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Faculty of Science and Technology



Case Study Cover Page

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Group Name/No.: Team Venturi

No	Name	ID	Program	Signature
1	Md. Tuhin Reza	18-39074-3	BSc [CSE]	
2	Mohammad Sakib Islam Mazumder	19-39290-1	BSc [CSE]	
3	Sobita Alam	19-40113-1	BSc [CSE]	
4	Usama Laden Sharif	19-41086-2	BSc [CSE]	
5			Choose an item.	
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Part A

1. Overview of Business Environment:

The idea of the project was to develop a database management system for a restaurant to operate both within the restaurant and online.

We wanted to build an integrated system to handle information corresponding to service providers at different levels and customers. It was targeted that the system must be flexible to suit to any changes made afterwards. All information must be easy to understand and readily available. Restaurant businesses require keeping track of orders, use and availability of resources, employee status, delivery status and end user feedback.

It was decided to start from scratch and begin with basics. The primary components were drafted to create a foundation. This draft was later modified and detailed to create a fundamental infrastructure for the database management system. The model is suitable for adjusting to changes. Priority was given to fetch data readily and clearly.

The business environment was developed to have a correlation between customers and employees. Considering this factor, the essential information required in both ends will be clearly stated. The data sourcing is such that data will be available to employees in the form of orders and customers in the form of a bill.

A descriptive idea of the business model is as follows:

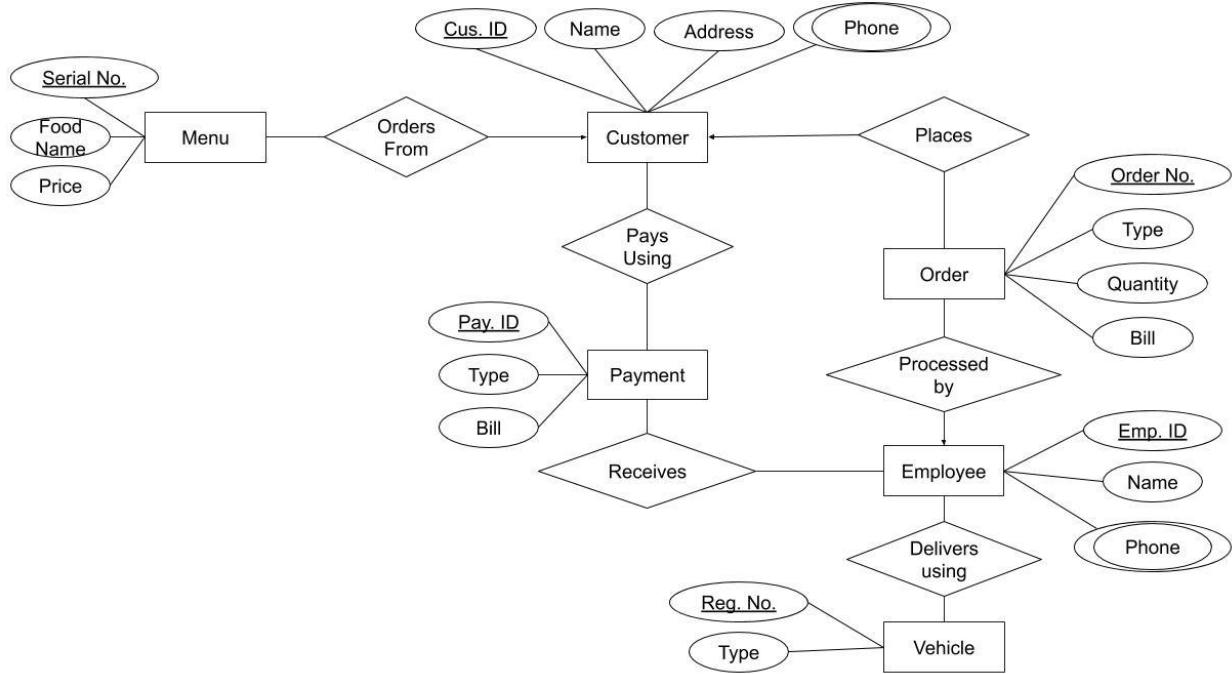
Customers can view food items from the menu. The menu will be available at the restaurant as well as online. They can place their desired items with respect to quantities in the form of an order. The orders will be received by employees for processing. Once confirmed, customers will receive a bill. If the order is placed online, the bill will include the information of the employee delivering that order. The payment can be done at the restaurant or online via cash, credit or mobile payment services. Customers will receive a confirmation of their payment.

