Name: Wong Ka Ngai
UID: 3035568881

Topic: Restaurant System

Brief Description:

A system for the restaurant to keep track of customer information, order transactions, and table booking, in addition to standard enterprise information such as human resources and accounting.

Business rules:

- The restaurant can be a restaurant chain. Each restaurant is identified by a unique ID, has different addresses and contact numbers.
- Employees are identified by their unique ID. Each employee has a name, a phone number, an address and a type. The type can be chef, waiter, manager, etc.
- Employees can either be full-time employee or part-time employee. For part-time employees, salaries will be paid once in a month by counting their working hours in that month.
- Customers are identified by their unique ID. Each customer has a name, a phone number and an address.
- Each restaurant has its own tables and labelled their tables with table numbers. Table has a capacity and can be reserved.
- Customer can book for a table. The date, start time and duration of the booking will be recorded.
- The restaurant provide a list of dishes to customers. Each dish is identified by a unique ID, has its name, price and a type. The type can be a set, food or drink. The dish could contain multiple allergens.
- When an order is created, it has a unique ID, date, total and type. The type can be dine in or take away.
- Each order contains item(s). Each item is specified by an item number and quantity. The item refers to dish ordered.
- An order can use a promotion. Each promotion is identified by a unique ID and has a discount.
- Every order is completed at cashiers. Each restaurant has its own cashier and labelled their cashiers with casher number. It has a list to show revenue made every day at different cashiers.

Assumptions:

- Booking a table is not a common practice for the restaurant chain, there won't be many bookings in a day.
- When a table is booked (is_reserved is true), other customers cannot book the same table at that day, even if timeslot does not clash. The table will continue to serve other walk-in customers until time is close to booking start time.
- The is_reserved state of tables resets every day. The status is set according to the bookings that the store has in that day.
- Customers are required to book a table at least one day before and they can only book one table in a day.
- Every day after stores are closed, daily closings of cashiers will be performed. Revenue made by the cashier and the date will be recorded.
- Total of an order is calculated by summing the product of item price and quantity, then minus the discount from promotion (if any).
- Total salary of part-time employee is calculated by multiplying hourly rate and working hours.
- Employees and customers act in rational way.

System functionalities/user activities:

- Display details of all the stores under the restaurant chain.
- Get statistics of order type to see if dine in is more popular of not.
- Display the transaction details of all orders created in all stores.
- Display the item details of a specific order.
- Get statistics of usage of promotion to see if the promotion is successful or not.
- Show the tables booked for a specific day in a specific store.
- Show all the upcoming bookings of a specific store.
- Display details of all customers who have never create an order in any store.
- Display details of all employees working in a specific store.
- Show monthly salaries of all full-time employees working in a specific store.
- Show salaries of all part-time employees working in a specific store.
- Find the revenue records of all cashiers of a specific store.
- Find the revenue made by a specific store in a specific day.
- Show the number of cashiers owned by each store.
- Find the number of orders that a specific customer has placed.
- Display the total number of orders created by each store and their respective total revenue generated.
- List details of all dishes that contain allergens.

Data requirement analysis:

Customers data

Attribute Name	Description		
customer_id	Unique ID of a customer	**Mandatory / Optional**	Mandatory
		Type	int
		Length	6
		Format	
		Validation	
		Default	
		Example	1
name	Name of a customer	**Mandatory / Optional**	Optional
		Type	varchar
		Length	80
		Format	
		Validation	
		Default	
		Example	Benny Wong
phone number	Phone number of a customer	**Mandatory / Optional**	Optional
		Type	char
		Length	8
		Format	
		Validation	
		Default	
		Example	98765432
address	Address of a customer	**Mandatory / Optional**	Optional
		Type	text
		Length	500
		Format	
		Validation	
		Default	
		Example	The University of Hong Kong, Pokfulam, Hong Kong

