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OMIS 105: Database Management Systems
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<center>Final Project - Beeba Inc. Retail Management System</center>

Business and Organizational Description:

Beeba Inc. is a fashion retail company, founded in Delhi NCR, India, that combines online and brick-and-mortar store operations. The company operates through a blend of online platforms and physical boutiques, offering a diverse range of fashion products including Indo-western clothing, accessories, footwear, and another product line that comes under their joint collaboration with a more traditional Indian fashion company called Gulabo (i.e. headquartered in Jaipur, India). There are two specific problems Beeba Inc. currently faces: customer experience shortcomings and supplier coordination issues. To begin with, as the customer base grows, so does the diversity of customer needs and preferences. Beeba Inc. has found it difficult to keep track of individual customer preferences, purchase history, and feedback using conventional methods (e.g. focus groups, sales ledgers, feedback boxes, etc.). This has led to a "one-size-fits-all" approach in Marketing and Customer Service, making it hard to offer personalized experiences that could enhance customer satisfaction and loyalty. Additionally, with an increasing variety of products, managing multiple suppliers and ensuring timely delivery of goods have become cumbersome. The lack of a centralized system (i.e. due to business data being scattered across different departments and systems) has led to communication gaps and delays, affecting the overall supply chain efficiency. A unified system will consolidate data across different operations, providing comprehensive analytics and reports.

At the heart of Beeba Inc.'s operations are its customers, who may be either online shoppers or boutique visitors. Recognizing the distinct shopping behaviors and preferences, the database categorizes customers into online customers and in-store customers, each maintaining some commonalities including name and contact details. Online customers should all have account creation date and payment preferences. Because this is an online account, there must be information on browsing history, login details (i.e. for future password retrieval), and shopping history. In-store customers are noted for their preferred boutique address, visit frequency, and purchase history. Each customer can be classified as online and/or in-store because a customer can shop in different ways depending on his/her mood, preferences, and geographic location. It is also important to note that online shopping history is different from in-store shopping history because certain items are exclusively offered online.

The Products sold by Beeba Inc. encompass their own designs and those developed through the partnership with Gulabo. To manage this diverse array, products are categorized into self-designed products and collaborative products, where collaborative products have a distinct design team, collaboration date, terms and conditions. Nonetheless, some products sold by Beeba Inc. are neither purely self-designed nor collaborative because they are standard stock items purchased from third parties without specific design input from Beeba Inc. or Gulabo. Alongside these two product categories, Beeba Inc. has recently gotten permission to incorporate specific creative elements they did not own previously. For example, Beeba seeks to capitalize on the growing popularity of oxidized jewelry, so it has received certain designs from some other design companies under a license. These products are neither entirely self-designed nor collaborative, so Beeba has created a licensed product category for them. Customers can purchase multiple products and products can be bought by multiple customers. However, this relationship can not be shown in a direct way, so Beeba Inc. says that a customer can place multiple orders. This order

can contain multiple order lines which break down the order into individual items. Many of these order lines can refer to the same product.

Each supplier has provided details, covering aspects such as supplier identification, company name, contact information, and geographic location. Each supplier is linked to specific products they supply, and they are also categorized by the types of materials they provide, such as textiles, accessories, or finished garments. This categorization supports strategic purchasing decisions and aids in risk management.

To ensure streamlined operations, Beeba Inc. maintains an inventory system that has a unique identifier and records the quantity, location, overall status, and last updated (with a date and a time). Each product can have multiple inventory records (i.e. if a product is stored in multiple locations or has different lots or batches), but each inventory record is associated with only one product. However, each product has different storage needs. There is an indirect association between the supplier and inventory record system and delivery date, batch number, and risk management information are needed to understand this relationship. Multiple supply events must be associated with solely one inventory item, capturing different dates and batches for each item. A single supplier might provide various inventory items, which represent different batches.

