Pharmacy Management System

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Contents

Introduction

Pharmacy Management System, the pharmacy operates as central hub for managing

- suppliers
- products,
- customers
- orders
- sales
- employees
- prescriptions
- inventory
- manufacturer
- expiry dates

this system enables seamless process including products procurement order fulfilment prescription management inventory control and sales tracking. The interplay of these entities and their relationship ensures efficient operations accurate record keeping and quality customer service within the pharmacy.

Scope

1. Database Objectives:

- Track and manage inventory of medications and medical supplies.
- Maintain accurate records of patient prescriptions, including dosage and refills.
- Enable efficient management of patient profiles, including personal information and medical history.
- Generate reports for inventory, sales, and financial analysis.

2. Functional Requirements:

- Medication Inventory Management:
- Track medication stock levels, including quantities, expiration dates, and storage locations.
- Automate stock replenishment based on predefined thresholds.
- Enable barcode scanning or RFID tagging for efficient inventory management.
- Prescription Management:
- Capture and store patient prescription information, including medication details, dosage instructions, and refills.
- Maintain a record of prescription history for each patient.
- Generate alerts for expired prescriptions or pending refills.

3. Customer Management:

- Create and update customer profiles with personal information, medical history, and insurance details.
- Link prescriptions to the respective customer and allow for easy retrieval.
- Support communication between healthcare providers and pharmacy staff.

4. Sales and Billing:

- Record sales transactions and generate itemized receipts.
- Manage payment methods, including cash, credit cards, and insurance billing.
- Calculate and track sales revenue, profits, and financial reports.

5. Reporting and Analytics:

- Generate reports for inventory levels, expired medications, and low-stock items.
- Analyse sales data, including top-selling medications, revenue trends, and profitability.
- Provide insights for decision-making and optimization of pharmacy operations.

7. Scalability and Performance:

- Design the database to handle a large volume of transactions and concurrent users.
- Optimize query performance to ensure quick access to data.

8. Usability and User Interface:

- Develop an intuitive and user-friendly interface for easy navigation and data entry.

- Incorporate search and filtering functionalities for efficient data retrieval.
- Integration:
- Integrate with external systems, such as electronic health record (EHR) systems or insurance billing systems, for data exchange and interoperability.

9. Project Deliverables:

- Fully functional database system with a user-friendly interface.
- Documentation, including system requirements, design specifications, and user manuals.
- Testing and quality assurance reports.
- Training materials and user support documentation.

10. Project Constraints:

- Budget limitations.
- Time constraints.
- Technical limitations of the chosen database management system.

Methodology

Tools used:

- SQL Server
- SQL Server Management Studio

Process:

Requirement Gathering:

- Conduct interviews and meetings with stakeholders, including pharmacists, technicians, administrators, and healthcare professionals, to identify their needs and expectations.
- Document and prioritize functional and non-functional requirements for the database system.
- Define use cases and user stories to capture the desired system behaviour.

System Design:

- Design the database schema, considering entities, attributes, relationships, and constraints.
- Determine appropriate data models, such as relational or object-oriented, based on the project requirements.
- Create entity-relationship diagrams (ERDs) to visualize the database structure.
- Define table structures, data types, and integrity rules.

Technology Selection:

- Identify and select a suitable database management system (DBMS) based on factors like scalability, performance, security, and compatibility with the project requirements.
- Choose programming languages, frameworks, and tools for implementing the front-end and back-end components of the database system.
- Consider any integration requirements with external systems or APIs.

Development:

- Create the necessary database tables, views, indexes, and stored procedures as per the defined design.
- Implement the user interface components, including forms, screens, and reports.
- Implement the functionality for medication inventory management, prescription management, patient management, sales and billing, and reporting/analytics.
- Perform regular testing and debugging during the development process to ensure the system's integrity and functionality.

Data Population:

- If applicable, plan and execute the migration of existing data from legacy systems or manual records into the new database system.
- Develop data import/export mechanisms to facilitate data exchange with external systems, such as EHR systems or insurance billing systems.
- Validate and clean the migrated data to ensure accuracy and consistency.

