

The CRM database project employs Microsoft SQL Server to systematically design, implement, and optimize a robust system for managing customer interactions.

Through careful entity-relationship modeling, schema creation, and strategic indexing, the project ensures data integrity and responsiveness. Successful data insertion and query testing validate system functionality, while orphan record checks fortify reliability

CUSTOMER RELATIONSHIP MANAGEMENT (CRM) SYSTEM DATABASE

Designed & Developed by Muhammad Khizer
Mohammadkhizer80@gmail.com

INTRODUCTION:

The CRM (Customer Relationship Management) database serves as a centralized and organized repository for managing information related to customer interactions, opportunities, and relationships. Its primary purpose is to streamline and enhance the management of customer data, facilitating efficient communication, tracking of business opportunities, and providing insights into customer interactions.

ENTITY-RELATIONSHIP MODEL:

ENTITIES:

1. Customer:

- CustomerID (Primary Key): Integer
- Name: Varchar(50), Not Null
- Email: Varchar(20)
- Phone: Varchar(20)
- Address: Text

2. Company:

- CompanyID (Primary Key): Integer
- Name: Varchar(255), Not Null
- Industry: Varchar(255)
- Address: Text

3. ContactPerson:

- ContactPersonID: (Primary Key): Integer
- Name: Varchar(50), Not Null
- Email: Varchar(50)
- Phone: Varchar(20)
- Position: Varchar(50)

4. Opportunity:

- OpportunityID (Primary Key): Integer

- Name: Varchar(50), Not Null
- Description: Text
- Status: Varchar(50)
- Expected Revenue: Decimal(10,2)

5. Activity:

- ActivityID (Primary Key): Integer
- Type: Varchar(50), Not Null
- Date: Date
- Time: Time
- Description: Text

6. Interaction:

- InteractionID (Primary Key): Integer
- Date: Date
- Time: Time
- Description: Text
- Medium: Varchar(50)

RELATIONSHIP:

1. Customer-Company Relationship:

One-to-Many relationship: A customer can be associated with multiple companies, but a company is associated with only one customer.

2. Customer-ContactPerson Relationship:

One-to-Many relationship: A customer can have multiple contact persons, but a contact person is associated with only one customer.

3. Customer-Opportunity Relationship:

One-to-Many relationship: A customer can have multiple opportunities, but an opportunity is associated with only one customer.

4. Opportunity-Activity Relationship:

One-to-Many relationship: An opportunity can have multiple activities, but an activity is associated with only one opportunity.

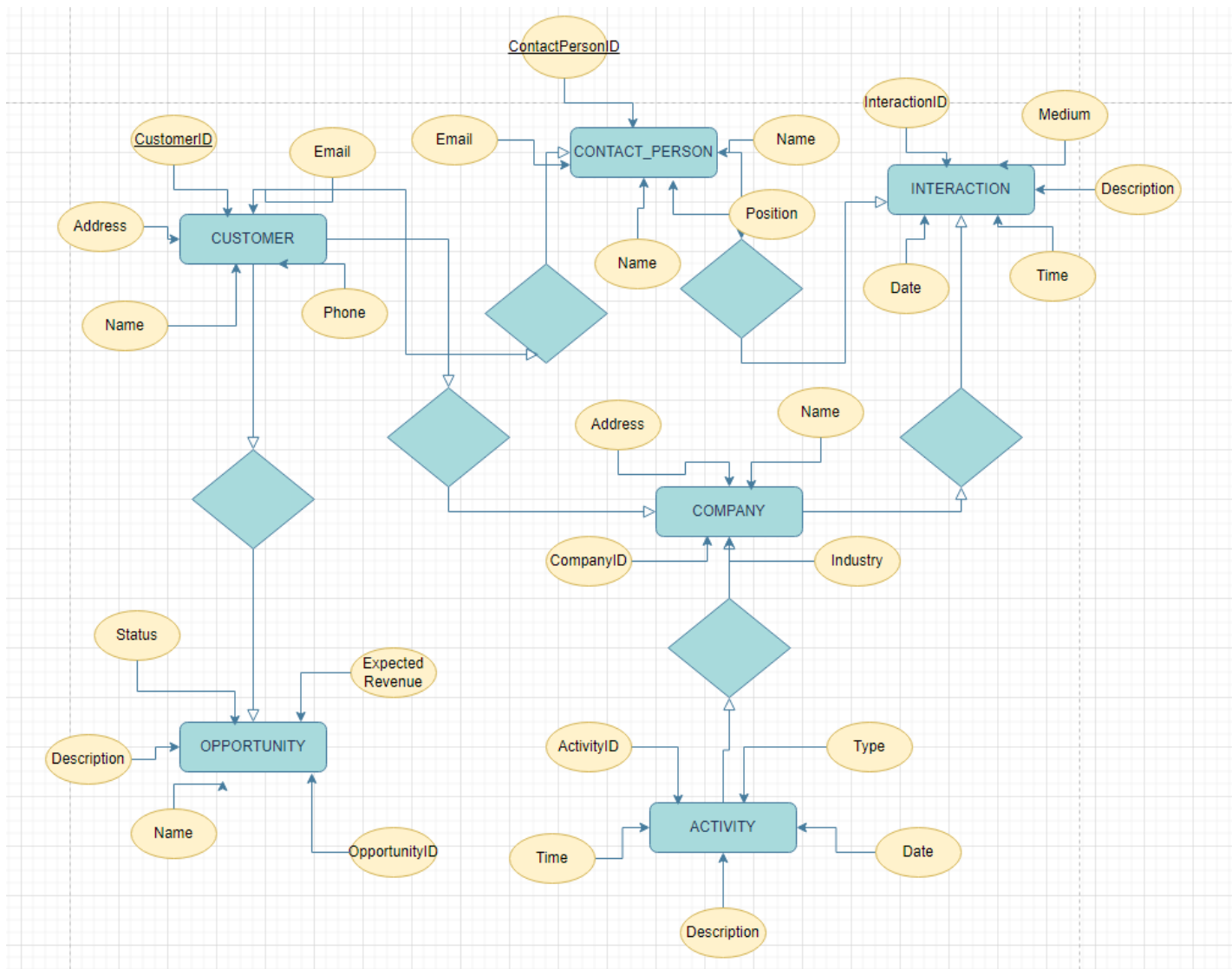
5. ContactPerson-Interaction Relationship:

One-to-Many relationship: A contact person can be associated with multiple interactions, but an interaction is associated with only one contact person.

6. Company-Interaction Relationship:

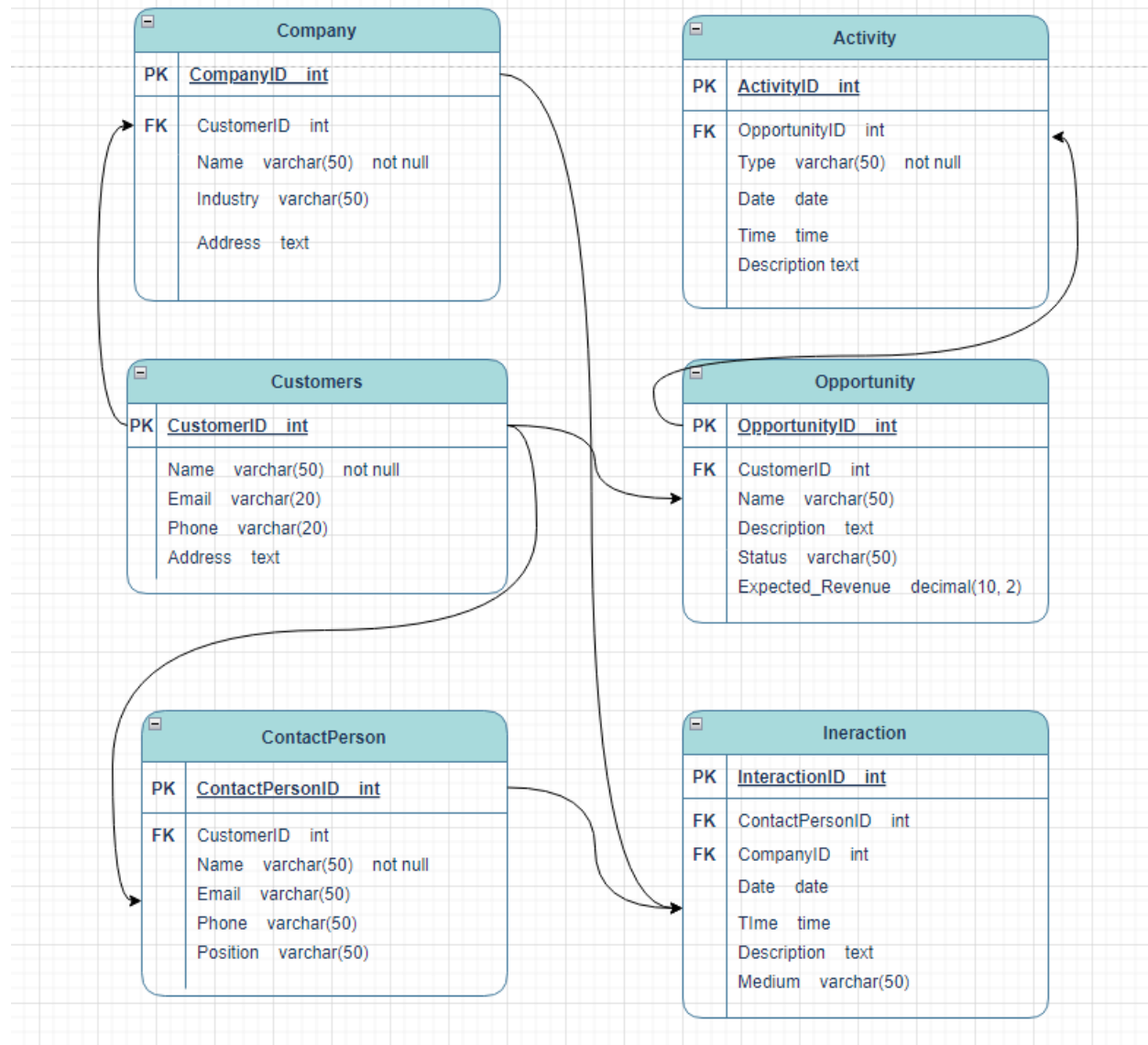
One-to-Many relationship: A company can have multiple interactions, but an interaction is associated with only one company.