Certain limitations were faced while constructing the infrastructure. These include availability of beverages items on online orders, vehicle information available to the customer, customization to the food items and keeping record of customer feedback. However, these issues were minimized as much as possible.

2. Project Objectives:

- To make all data readily available
- To make all data clear and uncomplicated
- To model the compiled specifications to the employees via order
- To model the compiled specifications to the customers via bill
- To make option for customers to order multiple food and in multiple quantities
- To assign delivery options to the employees
- To keep record of customers using a unique customer ID
- To keep track of employees using a unique employee ID
- To make employee and customer phone numbers available to each other for contact
- To make customer address available to employee for delivery

3. ER Diagram:



4. Normalization up to 3rd Normal Form:

1. ORDER

(SL_NO, FOOD_NAME, PRICE, C_ID, C_NAME, C_ADDRESS, C_PHONE, ORDER_NO,
ORDER_NO, ORDER_TYPE, FOOD_NAME, QUANTITY, BILL)

1NF: quantity, c_phone, Food_name is the multivalued attribute.

2NF: SL_NO, FOOD_NAME, PRICE;
C_ID, C_NAME, C_ADDRESS, C_PHONE;
ORDER_NO, ORDER_TYPE, FOOD_NAME, QUANTITY, BILL;

3NF: SL_NO, FOOD_NAME;
FOOD_NAME, PRICE;
C_ID, C_NAME, C_ADDRESS, C_PHONE;
ORDER_NO, ORDER_TYPE;
FOOD_NAME, QUANTITY, BILL;

Table for prepared by:

C_ID, C_NAME, C_ADDRESS, C_PHONE;
SL_NO, FOOD_NAME;
FOOD_NAME, PRICE;
ORDER_NO, ORDER_TYPE;
ORDER_NO FOOD_NAME, QUANTITY, BILL;

2. Employee_information (EMP_ID,EMP_NAME,EMP_PHONE, REG_NO, VEHICLE_TYPE)

1NF: EMP_PHONE is the multivalued attribute.

2NF: EMP_ID, EMP_NAME, EMP_PHONE;
REG_NO, VEHICLE_TYPE;

3NF: No transitive dependency.

Table for prepared by:

EMP_ID, EMP_NAME, EMP_PHONE;
REG_NO, VEHICLE_TYPE, EMP_PHONE;

3. Payment (C_ID,C_NAME,C_ADDRESS,C_PHONE, PAY_ID,PAY_TYPE,BILL)

1NF: C_PHONE is the multivalued attribute.

2NF: C_ID, C_NAME, C_ADDRESS, C_PHONE;
PAY_ID, PAY_TYPE, BILL;

3NF: No transitive dependency.

Table for prepared by:

C_ID, PAY_ID, PAY_TYPE, BILL;

Final Table :

1. Customer=C_ID,C_NAME,C_ADDRESS,C_PHONE,ORDER_NO
2. Menu=SL_NO,FOOD_NAME,PRICE
3. Order=ORDER_NO,FOOD_NAME,QUANTITY,SL_NO
4. Order_T= ORDER_NO,ORDER_TYPE,T_ITEM
5. Bill=C_ID,ORDER_NO,BILL
6. Employee = EMP_ID,EMP_NAME,EMP_PHONE
7. Delivery = C_ID,EMP_ID,REG_NO,VEHICLE_TYPE
8. PAYMENT= C_ID,PAY_ID,PAY_TYPE,BILL

5. Description of Tables with Screenshots:

1. **CUSTOMER TABLE:** This Table includes data of all customers and the orders they have placed. The primary key of this table is the Customer ID or C_ID.

C_ID	C_NAME	C_ADDRESS	C_PHONE	ORDERNO
39074	TUHIN	MOUCHAK	1234567890	1
39290	SAKIB	BARIDHARA	1234567891	2
40113	SUHA	KHILGAON	1234567892	3
41086	LADEN	MIRPUR	1234567893	4
50000	JERRY	WARI	1234567894	5

2. **MENU TABLE:** This table is the Menu of the restaurant.