System Integration and Testing:

- Integrate the database system with any required external systems or APIs.
- Conduct integration testing to verify the proper functioning of data exchanges and interoperability.
- Perform system testing to validate the overall functionality, including scenario-based testing and user acceptance testing.
- Identify and resolve any issues or bugs discovered during testing.

Deployment and Training:

- Prepare the production environment for the deployment of the database system.
- Conduct training sessions for end-users to familiarize them with the system's features, data entry, and retrieval processes.
- Provide user documentation and support materials to assist users in utilizing the system effectively.

Maintenance and Support:

- Establish a maintenance plan to address ongoing system updates, bug fixes, and enhancements.
- Provide user support and address user queries or concerns.
- Regularly review and update the system's security measures and data backup strategies.

Project Management:

- Assign roles and responsibilities to project team members.
- Monitor project progress, milestones, and deadlines.
- Conduct regular meetings to discuss project status, challenges, and risk mitigation strategies.
- Follow an iterative or Agile development approach to accommodate feedback and changes throughout the project lifecycle.

SCENARIO

A supplier provides products to the pharmacy. Each product belongs to a specific manufacturer.

The pharmacy maintains an inventory/stock of products, including information such as the

quantity available and the expiry date of each product.

Customers visit the pharmacy and place orders for specific products. Each order is associated with a customer and contains details like the ordered quantity. The employees of the pharmacy process the

orders by checking the availability of products in the inventory. If the products are available, the employees update the inventory accordingly and generate a sales record for each sold product. The sales record includes information about the product, the customer, the quantity sold, and the sales date.

The employees also handle prescriptions issued by healthcare professionals. Each prescription is associated with a specific customer and includes details such as the prescribed product, dosage, and date. The employees update the inventory based on the dispensing of prescribed medications to customers.

The expiry date entity helps in tracking the expiry dates of products in the inventory. It is associated with the product entity and assists in managing product expiration and removing expired items from the inventory.

Company being an entity has attributes such as comp_id, comp_name.

contact_No. company_country and manufacturer _license_no. Company Supplies Product to many Vendors.

Supplier who Provides Stock to the pharmacy and has attributes

s_id. s_name. s_address and s_email.

Stock being an entity itself can have attributes stock_id, stock_type

and stock_quantity.

Stock belongs to Products that has attributes p_id. p_name. p_unit_price

p_category, p_description. p_storage_instruction and

Stock provides Expiry(details Start date end date etc)

has attributes e_id, startDate end_date, expiry_status.

Stock belongs to Orders that has attributes order_id, total_amount,

and order_date.

Orders recorded in Sales being an entity has attributes

total_price.

Orders Placed by Customer that has attributes Customer_id,

Customer_name, cust_phone, cust_address and cust_email.

Orders Processed by Employee that has attributes Employee_id, Employee

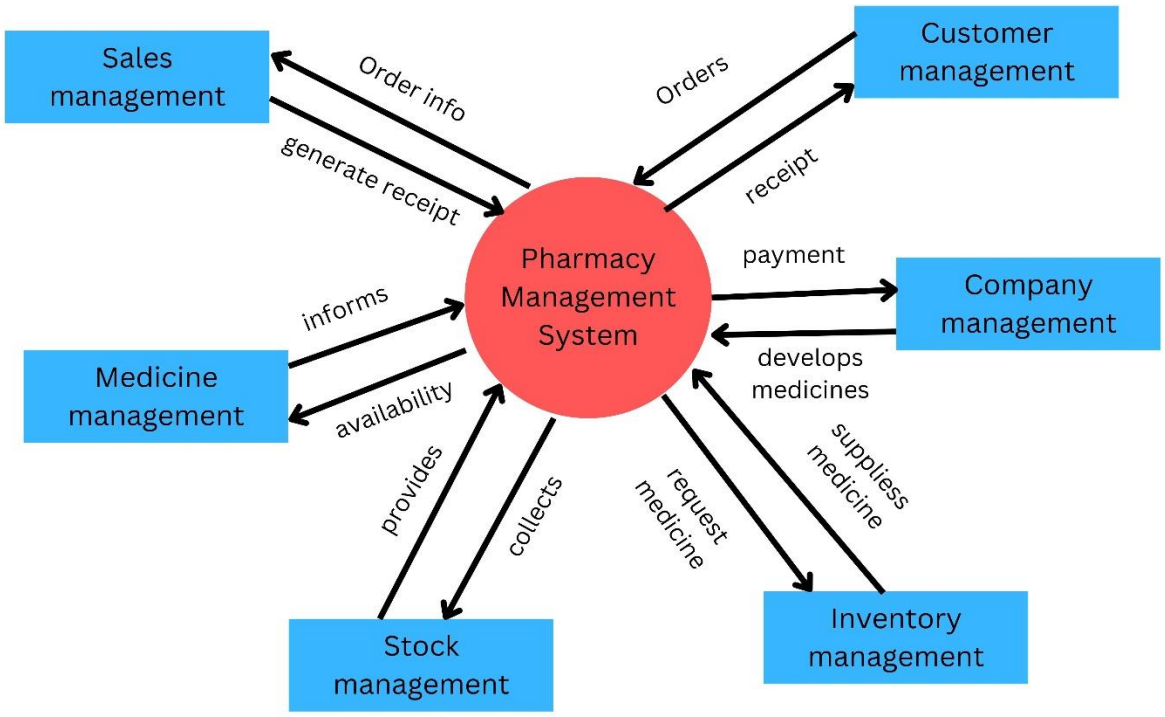
_name, emp_phone, emp_address and emp_email.