Orders data

Attribute Name	Description	
order_number	Unique ID of an order	**Mandatory / Optional**: Mandatory **Type**: int **Length**: 6 **Format**: **Validation**: **Default**: **Example**: 1
customer_id	{customer_id} references Customers(customer_id)	**NOT NULL**
restaurant_id	{restaurant_id} references Restaurants(restaurant_id)	**NOT NULL**
cashier_number	{cashier_number} references Cashiers(cashier_number)	**NOT NULL**
total	Total amount of an order	**Mandatory / Optional**: Mandatory **Type**: numeric **Length**: (7,1) **Format**: **Validation**: >=0 **Default**: **Example**: 123456.5
type	Dine in (D) or take away (T)	**Mandatory / Optional**: Optional **Type**: char **Length**: 1 **Format**: **Validation**: **Default**: D **Example**: T
date	Order creation time	**Mandatory / Optional**: Mandatory **Type**: datetime **Length**: 19 **Format**: yyyy-mm-dd hh-mm-ss **Validation**: **Default**:

		Example	2020-10-16 15:00:00
promo_id	{promo_id} references Promotions(promo_id)	**Default is 0, meaning no promotion used.**	

Items data

Attribute Name	**Description**		
order_number	{order_number} references Orders(order_number)	**NOT NULL**	
item_number	The index of the dishes in an order	**Mandatory / Optional**	Mandatory
		Type	int
		Length	2
		Format	
		Validation	
		Default	
		Example	11
dish_id	{dish_id} references Dishes(dish_id)	**NOT NULL**	
quantity	The quantity of the ordered dish	**Mandatory / Optional**	Mandatory
		Type	int
		Length	2
		Format	
		Validation	>0
		Default	
		Example	10

Restaurants data

Attribute Name	Description		
restaurant_id	Unique ID of a restaurant	**Mandatory / Optional**	Mandatory
		Type	int
		Length	2
		Format	
		Validation	
		Default	
		Example	1
name	Name of a restaurant	**Mandatory / Optional**	Optional
		Type	varchar
		Length	80
		Format	
		Validation	
		Default	
		Example	KFP_HKU
contact	Phone number of a restaurant	**Mandatory / Optional**	Optional
		Type	char
		Length	8
		Format	
		Validation	
		Default	
		Example	24442978
address	Address of a restaurant	**Mandatory / Optional**	Optional
		Type	text
		Length	500
		Format	
		Validation	
		Default	
		Example	Rm 203, 2/f Chong Yuet Ming Amenities Centre, HKU, Pok Fu Lam

Tables data

Attribute Name	Description	
restaurant_id	{restaurant_id} references Restaurants(restaurant_id)	**NOT NULL**
table_number	The number representing a table	**Mandatory / Optional**: Mandatory **Type**: int **Length**: 2 **Format**: **Validation**: **Default**: **Example**: 1
capacity	How many people can use the table	**Mandatory / Optional**: Mandatory **Type**: int **Length**: 2 **Format**: **Validation**: **Default**: **Example**: 4
is_reserved	Whether the table is reserved or not 0 means not reserved, 1 means reserved	**Mandatory / Optional**: Mandatory **Type**: bit **Length**: 1 **Format**: **Validation**: **Default**: 0 **Example**: 1

Cashiers data

Attribute Name	Description	
restaurant_id	{restaurant_id} references Restaurants(restaurant_id)	**NOT NULL**
cashier_number	The number representing a cashier	**Mandatory / Optional**: Mandatory **Type**: int **Length**: 2 **Format**: **Validation**: **Default**: **Example**: 1

CashierRevenue data

Attribute Name	Description	
restaurant_id	{restaurant_id} references Cashiers(restaurant_id)	**NOT NULL**
cashier_number	{cashier_number} references Cashiers(cashier_number)	**NOT NULL**
date	The date that record a revenue	**Mandatory / Optional**: Mandatory **Type**: date **Length**: 10 **Format**: yyyy-mm-dd **Validation**: **Default**: **Example**: 2020-11-26
revenue	The revenue made using that cashier in one day. It is the daily closing of the cashier.	**Mandatory / Optional**: Optional **Type**: numeric **Length**: (7,1) **Format**: **Validation**: >=0 **Default**: **Example**: 123456.5

