	History
MACHINE_NO				MENU_NO	
1				101	

## 6. View Menu

Results		Explain	Describe	Saved SQL	History	
MENU_NO	TEMPERATURE	WATER_LEVEL	HEAT_LEVEL	MACHINE_NO	START_TIME	END_TIME
101	Hot	High	High Heat	1	20-JAN-24 12.00.00.000000 PM	20-JAN-24 01.00.00.000000 PM

## 7. View Menu Sales

Results		Explain	Describe	Saved SQL	History
MENU_NO	SALES_NO	SALES_PRICE	ORDERS_COLLECTED		
101	1	1820	340		

## 8. View New Dryer

Results		Explain	Describe	Saved SQL	History
MACHINE_NO		DRYER_QUANTITY			
3		3			

## 9. View New Washer

Results		Explain	Describe	Saved SQL	History
MACHINE_NO		WASHER_QUANTITY			
2		3			
3		3			

## 10. View Old Dryer

Results					
Explain    Describe    Saved SQL    History					
MACHINE_NO		MACHINE_TYPE		DRYER_QUANTITY	
1		Old Dryer		3	
3		Old Dryer		3	

## 11. View Old Washer

Results					
Explain    Describe    Saved SQL    History					
MACHINE_NO		MACHINE_TYPE		WASHER_QUANTITY	
3		Old Washing Machine		3	
1		Old Washing Machine		3	

## 12. View Online Transfer

Results						
Explain    Describe    Saved SQL    History						
PAYMENT_NO	PAYMENT_AMOUNT	PAYMENT_STATUS	PAYMENT_DATE	SALES_NO	ORDER_NO	USER_ID
PAY002	6	Paid	01/21/2024	1	2	2

## 13. View Order Menu

Results				
Explain    Describe    Saved SQL    History				
ORDER_NO	MENU_NO	MENUORDERQUANTITY	MENUORDERPRICE	
1	101	2	10	
3	101	1	4	
2	101	1	6	

## 14. View Order Payment

Results		Explain	Describe	Saved SQL	History
1 <code>SELECT* FROM OrderPayment;</code>					
USER_ID		PAYMENT_NO			ORDER_NO
1		PAY001			1
2		PAY002			2
3		PAY003			3

## 15. View Order Pay

Results		Explain	Describe	Saved SQL	History							
1	<code>SELECT* FROM Order_Pay;</code>											
ORDER_PAY_ID	PRICE	ORDER_STATUS	LAUNDRY_STATUS	USER_ID	MENU_NO	LAUNDRY_TIME	PAYMENT_NO	PAYMENT_AMOUNT	PAYMENT_STATUS	PAYMENT_DATE	SALES_NO	ORDER_NO
1	10	Pending	Not Started	1	101	2024-01-20	PAY001	10	Paid	01/20/2024	1	1
2	6	Pending	In Process	2	101	2024-01-21	PAY002	6	Paid	01/20/2024	1	2
3	4	Complete	Ready to Collect	3	101	2024-01-21	PAY002	4	Paid	01/21/2024	1	3

## 16. View Order

Results		Explain	Describe	Saved SQL	History	
1	<code>SELECT* FROM "order";</code>					
ORDER_NO	PRICE	ORDER_STATUS	LAUNDRY_STATUS	USER_ID	MENU_NO	LAUNDRY_TIME
3	4	Complete	Ready to Collect	3	101	21-JAN-24 12.00.00.000000 PM
2	6	Pending	In Process	2	101	21-JAN-24 12.00.00.000000 PM
1	10	Pending	Not Started	1	101	20-JAN-24 12.00.00.000000 PM

## 17. View Payment

Results		Explain	Describe	Saved SQL	History	
1	<code>SELECT* FROM Payment;</code>					
PAYMENT_NO	PAYMENT_AMOUNT	PAYMENT_STATUS	PAYMENT_DATE	SALES_NO	ORDER_NO	USER_ID
PAY003	4	Paid	01/21/2024	1	3	3
PAY002	6	Paid	01/21/2024	1	2	2
PAY001	10	Paid	01/20/2024	1	1	1