Sales are done when order is fulfilled, Sales has attributes like sales_id, sales_date, total_price

Design

Data Flow Diagram (DFD)

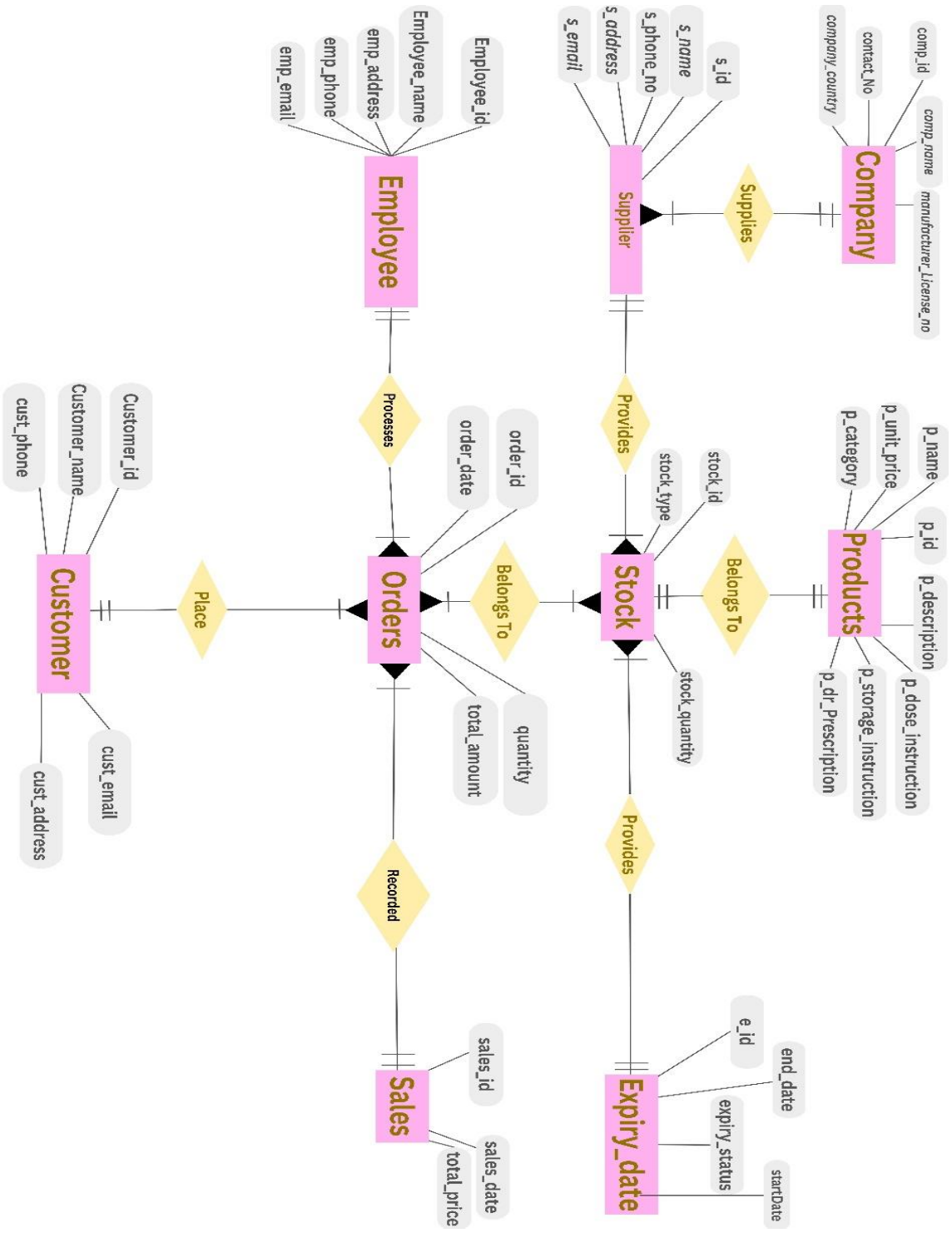
Level 0 DFD:



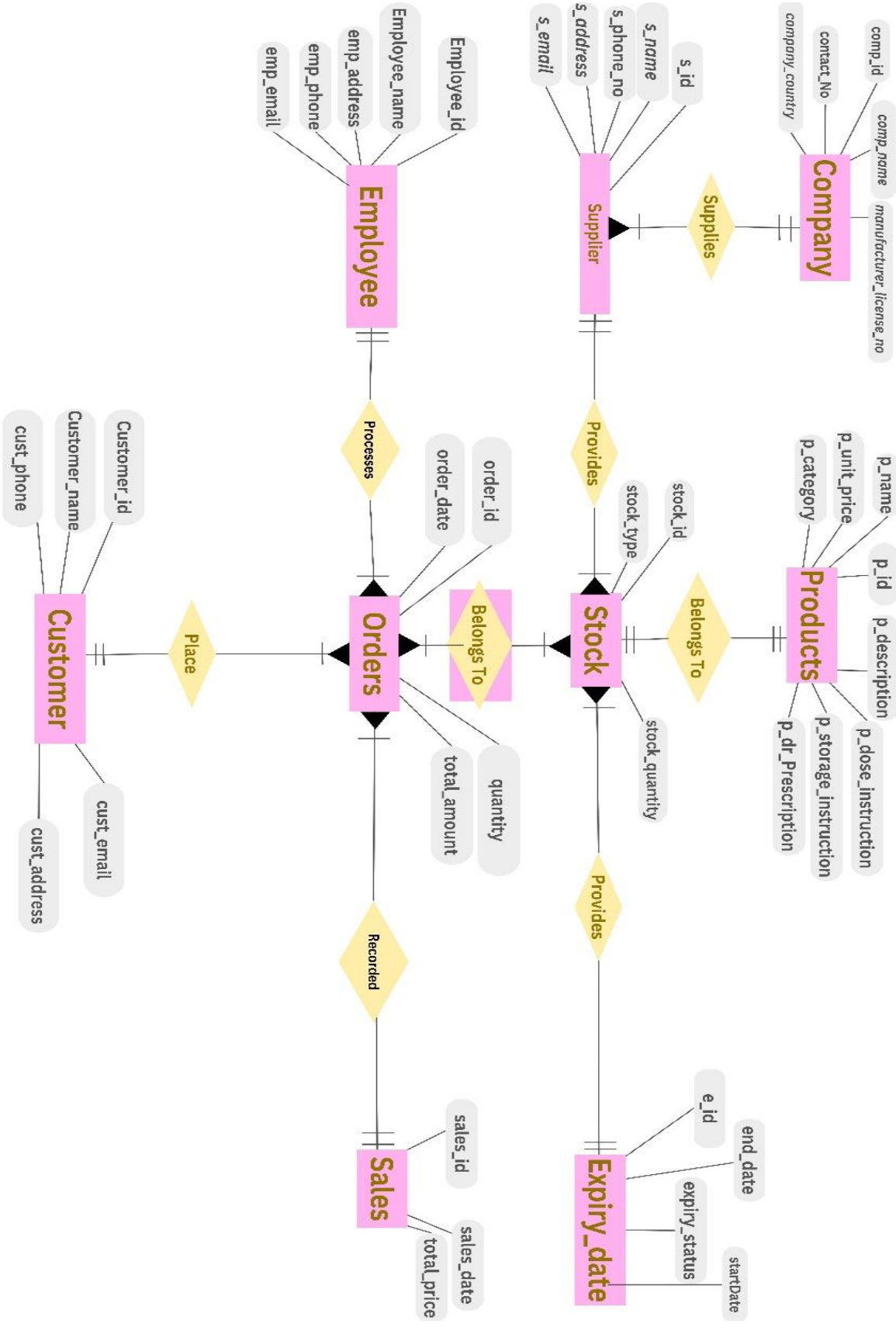
Level 1 DFD:


Pharma Company
Supplying managment
Supplier
Medicine inventory
Stock management
Sales manageme nt
Sales
Order processing
Employee management
Customer management
Employee info
Customer details

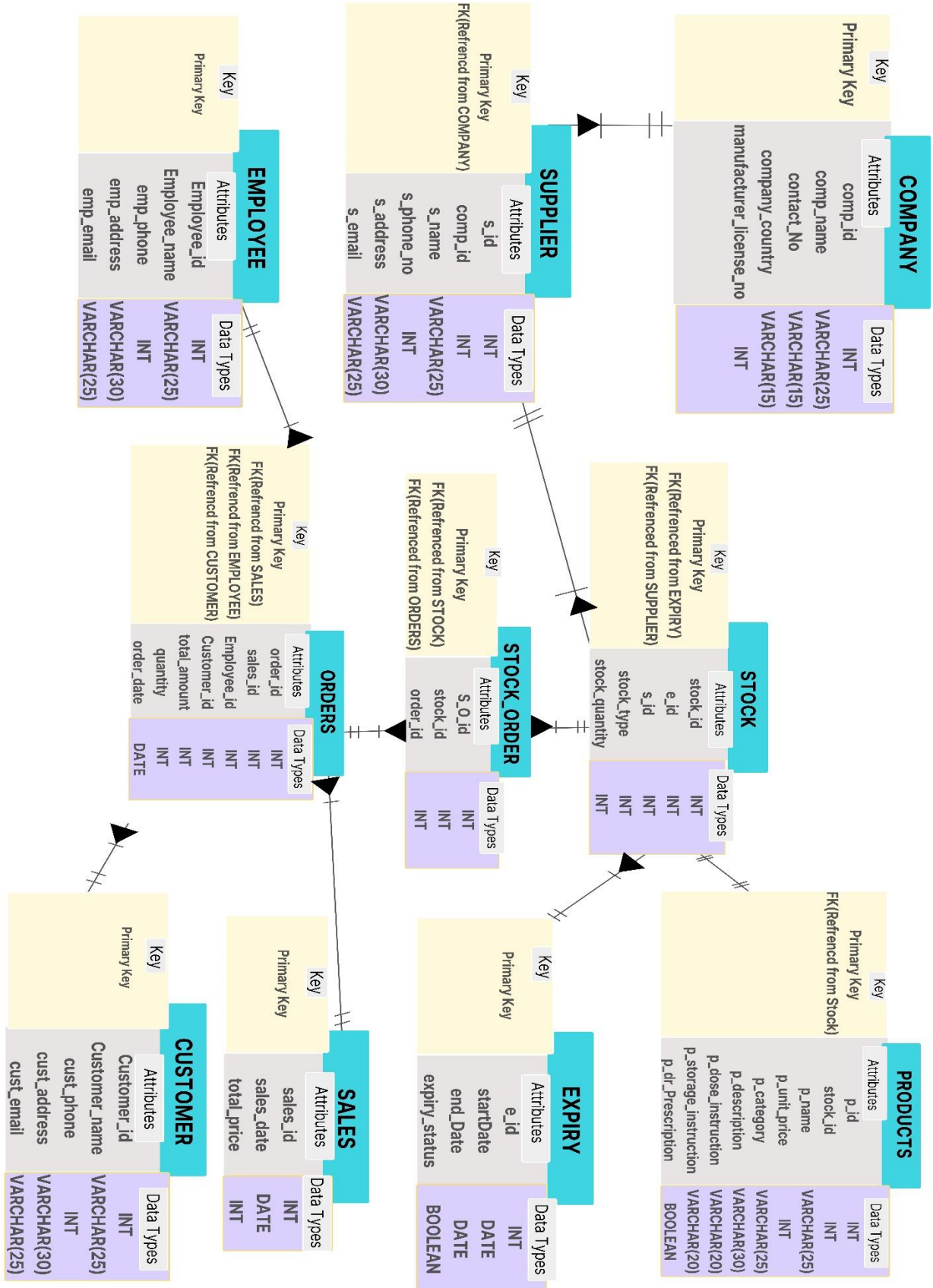
ERD


Company
comp_id
comp_name
manufacturer_License_no
company_country
contact_No
Supplies
Supplier
s_id
s_name
s_phone_no
s_address
s_email
Provides
Stock
stock_id
stock_type
stock_quantity
Belongs To
Products
p_id
p_name
p_unit_price
p_category
p_description
p_dose_instruction
p_storage_instruction
p_dr_Prescription
Provides
Expiry_date
e_id
end_date
expiry_status
startDate
Belongs To
Orders
order_id
order_date
quantity
total_amount
Processes
Employee
Employee_id
Employee_name
emp_address
emp_phone
emp_email
Place
Customer
Customer_id
Customer_name
cust_phone
cust_email
cust_address
Recorded
Sales
sales_id
sales_date
total_price