There is another system to capture all transactions made by customers. Every order is uniquely identified and links customers to order/purchase. In this way, the order/purchase also contains specific customers' profiles. Within this system, there is information on when the transaction occurred, cumulative cost of the order, and the ability to track the progression of the order through various stages such as processing, shipped, or completed, helping to manage operations efficiently and keep customers informed. Subsequent to this order/purchase system, each order is broken down into specific items through the order/purchase line system, which ensures detailed tracking of each product within an order. There is a unique identifier for line items, a reference to unique identifiers for products, number of units purchased in each line item, cost per unit of each product, and total cost for each line item (i.e. calculated by multiplying the quantity by the unit price). These two systems together provide a structured way to manage sales transactions.

Employees at Beeba Inc. are divided into four categories based on their roles: sales staff, customer service agents, managers, and creative staff each defined by specific responsibilities. Sales Staff are primarily responsible for the direct interaction with customers in-store. The database contains their sales training completion date, sales training name(s), and assigned location. One or many sales staff members can assist one customer at a time, but it is possible for staff members to not assist any customer if the customer does not require any help. Customer Service Agents must have at least 10 inquiries they have already handled. Each manager reports to two or more higher level managers. Creative Staff must have a specialization area and at least 5 years of experience. Creative Staff are responsible for collaborative and self-designed products, where many staff members work on at least one product.

Furthermore, customer feedback is collected and has an association with products, customers, and order/purchase. Each entry in the feedback system is cataloged with a unique feedback identifier and detailed descriptors such as feedback date, feedback type (e.g., complaint, suggestion, praise), and a narrative description of the customer's comments or concerns. Only one customer service agent handles many customer feedbacks and, then, must leave agent notes, resolution status, and date of resolution (i.e. within a month of the customer's feedback). For each product, there must be a rating on a scale of 1 to 5.
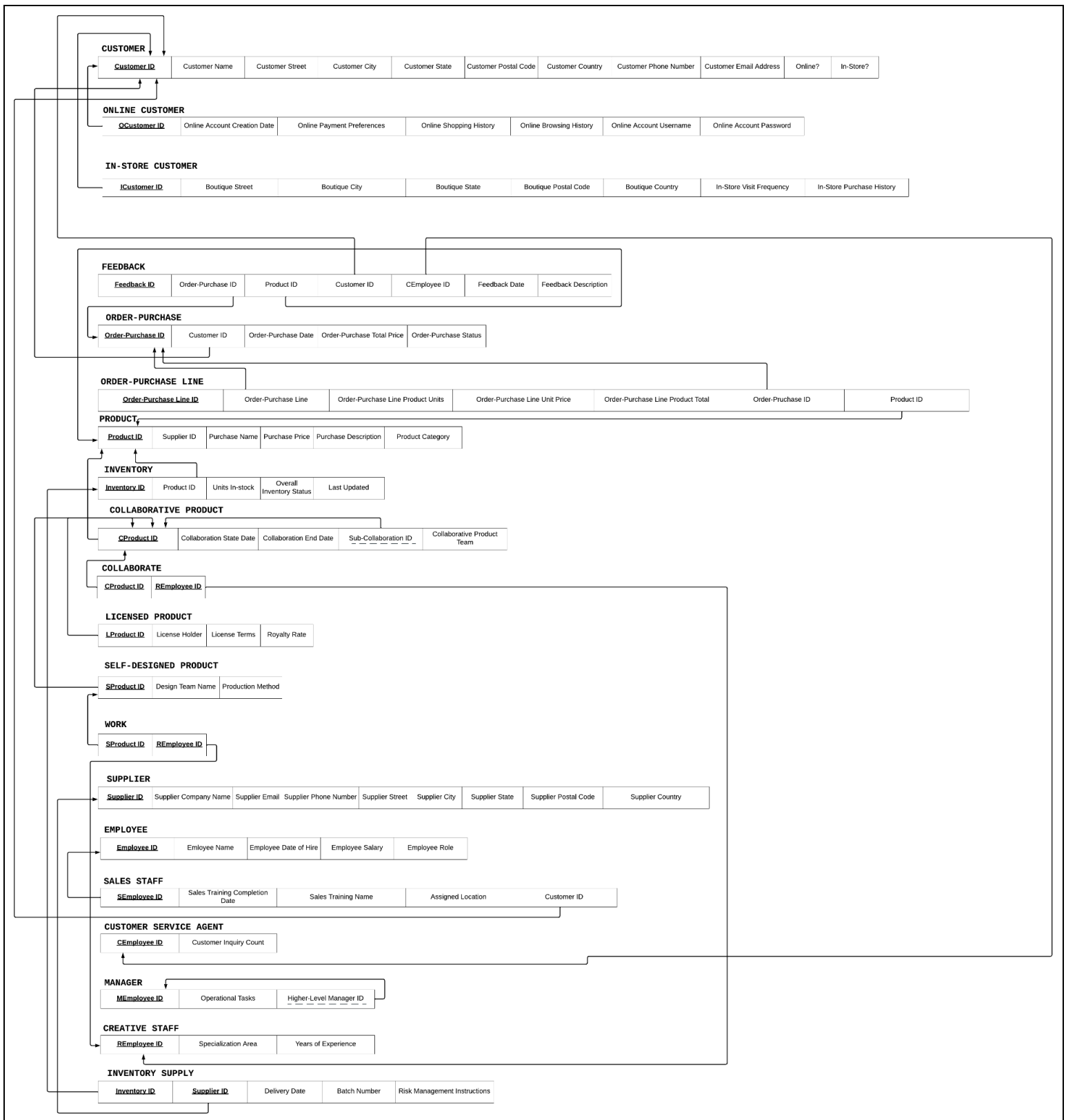
Entity Relationship Diagram (ERD)