Dishes data

Attribute Name	Description		
dish_id	Unique ID of a dish	**Mandatory / Optional**	Mandatory
		Type	int
		Length	2
		Format	
		Validation	
		Default	
		Example	1
name	Name of a dish	**Mandatory / Optional**	Mandatory
		Type	varchar
		Length	80
		Format	
		Validation	
		Default	
		Example	Individual Meal 1
price	Price of the dish	**Mandatory / Optional**	Mandatory
		Type	numeric
		Length	(4,1)
		Format	
		Validation	>=0
		Default	
		Example	100.5
type	Can be a set (S), food (F) or drink (D)	**Mandatory / Optional**	Mandatory
		Type	char
		Length	1
		Format	
		Validation	
		Default	
		Example	S

DishAllergen data

Attribute Name	Description	
dish_id	{dish_id} references Dishes(dish_id)	**NOT NULL**
allergen	one or multiple allergen information in a dish	**Mandatory / Optional**: Optional **Type**: varchar **Length**: 100 **Format**: **Validation**: **Default**: **Example**: Eggs

Employees data

Attribute Name	Description		
employee_id	Unique ID of an employee	**Mandatory / Optional**	Mandatory
		Type	int
		Length	6
		Format	
		Validation	
		Default	
		Example	1
restaurant_id	{restaurant_id} references Restaurants(restaurant_id)	**NOT NULL**	
name	Name of an employee	**Mandatory / Optional**	Optional
		Type	varchar
		Length	80
		Format	
		Validation	
		Default	
		Example	Nicoli Eykelbosch
phone number	Phone number of an employee	**Mandatory / Optional**	Mandatory
		Type	char
		Length	8
		Format	
		Validation	
		Default	
		Example	98765432
address	Home address of an employee	**Mandatory / Optional**	Optional
		Type	text
		Length	500
		Format	
		Validation	
		Default	
		Example	The University of Hong Kong, Pokfulam, Hong Kong

type	Waiter, manager, chef, etc	**Mandatory / Optional**	Optional
		Type	varchar
		Length	20
		Format	
		Validation	
		Default	
		Example	waiter

FullTimeEmployee data

Attribute Name	**Description**		
employee_id	{employee_id} references Employees(employee_id)	**NOT NULL**	
monthly_salary	Salary of an full-time employee	**Mandatory / Optional**	Optional
		Type	numeric
		Length	(7,1)
		Format	
		Validation	>=0
		Default	
		Example	123456.5

PartTimeEmployee data

Attribute Name	**Description**		
employee_id	{employee_id} references Employees(employee_id)	**NOT NULL**	
hourly_rate	How much to earn per hour	**Mandatory / Optional**	Optional
		Type	numeric
		Length	(4,1)
		Format	
		Validation	>=0
		Default	
		Example	100.5
working hours	The total number of working hours of an employee in a month	**Mandatory / Optional**	Optional
		Type	numeric
		Length	(4,1)

		Format	
		Validation	>=0
		Default	
		Example	100.5
total salary	Salary of an part-time employee	**Mandatory / Optional**	Optional
		Type	numeric
		Length	(7,1)
		Format	
		Validation	>=0
		Default	
		Example	123456.5