SL_NO	FOOD_NAME	PRICE
1	PIZZA	500
2	BURGER	200
3	SUB	150
4	SANDWICH	150
5	FRIES	50

3. ORDER TABLE: This table is the list of orders the customers have placed

ORDER_NO	FOOD_NAME	QUANTITY	SL_NO
1	PIZZA	1	1
2	SUB	2	3
2	SANDWICH	2	4
2	FRIES	1	5
3	PIZZA	3	1
4	PIZZA	1	1
4	BURGER	1	2
5	PIZZA	1	1
5	SUB	1	3
5	SANDWICH	1	4

4. ORDER TYPE (ORDER_T) TABLE: This table contains the data of the type of order given by customers. IN HOUSE refers to orders in the restaurant while HOME DELIVERY refers to online orders.

ORDER_NO	ORDER_TYPE	T_ITEM
1	IN HOUSE	1
2	HOME DELIVERY	5
3	HOME DELIVERY	3
4	HOME DELIVERY	2
5	IN HOUSE	3

5. EMPLOYEE TABLE: This table contains information of all employees. The primary key is the Employee ID or E_ID.

E_ID	E_NAME	E_PHONE
1111	ABDUL	1234567895
1112	BABUL	1234567896
1113	RATA	1234567897
1114	MATIN	1234567898
1115	LATIF	1234567899

6. BILL TABLE: This table contains the bills corresponding to the Customer ID numbers.

C_ID	ORDER_NO	BILL
39074	1	500
39290	2	650
40113	3	1500
41086	4	700
50000	5	850

7. PAYMENT TABLE: This table contains the information of the payment done by the customers corresponding to a unique Payment ID or PAY_ID.

C_ID	PAY_ID	PAY_TYPE	BILL
39074	12345	CASH	500
39290	12346	BKASH	650
40113	12347	CREDIT	1500
41086	12348	NOGOD	700
50000	12349	CASH	850

8. DELIVERY TABLE: This Table contains the information of the delivery of online orders.
Here, REG_NO refers to vehicles assigned to the employees for delivery.

C_ID	E_ID	REG_NO	VEHICLE_TYPE
39290	1112	1234	MOTORBIKE
40113	1113	1235	MOTORBIKE
41086	1114	1236	MOTORBIKE

6. Q&A/Scenarios/Queries in Application Domain with Screenshots:

1. Display the customer name and order from Customer table

Command: SELECT C_NAME, ORDERNO FROM CUSTOMER;

C_NAME	ORDERNO
TUHIN	1
SAKIB	2
SUHA	3
LADEN	4
JERRY	5

2. Display the menu table

Command: SELECT * FROM MENU;

SL_NO	FOOD_NAME	PRICE
1	PIZZA	500
2	BURGER	200
3	SUB	150
4	SANDWICH	150
5	FRIES	50

3. Display the order table information which are only IN HOUSE

Command: SELECT ORDER_NO, FOOD_NAME, FROM ORDER_T,"ORDER" WHERE "ORDER".ORDER_NO=ORDER_T.ORDER_NO AND ORDER_T.ORDER_TYPE='IN HOUSE';

ORDER_NO	FOOD_NAME	QUANTITY	SL_NO
1	PIZZA	1	1
5	PIZZA	1	1
5	SUB	1	3
5	SANDWICH	1	4

4. Display order number, food name and quantity from order table

Command: SELECT ORDER_NO, FOOD_NAME, QUANTITY FROM "ORDER";

ORDER_NO	FOOD_NAME	QUANTITY
1	PIZZA	1
2	SUB	2
2	SANDWICH	2
2	FRIES	1
3	PIZZA	3
4	PIZZA	1
4	BURGER	1
5	PIZZA	1
5	SUB	1
5	SANDWICH	1

5. Perform an equijoin between Order type table and Bill table and display Customer ID, Order Type and Bill

Command: SELECT C_ID, ORDER_TYPE, BILL FROM "ORDER", BILL WHERE BILL.ORDER_NO = "ORDER".ORDER_NO;

C_ID	ORDER_TYPE	BILL
39074	IN HOUSE	500
39290	HOME DELIVERY	650
40113	HOME DELIVERY	1500
41086	HOME DELIVERY	700
50000	IN HOUSE	850

6. Perform an equijoin between Employee table and Delivery table and show the Employee details and information of those who have been assigned vehicles for delivery