For clarity of image, please view it in Lucidchart on this link.
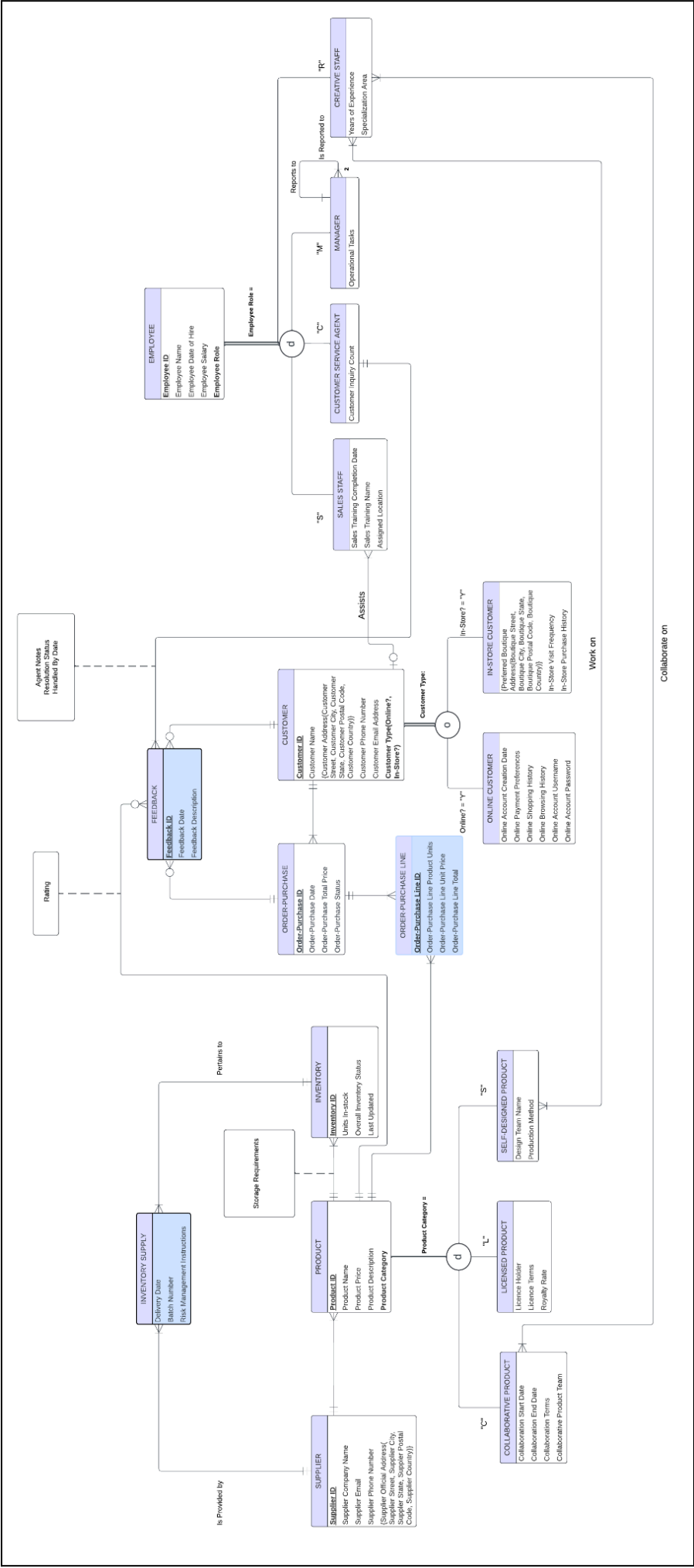
Relational Database Model (RDM)