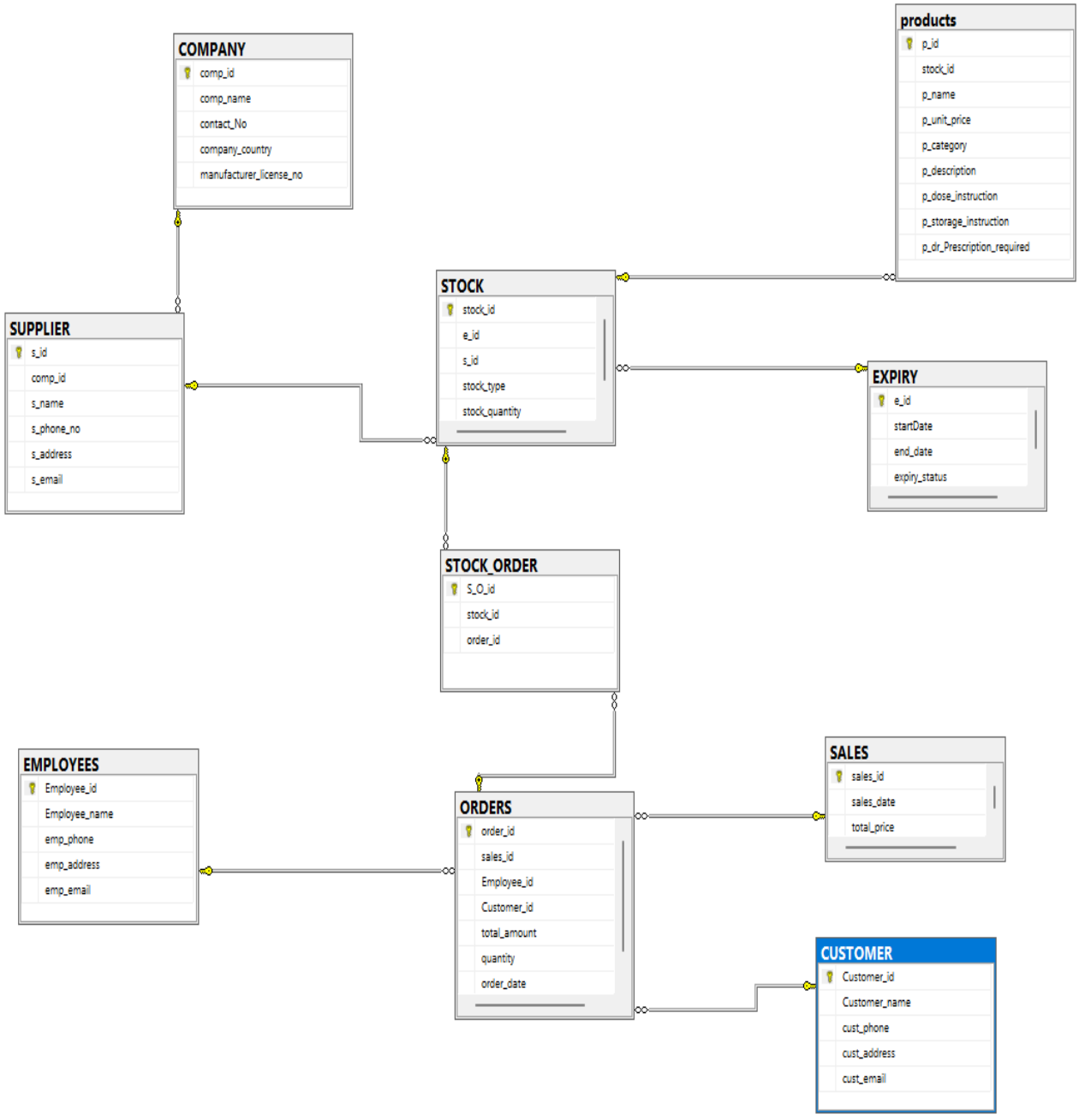
Normalized ERD



Relational model



Relational model using SQL Server



Queries

```
SELECT *
FROM COMPANY
```

	comp_id	comp_name	contact_No	company_country	manufacturer_license_no
1	1	Ahmed Corporation	+1123-456-7890	United States	7890
2	2	Ameer and Sons	+44-123-4567890	United Kingdom	4567
3	3	Daniyal and Sons	+91 9876543210	India	1234
4	4	Mahboob Medical	+61 2-1234-5678	Australia	5678
5	5	Chughtai Lab	+33 123-456-789	France	9012
6	6	Hameed Latif	+1 987-654-3210	United States	3456
7	7	BYD Pharma	+44 9876 543210	United Kingdom	7890

```
SELECT *
FROM ORDERS
```

	order_id	sales_id	Employee_id	Customer_id	total_amount	quantity	order_date
1	1	1021	104	1	250	5	2023-01-05
2	2	5926	103	5	120	3	2023-10-10
3	3	1099	105	25	75	2	2023-09-15
4	4	2255	105	14	180	4	2023-08-20
5	5	6102	102	11	320	8	2023-11-25
6	6	8123	101	10	95	3	2023-02-01
7	7	3289	101	5	200	5	2023-05-07
8	8	4027	103	8	150	4	2023-12-12
9	9	3952	105	20	280	7	2023-12-18
10	10	7239	101	23	400	10	2023-10-23
11	11	4031	103	11	135	3	2023-01-29
12	12	9230	102	2	190	5	2023-03-04
13	13	5402	104	22	220	6	2023-03-31
14	14	1294	104	12	75	2	2024-07-07
15	15	4053	101	19	150	4	2024-06-13

```
SELECT *
FROM SUPPLIER
```

	s_id	comp_id	s_name	s_phone_no	s_address	s_email