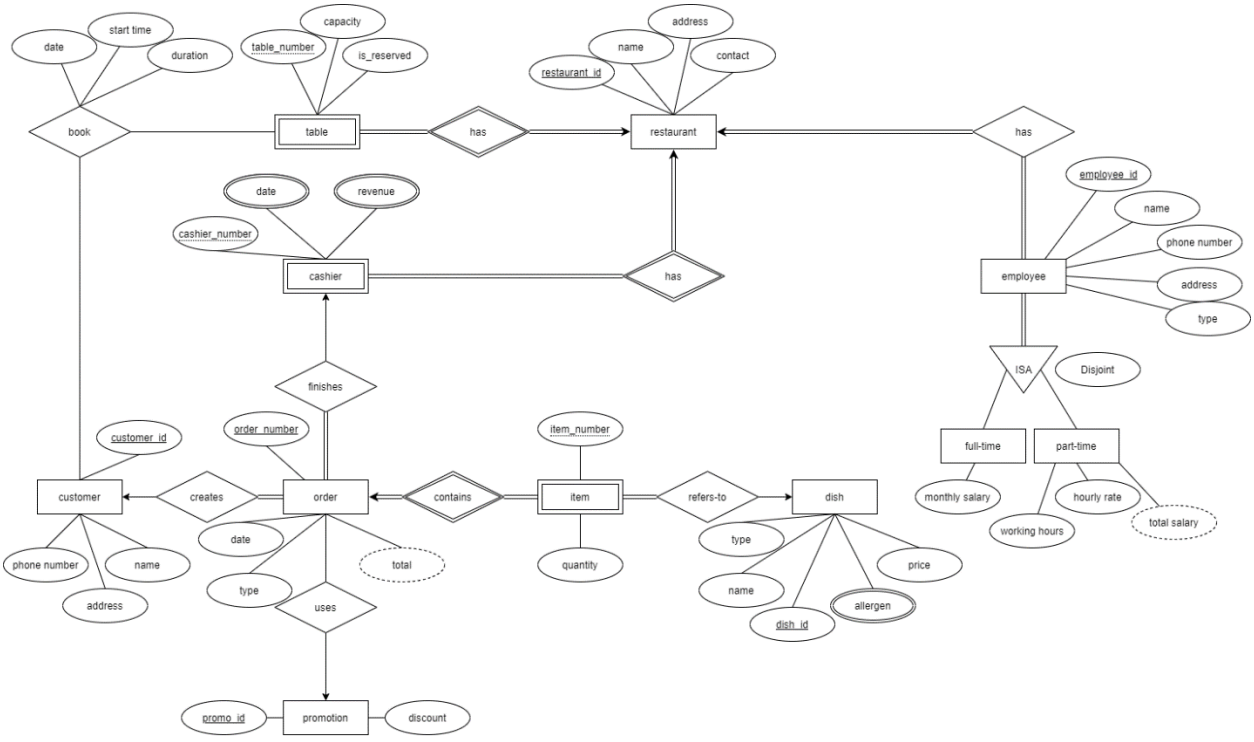
Promotions data

Attribute Name	**Description**		
promo_id	Unique ID of a promotion 0 means no promotion used	**Mandatory / Optional**	Mandatory
		Type	int
		Length	2
		Format	
		Validation	
		Default	0
		Example	1
discount	The amount that this promotion reduces	**Mandatory / Optional**	Mandatory
		Type	numeric
		Length	(4,1)
		Format	
		Validation	>=0
		Default	
		Example	5.5

Books data

Attribute Name	Description	
customer_id	{customer_id} references Customers(customer_id)	**NOT NULL**
restaurant_id	{restaurant_id} references Restaurants(restaurant_id)	**NOT NULL**
table_number	{table_number} references Tables(table_number)	**NOT NULL**
date	The date that the customer books	**Mandatory / Optional**: Mandatory **Type**: date **Length**: 10 **Format**: yyyy-mm-dd **Validation**: **Default**: **Example**: 2020-11-27
Start time	When the booking starts	**Mandatory / Optional**: Mandatory **Type**: time **Length**: 8 **Format**: hh:mm:ss **Validation**: **Default**: **Example**: 15:00:00
duration	How long the customer books for (in minutes)	**Mandatory / Optional**: Mandatory **Type**: numeric **Length**: 3 **Format**: **Validation**: >0 **Default**: **Example**: 120

ER Model diagram:



ER diagram description:

- Each order belongs to one (total participation) and only one customer.
- Each order is finished at one (total participation) and only one cashier.
- Each order uses zero (partial participation) to one promotion.
- Each order contains one (partial participation) or more items.
- Each item refers to (total participation) one dish.
- Each restaurant has one (total participation) or more cashiers.
- Each restaurant has one (total participation) or more tables.
- Each restaurant has one (total participation) or more employees.
- Employee is either (total participation) full-time or part-time.
- Each customer books zero (partial participation) to one table in one day.