For clarity of image, please view it in Lucidchart on this [link](#).

CUSTOMER

Customer ID	Customer Name	Customer Street	Customer City	Customer State	Customer Postal Code	Customer Country	Customer Phone Number	Customer Email Address	Online?	In-Store?

ONLINE CUSTOMER

OCustomer ID	Online Account Creation Date	Online Payment Preferences	Online Shopping History	Online Browsing History	Online Account Username	Online Account Password

IN-STORE CUSTOMER

ICustomer ID	Boutique Street	Boutique City	Boutique State	Boutique Postal Code	Boutique Country	In-Store Visit Frequency	In-Store Purchase History

FEEDBACK

Feedback ID	Order-Purchase ID	Product ID	Customer ID	CEmployee ID	Feedback Date	Feedback Description

ORDER-PURCHASE

Order-Purchase ID	Customer ID	Order-Purchase Date	Order-Purchase Total Price	Order-Purchase Status

ORDER-PURCHASE LINE

Order-Purchase Line ID	Order-Purchase Line	Order-Purchase Line Product Units	Order-Purchase Line Unit Price	Order-Purchase Line Product Total	Order-Pruchase ID	Product ID

PRODUCT

Product ID	Supplier ID	Purchase Name	Purchase Price	Purchase Description	Product Category

INVENTORY

Inventory ID	Product ID	Units In-stock	Overall Inventory Status	Last Updated

COLLABORATIVE PRODUCT

CProduct ID	Collaboration State Date	Collaboration End Date	Sub-Collaboration ID	Collaborative Product Team

COLLABORATE

CProduct ID	REmployee ID

LICENSED PRODUCT

LProduct ID	License Holder	License Terms	Royalty Rate

SELF-DESIGNED PRODUCT

SProduct ID	Design Team Name	Production Method

WORK

SProduct ID	REmployee ID

SUPPLIER

Supplier ID	Supplier Company Name	Supplier Email	Supplier Phone Number	Supplier Street	Supplier City	Supplier State	Supplier Postal Code	Supplier Country

EMPLOYEE

Employee ID	Emloyee Name	Employee Date of Hire	Employee Salary	Employee Role

SALES STAFF

SEmployee ID	Sales Training Completion Date	Sales Training Name	Assigned Location	Customer ID

CUSTOMER SERVICE AGENT

CEmployee ID	Customer Inquiry Count

MANAGER

MEmployee ID	Operational Tasks	Higher-Level Manager ID

CREATIVE STAFF

REmployee ID	Specialization Area	Years of Experience

INVENTORY SUPPLY

Inventory ID	Supplier ID	Delivery Date	Batch Number	Risk Management Instructions

Data Dictionary

CUSTOMER

Name	Data Type	Constraints	Key	Description	Example Value
Customer ID	bigint	>0	PK	Unique identifier for a customer	101
Customer Name	nvarchar(100)	None		Full name of the customer	John Doe
Customer Address	nvarchar(255)	None		Address of the customer	No. 12, Third Cross Street Nehru Nagar Chennai, Tamil Nadu 600041
Customer Phone Number	char(14)	None		Contact phone number of the customer	+91-9876543220
Customer Email Address	varchar(255)	The email address must include an "@" symbol, followed by a domain and a domain suffix (like .com, .org, .net). It must start with alphanumeric characters and can include dots, dashes, and underscores.		Email address of the customer	johndoe@example.com
Customer Type	char(1)	None		Type of indicator (O for online, S for in-store)	O

