INFO 6210 SEC 01 - DATA MANAGEMENT AND DATABASE DESIGN
SUMMER 2020

P4. DATABASE DESIGN AND INITIAL ENTITY RELATIONSHIP DIAGRAM
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PROJECT TEAM 10

TEAM MEMBERS

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Database Topic:
Retail Store Management

Mission Statement:
The purpose of our database is to maintain and store data which is used to facilitate data analysis in order to attain efficiency in inventory control, sales, timely deliveries and customer satisfaction

Business Problems Addressed:

- Storage and management of data related to sales and delivery
- Attain efficiency in inventory control
- Timely delivery needs to be ensured
- Customer satisfaction should be attained

Business Rules:

- One or many employes belongs to one branch
- One or many branch may have zero or many customer
- One or many branch may have zero or many products

- One branch can have only one location
- One customer goes to one or many branch
- One customer may place one or many orders
- An order can be delivered one and only one time
- An order contains zero or more customer_feedback
- An order contains to zero or one customer_benefit
- One location can have one or more deliveries
- One delivery_personnel may do zero or many deliveries
- One supplier may supply zero or many products
- Multiple products belong to zero or more orders
- Delivery fee is charged till a certain amount
- Delivery of order is allowed till a particular distance
- Discount is calculated based on both the products and customer type.
- Customer_satisfaction is based on feedback given by customers
- Only customers of the type premium get discounts.

Design Requirements:

- Establish relationships between each entity.
- Use crow's foot notation in order to specify multiplicity
- Identify and specify the primary key fields in each entity to uniquely identify each record in a particular entity.
- Drawing lines between tables to establish a relationship between them.
- The lines may specify either identifying relationships (solid lines) or non-identifying relationships(dotted lines)
- PK denotes primary key and FK denotes the foreign key in the diagram

Design Decisions:

Entity NO.	Entity Name	Why entity included	How entity is related to other entities
1	**employee**	Keeps track of all employees involved in the retail management system. The attributes are employee_id, branch_id, first_name , last_name, type, employee_password.	Each employee belongs to at least 1 branch, where branch is an entity which has branch_id and branch_name as its attributes.

			One or many employees belongs to one branch
2	**branch**	Keeps track of all the branches of the retail store in the retail store management systems. The attributes are branch_id, branch_name, location_id.	Each branch in the system is related to multiple entities which are branch_customer, employee, branch_product, location. Branch has many branch_customers Branch has many branch_products Branch has many employees Each branch has 1 location
3	**branch_product**	This is an associative entity. It keeps track of which product is present in which branch. The branch_product helps in solving many to many relationships between branch and product. The attributes included are branch_product_id, branch_id, product_id, selling_price, stock	Branch_product is related to product, branch and order_product. A branch_product contains many branches. A branch_product contains many products A branch_product belongs to many order_products

4	**branch_customer**	This is an associative entity. It keeps track of branches and customers.. The branch_customer helps in solving many to many relationships between branch and customer. The attributes included are branch_id and customer_id.	Branch_customer is related to branch and customer entity Branch has many customers A customer goes to many branches
5	**product**	Keeps a track of all the products of the retail management system. The attributes are product_id, supplier_id, product_name, cost_price, product_discount, discount_on_quantity and supplier_intake, supplier_intake_counter.	A product is related to supplier and branch_product. 0 or many products are supplied by a supplier. A product can be part of multiple branch_products
6	**customer**	One of the most important entities in the retail management system. Keep track of all customers who make purchases. The attributes are customer_id, first_name, last_name, customer_type, customer_password	A customer is related to branch_customer and order A customer is related to 0 or many branch_customers A customer places to 1 or many orders
7	**supplier**	Keeps track of all the suppliers in the retail management system. A supplier is an entity that supplies goods and services to another organization in the supply chain. The attributes are supplier_id and supplier_name	A supplier may supply either 0 or many products
8	**order**	Keeps track of all the orders made by customers in the system. The attributes are order_id, customer_id, order_date, order_type, total_price,	Order is related to order_branch_product, customer and customer_feedback, delivery and

		order_completed.	customer_benefit. 1 or more orders can be placed by only 1 customer. An order contains 1 or more order_branch_product An order contains 0 or more customer_feedback An order contains to 0 or 1 customer_benefit An order contains to 0 or 1 delivery
9	**order_branch_product**	This is an associative entity which keeps track of the products that are added to a particular order. The attributes are order_branch_product_id, product_id, order_id, quantity, discounted_selling_price, sale_profit	Order_branch_product is related to order and branch_product 1 or more order_branch_product belongs to 1 order One branch_product can be part of 0 or more order_branch_product
10	**delivery_personnel**	This entity keeps track of information regarding all delivery personnel involved in the system. The attributes are delivery_personnel_id, availability, first_name and last_name, delivery_personnel_password.	A delivery person is related to the delivery entity. A delivery person can make either 0 or many deliveries.
11	**location**	This entity would help us keep track of all the locations that are involved in the system. This would include the branch	Location is related to branch and delivery A location can have 1 or many delivery

		location and the delivery location The attributes included are location_id, street_address, house_no, area and zip_code	A location can be associated with one and only one branch
12	**customer_feedback**	This entity is used to calculate parameters related to customer's satisfaction of the overall retail store services. The attributes are customer_feedback_id, order_id, timely_delivery, stock_availability, quality, employee_response, cleanliness.	Customer_feedback is related to order. 0 or more Customer_feedback would be based on a particular order.
13	**delivery**	Keeps track of all deliveries that are made from the retail store for customers who had opted for the delivery option. The attributes included are delivery_id, order_id, delivery_personnel_id, location_id, estimated_time, start_time, end_time, delivery_fee, total_price_with_delivery_fee.	Delivery is related to delivery_personnel, order and location Delivery is related to 1 and only 1 order Many deliveries can be made by 1 delivery personnel Many deliveries can be sent to 1 location
14	**customer_benefit**	Keep track of the benefits of the customer. The attributes are customer_benefit_id, order_id, customer_satisfaction, customer_discounted_total_price	One order contain 0 or 1 customer_benefit