Command: SELECT EMPLOYEE.*, REG_NO, VEHICLE_TYPE FROM EMPLOYEE, DELIVERY WHERE EMPLOYEE.E_ID=DELIVERY.E_ID;

E_ID	E_NAME	E_PHONE	REG_NO	VEHICLE_TYPE
1112	BABUL	1234567896	1234	MOTORBIKE
1113	RATA	1234567897	1235	MOTORBIKE
1114	MATIN	1234567898	1236	MOTORBIKE

7. Display the food name which was ordered more than one item, using group function

Command: SELECT ORDER_NO, COUNT (QUANTITY) FROM "ORDER" GROUP BY ORDER_NO HAVING COUNT (*)>1;

FOOD_NAME	count(*)
PIZZA	4
SANDWICH	2
SUB	2

8. Perform an equijoin between Order table and Bill table and show total bill of those who ordered sub and sandwich

Command: SELECT DISTINCT BILL.* FROM "ORDER", BILL WHERE BILL.ORDER_NO = "ORDER".ORDER_NO AND FOOD_NAME IN ('SUB', 'SANDWICH');

C_ID	ORDER_NO	BILL
39290	2	650
50000	5	850

9. Show the customer details of the customers who ordered max quantity of food items

Command: SELECT CUSTOMER.* FROM CUSTOMER,"ORDER" WHERE CUSTOMER.ORDERNO="ORDER".ORDER_NO AND QUANTITY=(SELECT MAX(QUANTITY)FROM "ORDER");

C_ID	C_NAME	C_ADDRESS	C_PHONE	ORDERNO
39290	SAKIB	BARIDHARA	1234567891	2

10. Show the order details of the customer who paid the second highest bill

Command: SELECT C_NAME, ORDER_T.* FROM CUSTOMER,ORDER_T WHERE CUSTOMER.ORDERNO=ORDER_T.ORDER_NO AND ORDER_NO=(SELECT ORDER_NO FROM BILL WHERE BILL=(SELECT MAX(BILL) FROM BILL WHERE BILL<(SELECT MAX(BILL) FROM BILL)));

C_NAME	ORDER_NO	ORDER_TYPE	T_ITEM
JERRY	5	IN HOUSE	3

11. Show the customer information,order type and payment information of the customers who paid using bKash or Nogod and 3rd lowest bill.

Command: SELECT CUSTOMER.*, ORDER_TYPE, PAY_ID, PAY_TYPE, BILL FROM CUSTOMER, PAYMENT, ORDER_T WHERE CUSTOMER.ORDERNO=ORDER_T.ORDER_NO AND CUSTOMER.C_ID=PAYMENT.C_ID AND CUSTOMER.C_ID = (SELECT C_ID FROM PAYMENT WHERE PAY_TYPE IN ('BKASH','NOGOD') AND BILL = (SELECT MIN (BILL) FROM BILL WHERE BILL>(SELECT MIN (BILL) FROM BILL WHERE BILL>(SELECT MIN (BILL) FROM BILL))));

C_ID	C_NAME	C_ADDRESS	C_PHONE	ORDERNO	ORDER_TYPE	PAY_ID	PAY_TYPE	BILL
41086	LADEN	MIRPUR	1234567893	4	HOME DELIVERY	12348	NOGOD	700

Part B

1. Learning Experience:

This project has helped us grow an insight towards database management systems in various businesses. The development and implementation of a database management system requires thorough planning and interrelation of data. Furthermore, data must be arranged in such a way that it may be easily readable and retrievable.

2. Problems and Lessons Learned:

Some of the problems that we faced during development of this database are including certain types of data due to environment restrictions and the facilities and resources to deliver them. This has retargeted our focus to simplify things and trim off parts which were not possible to implement with the knowledge we have.

3. Achievements and Outcomes:

We have been able to design and develop a database that can be used as a base model for a restaurant business. We have designed it in such a way that there are scopes for changes and extensions.

For example, a new segment can be added with relation to employees under the tag “resource management”. This can help with the overview of availability, use and sourcing raw materials required for the business.

4. Future Plans, Thoughts and Comments:

Future plans for the database management system include extension of the data tables to hold records of more information for better management. Doing so can help to collaborate with third party service providers and increase the domain of business. That is, one business can help another. However, with the limitation of our current knowledge and experience, we feel that it is important to learn, observe and apply more in the field of database management system.

This future plan concludes to our final thought, “experience can help with expertise”.