1	101	3	John Smith	1234567890	13 Main Street,LA,US	johnsmith@example.com
2	102	3	Emily Johnson	9876543210	46 Elm Street,NYC,US	emilyjohnson@example.com
3	103	2	David Thompson	441234567890	89 Oak Street,London,UK	davidthompson@example.com
4	104	2	Sophia Davis	449876543210	31 Maple Street,Manchester, UK	sophiadavis@example.com
5	105	1	Michael Brown	919876543210	57 Pine Street,Mumbai,IND	michaelbrown@example.com
6	106	7	Emma Wilson	911234567890	80 Cedar Street,Delhi,IND	emmawilson@example.com
7	107	6	Jacob Martinez	6123456789	24 Birch Street,Sydney,AUS	jacobmartinez@example.com
8	108	3	Olivia Anderson	6234567890	68 Walnut Street,Melbourne,AUS	oliviaanderson@example.com
9	109	5	William Garcia	33123456789	90 Willow Street,Paris,FR	williamgarcia@example.com
10	110	4	Ava Lopez	331234567890	45 Cedar Street,Lyon,FR	avalopez@example.com
11	111	1	James Lee	1122334455	68 Oak Street,Seoul,SK	jameslee@example.com
12	112	6	Sophia Kim	9988776655	53 Elm Street,Busan,SK	sophiakim@example.com
13	113	7	Logan Park	4477889900	76 Pine Street,Tokyo,JPN	loganpark@example.com
14	114	2	Charlotte Suzuki	2244668899	97 MapleStreet,Osaka,JPN	charlottesuzuki@example.com
15	115	2	Benjamin Chen	3366998877	43 OakStreet,Shanghai,CHN	benjaminchen@example.com

```
select *
from CUSTOMER
where Customer_name='john doe'
```