Relational Database Schema:

Customers(customer_id, name, phone_number, address)

Orders(order_number, customer_id: NOT NULL, restaurant_id: NOT NULL, cashier_number: NOT NULL, total, type, date, promo_id)

- Foreign key: {customer_id} references Customers(customer_id)
- Foreign key: {restaurant_id, cashier_number} references Cashiers(restaurant_id, cashier_number)
- Foreign key: {promo_id} references Promotions(promo_id)

Items(order_number, item_number, dish_id: NOT NULL, quantity)

- Foreign key: {order_number} references Orders(order_number)
- Foreign key: {dish_id} references Dishes(dish_id)

Restaurants(restaurant_id, name, contact, address)

Tables(restaurant_id, table_number, capacity, is_reserved)

- Foreign key: {restaurant_id} references Restaurants(restaurant_id)

Cashiers(restaurant_id, cashier_number)

- Foreign key: {restaurant_id} references Restaurants(restaurant_id)

CashierRevenue(restaurant_id, cashier_number, date, revenue)

- Foreign key: {restaurant_id, cashier_number} references Cashiers(restaurant_id, cashier_number)

Dishes(dish_id, name, price, type)

DishAllergen(dish_id, allergen)

- Foreign key: {dish_id} references Dishes(dish_id)

Employees(employee_id, restaurant_id: NOT NULL, name, phone number, address, type)

- Foreign key: {restaurant_id} references Restaurants(restaurant_id)

FullTimeEmployee (employee_id, monthly_salary)

- Foreign key: {employee_id} references Employees(employee_id)

PartTimeEmployee(employee_id, hourly_rate, working hours, total salary)

- Foreign key: {employee_id} references Employees(employee_id)

Promotions(promo_id, discount)

Books(customer_id, restaurant_id, table_number, date, start time, duration)

- Foreign key: {customer_id} references Customers(customer_id)

- Foreign key: {restaurant_id, table_number} references Tables(restaurant_id, table_number)

Description of each query in "queries.sql"

The total of orders and the total salary of part-time employees are calculated in data.sql. These calculations will not be included in queries.sql.

Q1 displays details of all the stores under the restaurant chain.

Q2 gets statistics of order type to see if dine in is more popular of not.

Q3 displays the transaction details of all orders, showing the order number, customer name, restaurant name, cashier number, date of transaction, dine in or take away, discount used and the total amount after discount.

Q4 displays the item details of a specific order (order_number=1).

Q5 gets statistics of usage of promotion to see if the promotion is successful (promo_id=0 means orders did not use any promotion).

Q6 shows the table number and capacity of the tables booked for today in a specific store. Assume today is 27/11/2020, staff at store ‘KFP HKU’ (restaurant_id=1) wants to know all the tables reserved.

Q7 shows all the upcoming bookings (today is not included) with details for a specific store ‘KFP HKU’.

Q8 displays IDs, names, phone numbers and addresses of all customers who have never create an order in any store.

Q9 displays details of all employees working in a specific store ‘KFP HKU’.

Q10 shows the monthly salaries of all full-time employees working in a specific store ‘KFP HKU’.

Q11 shows the salaries of all part-time employees working in a specific store ‘KFP HKU’.

Q12 finds the revenue records of all cashiers of a specific store ‘KFP HKU’.

Q13 finds the revenue of a specific store ‘KFP HKU’ made in one day (26/11/2020).

Q14 shows the number of cashiers owned by each store.

Q15 finds the number of orders that customer ‘Benny’ (customer_id=1) has placed.

Q16 displays the total number of orders created by each store and their respective total revenue generated.

Q17 lists details of all dishes that contain allergens.