Attribute Definition:

#	Entity Name	Attribute definition
1.	**employee**	1. employee_id: (PK), a unique identification code given for every employee of the company 2. branch_id: (FK), referencing the branch entity. 3. first_name: first name of the employee 4. last_name: last name of the employee

		5. type: describes different types of employees a. full-time b. contract 6. employee_password: protects the employee data with the help of a password. Enhances security by limiting data loss
2.	**branch**	1. branch_id: Primary-key of branch entity 2. branch_name: name of branch 3. location_id: foreign key referencing location entity
3.	**product**	1. product_id: (PK), a unique identification code given for every product in the company 2. supplier_id: (FK), a unique id given to every supplier 3. product_name: name of the product 4. cost_price: price at which product is purchased from the supplier 5. product_discount: discount for each product 6. discount_on_quantity: discount based on quantity 7. supplier_intake: quantity of product purchased from supplier 8. supplier_intake_counter: counts the number of times we replenish our inventory from the supplier.
4.	**branch_product**	1) branch_product_id: Primary-key of branch_product entity 2) branch_id: Foreign key referencing branch entity 3) product_id: Foreign key referencing product entity 4) selling_price: Price at which 1 unit of a product is sold to customer 5) stock: Quantity of a product present in the branch
5.	**branch_customer**	1. branch_id: Primary key and Foreign key referencing branch entity 2. customer_id: Primary key and Foreign key referencing customer entity
6.	**customer**	1. customer_id: Primary key for the customer entity 2. first_name: specifies the first name of customer 3. last_name: specifies the last name of customer 4. customer_type: describes different types of customers: a. regular b. Premium 5. customer_password: protects the customer data with

		the help of a password. Enhances security by limiting data loss
7.	**supplier**	1. supplier_id: Primary_key of supplier entity 2. supplier_name: Name of supplier

8.	**order**	1. order_id: Primary key of order entity
		2. customer_id: Foreign key referencing Customer entity
		3. order_date: Date at which customer places an order
		4. order_type: Type of order
		  1. onsite
		  2. pickup
		  3. delivery
		5. total_price: Total price of the order. Calculated by adding discounted_selling_price of all order_branch_products in that order.
		6. order_completed: tracks the status of the order completion.

9.	**order_branch_product**	1. order_branch_product_id: Primary key for order_branch_product entity 2. branch_product_id: Foreign key, unique identification given for each product in a branch 3. order_id: Forign key, unique identification given for each order 4. quantity: Number of products, belonging to a certain branch and present in a particular order 5. discounted_selling_price: Final price at which the customer makes his purchase, however, this price does not include the discount incurred by the customer based on the customer type. 6. sale_profit: Calculates the profit earned by the store through sales of products. Calculated by Subtracting discounted_selling_price from multiplication of quantity and cost price of that order_branch_product
10.	**delivery_personnel**	1. delivery_personnel_id: Primary key of the delivery_personnel entity, a unique identification code for each delivery person 2. availability: is a binary constraint that indicates the availability of delivery personnel 3. first_name: first name of delivery personnel 4. last_name: last name of delivery personnel 5. delivery_personnel_password: protects the delivery_personnel data with the help of a password.

		Enhances security by limiting data loss
11.	**location**	1. location_id: (PK) a unique code given to every location 2. street_address: name of the street 3. house_no: house no of the location 4. area: area of the location 5. zip_code: zip code of the area
12.	**customer_feedback**	1. customer_feedback_id: Primary key for the customer_feedback entity. It is a unique id generated for each feedback given by the customer 2. order_id: Foreign key referring to order entity 3. timely_delivery: Records if the delivery is received within the estimated delivery time given by the company. Customers rate on a scale of 0-10 4. stock_availability: On a scale of 0-10, this attribute reflects the availability of products, according to the customer, on the racks of a store. 5. quality: On a scale of 0-10, this attribute records the customer's perception of the quality of the products 6. employee_response: On a scale of 0-10, this attribute records the customer's perception of how they are treated by the employees of the store. 7. cleanliness: On a scale of 0-10, this attribute records the customer's perception of the cleanliness of the store.
13.	**delivery**	1. delivery_id: Primary key of delivery entity 2. order_id: Foreign key referencing order entity 3. delivery_personnel_id: Foreign key referencing delivery_personnel entity 4. location_id: Foreign key referencing location entity 5. estimated_time: Time given by company within which the delivery is expected 6. start_time: Time at which Delivery process begins 7. end_time: Time at which Delivery process completes 8. delivery_fee: Charges of delivery. Will be charged fixed delivery fee for orders less than $20. 9. total_price_with_delivery_fee: sum of total price of the order (calculated by adding discounted_selling_price of all order_branch_products in that order) and the delivery fee.
14.	**customer_benefit**	1. customer_benefit_id: (PK) unique id code given to

		every customer benefit 2. order_id: (FK) unique identification code given to every order 3. customer_satisfaction: a calculated value which states whether the customer is satisfied or not. Calculated by adding the scores given by a customer in a customer feedback. 4. customer_discounted_total_price: total price including the discount obtained by the customer. It is also one of the parameters to calculate customer satisfaction. Calculated by applying 10% discount on the total price on order if the customer is of a premium type