ONLINE CUSTOMER

Name	Data Type	Constraints	Key	Description	Example Value
Customer ID	bigint	>0	PK	Link to general customer details	101
Account Creation Date	datetime	None		Date the online account was created	12/31/2021 1:00 PM

Online Payment Preference	nvarchar(50)	None		Preferred payment methods for online purchases	Credit Card
Online Shopping History	varchar(4000)	None		Record of all online transactions made by the customer	Laptop, 2023-01-15, $1200; Headphones, 2023-01-20, $150
Online Browsing History	varchar(4000)	None		Record of websites and products browsed by the customer	Visited Audio Equipment Page, Visited Reviews Page
Online Account Username	varchar(50)	Every username in the system must be unique to prevent multiple users from registering with the same username. Usernames should only contain alphanumeric characters (letters and numbers), and optionally, underscores, dashes, or periods.		Username for online account access	johndoe
Online Account Password	varchar(255)	At least 8 characters to ensure a basic level of complexity. Must include a combination of uppercase letters, lowercase letters, numbers, and special		Password for online account access	example_Password123

				characters.		

IN-STORE CUSTOMER

Name	Data Type	Constraints	Key	Description	Example Value
Customer ID	bigint	>0	PK	Link to general customer details	101
Preferred Boutique	nvarchar(255)	None		Address of the boutique preferred by the customer	123 Fashion Street, Connaught Place, New Delhi, 110001
In-Store Visit Frequency	int	None		Number of times the customer has visited the boutique	5
In-Store Purchase History	nvarchar(max)	None		Record of all in-store purchases made by the customer	

PRODUCT

Name	Data Type	Constraints	Key	Description	Example Value
Product ID	bigint	>0	PK	Unique identifier for a product	12
Product Name	nvarchar(255)	None		Name of the product	"Off White Viscose Flared Palazzo"
Product Description	nvarchar(max)	None		Description of the product	"Traditional hand-embroidered kurti, perfect for festive occasions."
Product Price	decimal(10, 2)	>= 0		Price of the product.	$19.99
Product Category	nvarchar(50)	None		Category of the product (self-designed, collaborative, licensed)	Self-Designed

COLLABORATIVE PRODUCT

Name	Data Type	Constraints	Key	Description	Example Value
Product ID	bigint	>0	PK	Link to general product details	1002
Collaboration Start Date	date	None		Start date of collaboration	01/03/2021
Collaboration End Date	date	Must be exactly two months after the start date		End date of collaboration	03/03/2021
Collaboration Terms	nvarchar(max)	None		Terms and conditions of the collaboration	The terms include shared marketing responsibilities and profit sharing on sales.
Collaborative Product Team	nvarchar(255)	None		Names of the team involved in the product collaboration.	

SELF-DESIGNED PRODUCT

Name	Data Type	Constraints	Key	Description	Example Value
Product ID	bigint	>0	PK	Link to general product details	1002
Design Team Name	nvarchar(100)	None		Name of the in-house design team	Palazzo Design Team
Production Method	varchar(2000)	None		Detailed description of the design process	Inspired by the vibrant colors of Indian summer, this knee-length dress combines traditional block printing techniques with modern cuts. The design team incorporated organic cotton fabrics sourced from sustainable farms in Rajasthan. The dress features a fitted bodice with a flared skirt, embodying a blend of contemporary style and classic elegance. It's perfect for both casual and formal summer

					events.