## 18. View Sales

Results						
SALES_NO		SALES_DATE		DAILY_SALE		
1		01/20/2024		500		

## 19. View Shop Staff

Results						
STAFF_ID		STAFF_FNAME	STAFF_LNAME	STAFF_PHONE	STAFF_SALARY	STAFF_STARTTIME
1001	John	Doe		0123456789	2000	01-JAN-24 08.00.00.000000 AM

## 20. View Staff Telephone

Results						
STAFF_PHONE				STAFF_ID		
0123456789				1001		

## 21. View User Order

Results						
STAFF_ID		ORDER_NO		USER_ID		
1001		1		1		
1001		2		2		
1001		3		3		

## 22. View Users

Results						
USER_ID		USER_FNAME		USER_LNAME		USER_PHONE
1	Ahmad		Azzim			0195588188
2	Akhmal		Affendi			0123345678
3	Mohd		Adam			0193345678

## 23. View Users Pay

Results									
User ID User Fname User Lname User Phone Payment No Payment Amount Payment Status Payment Date Sales No Order No									
1	Ahmad	Azzim	0189118001	PAY001	10	Paid	01/20/2024	1	1
2	Akhmal	Affendi	012345678	PAY002	6	Paid	01/21/2024	1	2
3	Mohd	Adam	0193345678	PAY003	4	Paid	01/21/2024	1	3

## 24. Update Ahmad Azzim's new phone number

Results			
User ID User Fname User Lname User Phone			
1	Ahmad	Azzim	018944375
2	Akhmal	Affendi	012345678
3	Mohd	Adam	0193345678

## 25. Delete Ahmad Azzim's order pay due to cancel order

Results													
Order Pay ID Price Order Status Laundry Status User ID Menu No Laundry Time Payment No Payment Amount Payment Status Payment Date Sales No Order No													
2	6	Pending	In Process	2	101	2024-01-21	PAY002	6	Paid	01/20/2024	1	2	
3	4	Complete	Ready to Collect	3	101	2024-01-21	PAY002	4	Paid	01/21/2024	1	3	

## **7.0 SUMMARY**

In summary, UniLaundry is a revolutionary project that was prompted by the need to address inefficiencies in the UTM laundry system. Beyond traditional laundry management, the project aims to create an advanced computerised system that can simplify processes, adjust to changing needs, and solve issues that administrators and students have with the manual setup that is now in place. UniLaundry's mission is to provide a technologically sophisticated, user-friendly laundry system that encourages both academic and personal growth. This dedication to enhance the whole university experience is the basis of the organization's efforts. Besides that, a conceptual ERD, logical design that outlines entity connections, and revised business rules are all included in the complete database design. The relational database schemas guarantee a well-structured basis by emphasising normalisation for effective data organisation. Addressing one-to-many, one-to-one, and many-to-many relationships—including complicated scenarios—demonstrates the project's comprehensive approach. When UniLaundry moves on with the implementation phase, the SQL statements play a crucial role in transforming the suggested design into a workable reality and guaranteeing that it works in harmony with its intended goals and capabilities.

Furthermore, the UniLaundry project's completion is a noteworthy accomplishment as it translates creative concepts into a workable and influential solution. With careful consideration of business principles and complex database design, a solid system has been created that has the potential to completely transform UTM's laundry services. The process, from conception to completed relational schemas and SQL statements, demonstrates a commitment to accuracy and productivity. Upon the project's completion, administrators and students will feel a feeling of fulfilment since UniLaundry has the ability to positively impact their everyday lives. This significant event marks the start of a revolutionary era in university laundry management as well as the conclusion of a developmental stage.

## **8.0 APPENDIX**

Link to SQL demonstration video:

 **PRESENTATION VIDEO**