	Customer_id	Customer_name	cust_phone	cust_address	cust_email
1	1	John Doe	1234567890	123 Main St	john.doe@example.com

```
SELECT c.comp_id, c.comp_name, s.s_name
FROM COMPANY AS c INNER JOIN SUPPLIER AS s
ON c.comp_id = s.comp_id
```

	comp_id	comp_name	s_name
1	3	Daniyal and Sons	John Smith
2	3	Daniyal and Sons	Emily Johnson
3	2	Ameer and Sons	David Thompson
4	2	Ameer and Sons	Sophia Davis
5	1	Ahmed Corporation	Michael Brown
6	7	BYD Pharma	Emma Wilson
7	6	Hameed Latif	Jacob Martinez
8	3	Daniyal and Sons	Olivia Anderson
9	5	Chughtai Lab	William Garcia
10	4	Mahboob Medical	Ava Lopez
11	1	Ahmed Corporation	James Lee
12	6	Hameed Latif	Sophia Kim
13	7	BYD Pharma	Logan Park
14	2	Ameer and Sons	Charlotte Suzuki
15	2	Ameer and Sons	Benjamin Chen

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```
SELECT STOCK.stock_id, STOCK.stock_type, s.s_id,s_name,p.p_name
FROM SUPPLIER AS s INNER JOIN STOCK
ON  s.s_id = STOCK.s_id
inner join products as p
on STOCK.stock_id=p.stock_id
```

Results Messages

	stock_id	stock_type	s_id	s_name	p_name
1	10	2	105	Michael Brown	Paracetamol
2	12	2	108	Olivia Anderson	Ibuprofen
3	1	1	115	Benjamin Chen	Amoxicillin
4	2	2	101	John Smith	Cetirizine
5	9	1	102	Emily Johnson	Omeprazole
6	12	2	108	Olivia Anderson	Aspirin
7	29	1	103	David Thompson	Loratadine
8	22	2	110	Ava Lopez	Simvastatin
9	4	2	109	William Garcia	Metformin
10	7	1	107	Jacob Martinez	Lisinopril
11	8	2	111	James Lee	Vitamin C
12	30	2	108	Olivia Anderson	Melatonin
13	30	2	108	Olivia Anderson	Probiotics
14	3	1	101	John Smith	Calcium Supplement
15	7	1	107	Jacob Martinez	Iodine Supplement
16	16	2	114	Charlotte Suzuki	Fish Oil
17	19	1	106	Emma Wilson	Multivitamin
18	24	2	104	Sophia Davis	Ginkgo Biloba
19	25	1	104	Sophia Davis	Folic Acid
20	26	2	109	William Garcia	Magnesium Supplement
21	1	1	115	Benjamin Chen	Protein Powder
22	9	1	102	Emily Johnson	Creatine Supplement
23	19	1	106	Emma Wilson	Biotin Supplement
24	12	2	108	Olivia Anderson	Zinc Supplement
25	11	1	103	David Thompson	Vitamin D Supplement
26	11	1	103	David Thompson	Glucosamine Supplement
27	11	1	103	David Thompson	Turmeric Supplement
28	28	2	110	Ava Lopez	Coenzyme Q10 Supplement
29	14	2	110	Ava Lopez	Saw Palmetto Supplement
30	30	2	108	Olivia Anderson	Iron Supplement
31	29	1	103	David Thompson	Glucometer
32	27	1	112	Sophia Kim	Blood Pressure Monitor
33	16	2	114	Charlotte Suzuki	Nebulizer
34	5	1	112	Sophia Kim	Thermometer
35	2	2	101	John Smith	Band-Aids