LICENSED PRODUCT

Name	Data Type	Constraints	Key	Description	Example Value
Product ID	bigint	>0	PK	Link to general product details	1002
License Holder	nvarchar(100)	None		Entity from which the design license is obtained	Design Innovations Inc.
License Terms	varchar(4000)	None		Specific terms of the license agreement	Exclusive rights to manufacture and sell within India for 5 years.
Royalty Rate	decimal(5, 2)	>= 0		Percentage of sales paid to the license holder as royalties.	7.5

SUPPLIER

Name	Data Type	Constraints	Key	Description	Example Value
Supplier ID	bigint	>0	PK	Unique identifier for a supplier	501
Supplier Company Name	nvarchar(100)	None		Name of the supplier company	Supplier Co.
Supplier Email	varchar(255)	None		Professional email address of the supplier	johndoe@example.com
Supplier Phone Number	char(14)	None		Contact phone number of the supplier	+91-9876543230
Supplier Address	nvarchar(255)	None		Address of the supplier	23 Cartar Street, New Delhi, 98076

ORDER-PURCHASE

Name	Data Type	Constraints	Key	Description	Example Value
Order-Purchase ID	bigint	> 0	PK	Unique identifier for order-purchase	100
Customer ID	bigint	> 0	FK	Reference to the customer who	501

				placed the order or purchased it.	
Order-Purchase Date	datetime	None		Date and time when the order was placed or purchased.	12/12/2023 12:00 PM
Order-Purchase Total Price	decimal(10, 2)	None		Total amount of the order or purchase.	4500.00
Order-Purchase Status	nvarchar(50)	Either pending or completed. No other value is accepted.		Current status of the order or purchase (e.g., pending, completed).	"Completed"

ORDER-PURCHASE LINE

Name	Data Type	Constraints	Key	Description	Example Value
Order-Purchase Line ID	bigint	> 0	PK	Unique identifier for order-purchase line	100
Order-Purchase ID	bigint	> 0	FK	Reference to the order or purchase this line item belongs to	501
Product ID	bigint	> 0	FK	Identifier for the product associated with this line item.	20
Order-Purchase Line Product Units	int	> 0		Number of units of the product ordered in this line item.	2
Order-Purchase Line Unit Price	decimal(10, 2)	>= 0		Price per unit of the product.	50.00
Order-Purchase Line Total	decimal(10, 2)	>= 0		Total cost for this line item (Product Units * Unit Price).	100.00

EMPLOYEE

Name	Data Type	Constraints	Key	Description	Example Value

Employee ID	bigint	> 0	PK	Unique identifier for employee	125
Employee Name	nvarchar(100)	None		Full name of the employee.	Ankit Sharma
Employee Date of Hire	date	None		Date the employee was hired.	01/03/2023
Employee Salary	decimal(10, 2)	None		Yearly salary (in dollars)	50000
Employee Role	varchar(50)	Must be Manager, Sales Staff, Customer Service Agent, or Creative Staff		Role or title of the employee within the company.	Manager

SALES STAFF

Name	Data Type	Constraints	Key	Description	Example Value
Employee ID	bigint	> 0	PK	Link to the general employee details.	125
Sales Training Completion Date	date	None		Date when the sales training was completed.	01/12/2023
Sales Training Name	nvarchar(100)	None		Name of the training program completed by the sales staff.	Advanced Sales Strategies
Assigned Location	decimal(10, 2)	Must end with "Branch"		Role or title of the employee within the company.	Delhi Branch

CUSTOMER SERVICE AGENT

Name	Data Type	Constraints	Key	Description	Example Value
Employee ID	bigint	> 0	PK	Link to the general employee details.	125
Customer Inquiry Count	int	None		Number of customer inquiries handled	20

				by the agent.	

CREATIVE STAFF

Name	Data Type	Constraints	Key	Description	Example Value
Employee ID	bigint	> 0	PK	Link to the general employee details.	120
Years of Experience	int	None		Number of years the employee has worked in a creative role.	5
Specialization Area	nvarchar(100)	None		Area of specialization within the creative field.	Textile Embroidery

MANAGER

Name	Data Type	Constraints	Key	Description	Example Value
Employee ID	bigint	> 0	PK	Link to the general employee details.	120
Operational Tasks	nvarchar(1000)	None		List of key operational tasks and responsibilities managed by the manager.	Oversee daily operations, budget approval, staff training, project management.
Higher-Level Manager ID	bigint	> 0	FK	Employee ID of the manager's direct superior in the organizational hierarchy.	30

FEEDBACK

Name	Data Type	Constraints	Key	Description	Example Value
Feedback ID	bigint	> 0	PK	Unique identifier for a feedback entry.	120
Customer ID	bigint	> 0	FK	References the customer providing the feedback.	

Product ID	bigint	> 0	FK	Reference the product for which feedback is given.	30
Order-Purchase ID	bigint	> 0	FK	References the order or purchase associated with the feedback.	12
Employee ID	bigint	> 0	FK	References the employee associated with the feedback instance.	100
Feedback Date	date	None		Date on which the feedback was provided.	04/05/2021
Feedback Description	nvarchar(2000)	None		Detailed description of the feedback provided by the customer.	Great product, but the size was a bit off.
Rating	int	1-5		Numeric rating given by the customer, scaled from 1 to 5.	4
Agent Notes	nvarchar(2000)	None		Notes or additional information added by the handling agent.	Customer was contacted and a replacement was offered.
Resolution Status	nvarchar(50)	Either resolved or pending.		Status of the feedback resolution (e.g., Resolved, Pending).	Resolved
Handled By Date	datetime	Must be within a month of Feedback Date		Date when the feedback was processed or handled by the agent.	04/07/2021 9:00 AM

INVENTORY

Name	Data Type	Constraints	Key	Description	Example Value
Inventory ID	bigint	> 0	PK	Unique identifier	120

				for a feedback entry.	
Product ID	bigint	> 0	FK	References the product associated with this inventory.	50
Units In-stock	int	>=0		Current number of units available in stock for the product.	30
Overall Inventory Status	nvarchar(50)	Either Low, Optimal, or Overstocked. No other values accepted.		Descriptive status of the inventory, such as 'Low', 'Optimal', or 'Overstocked'.	Optimal
Last Updated	datetime	None		Timestamp for the last update to the inventory record.	06/01/2022 12:00 PM
Storage Requirements	nvarchar(300)	None		Specific storage requirements, particularly for jewelry items.	Separate compartments, avoid humidity.

INVENTORY SUPPLY

Name	Data Type	Constraints	Key	Description	Example Value
Inventory ID	bigint	> 0	PK	Unique identifier for a feedback entry.	120
Supplier ID	bigint	> 0	FK	References the supplier providing the inventory.	50
Delivery Date	date	None		Date and time the inventory was delivered.	03/21/2021
Batch Number	varchar(50)	Must start with "Batch-"		Identifier for the specific batch of product delivered.	Batch-042023
Risk Management Instructions	nvarchar(max)	None		Specific handling or risk	Keep away from moisture and heat.

				management instructions for the batch.	

Views Explanation

View #1:

Beeba Inc. has a growing number of collaborations with suppliers and other brands, so this view becomes important because it provides a good overview of the current inventory status with information about product names, units in stock, inventory status, last updated date, and storage requirements. In the future, if Bebba Inc. has a special type of manager like inventory managers and many warehouse staff to monitor stock levels, they can identify low stock items and ensure all products are intact. It eliminates the need to go back and forth in the database to check these related items.

View #2:

This view is most important for marketing efforts because it allows for Beeba Inc.'s marketing experts to analyze purchasing behaviors and identify trends. Thus, they can implement targeted promotions or discounts. It also allows to resolve customer inquiries in a timely manner (e.g. as done by the Customer Service Agent for Feedbacks).

View #3:

This is most important for Customer Service Agents or Sales Staff (in-store) because they always need quick access to customer contact information so that they can resolve inquiries, order statuses, and provide personalized support. As shown in the implementation example, representatives can filter based on phone number area code so that they can do localized marketing campaigns.

Conclusion

All deliverables from organizational description, ERD, RDM, data dictionary, and View justifications are attached on this report document. All other SQL code files are attached separately.