ENTITY-RELATIONSHIP DIAGRAM:



SCHEMA DIAGRAM:

CUSTOMER RELATIONSHIP MANAGEMENT (CRM):



CREATING DATABASE, TABLES AND THEIR RELATIONS USING MS SQL SERVER:

CUSTOMER TABLE:

```

create table Customer (
CustomerID int Primary Key,
Name varchar(50) not null,
Email varchar(50),
Phone varchar(50),
Address varchar(50)
)
  
```

COMPANY TABLE:

```
create table Company (
CompanyID int Primary Key,
Name varchar(50) not null,
Industry varchar(50),
Address varchar(50),
CustomerID int,
foreign key (CustomerID) references Customer(CustomerID)
)
```

ACTIVITY TABLE:

```
create table Activity (
ActivityID int Primary Key,
Type varchar(20) not null,
Date date,
Time time,
Description text,
OpportunityID int,
foreign key (OpportunityID) references Opportunity(OpportunityID)
)
```

OPPORTUNITY TABLE:

```
create table Opportunity (
OpportunityID int Primary Key,
Name varchar(50) not null,
Description text,
Status varchar(50),
Expected_Revenue decimal(15, 2),
CustomerID int,
foreign key (CustomerID) references Customer(CustomerID)
)
```

CONTACT PERSON TABLE:

```
create table ContactPerson (
ContactPersonID int Primary Key,
Name varchar(50) not null,
Email varchar(50),
Phone varchar(50),
Position varchar(50),
CustomerID int,
foreign key (CustomerID) references Customer(CustomerID)
)
```

INTERACTION TABLE:

```
create table Interaction (
InteractionID int Primary Key,
Date date,
Time time,
Description text,
Medium varchar(50),
ContactPersonID int,
CompanyID int,
foreign key (ContactPersonID) references ContactPerson(ContactPersonID),
foreign key (CompanyID) references Company(CompanyID)
)
```

INSERTING DATA:

FOR CUSTOMER TABLE:

```
INSERT INTO Customer (CustomerID, Name, Email, Phone, Address) VALUES
(1, 'John Alex', 'john@example.com', '123 456 7890', '123 Main Street'),
(2, 'Jane Smith', 'jane@example.com', '987-654-3210', '456 Maple Drive'),
(3, 'Alice Johnson', 'alice@example.com', '983-554-7450', '836 Elm Avenue'),
(4, 'Bob Williams', 'bob@example.com', '457-564-0485', '732 Oak Street'),
(5, 'Claire Davis', 'claire@example.com', '031-674-7473', '346 Pine Street'),
(6, 'David Smith', 'david@example.com', '743-943-9483', '343 Cedar Road'),
(7, 'Emily Taylor', 'emily@example.com', '251-653-0463', '335 Birch Lane'),
(8, 'Frank Miller', 'frank@example.com', '625-864-9573', '854 Willow Avenue'),
(9, 'Grace Turner', 'grace@example.com', '241-752-8324', '357 Aspen Lane'),
(10, 'Isabella Martinez', 'isabella@example.com', '987-654-3210', '256 Cedar Avenue')
```

FOR COMPANY TABLE:

```
INSERT INTO Company (CompanyID, Name, Industry, Address, CustomerID) VALUES
(1, 'ABC Corp', 'Technology', '789 Tech Blvd', 3),
(2, 'XYZ Ltd', 'Finance', '321 Finance Ave', 4),
(3, 'Tech Innovators', 'Technology', '456 Innovation St', 10),
(4, 'Global Finance Group', 'Finance', '789 Financial Square', 8),
(5, 'Data Solutions Inc.', 'IT Services', '123 Data Lane', 1),
(6, 'Green Energy Ltd', 'Renewable Energy', '567 Eco Park', 6),
(7, 'HealthCare Systems', 'Healthcare', '890 Medical Avenue', 9),
(8, 'Infinite Innovations', 'Technology', '234 Tech Park', 4),
(9, 'Finance Dynamics', 'Finance', '678 Money Street', 7),
(10, 'SmartTech Solutions', 'Technology', '345 Innovation Road', 3);
```

FOR CONTACT PERSON TABLE:

```
INSERT INTO ContactPerson (ContactPersonID, Name, Email, Phone, Position, CustomerID)
VALUES
(1, 'Alice Johnson', 'alice@company.com', '555-1234', 'Manager', 4),
(2, 'Bob Williams', 'bob@corporation.com', '555-5678', 'Director', 7),
(3, 'Charlie Davis', 'charlie@techinnovators.com', '555-9876', 'Lead Engineer', null),
(4, 'Diana Miller', 'diana@globalfinance.com', '555-4321', 'Financial Analyst', 4),
(5, 'Ethan Smith', 'ethan@datasolutions.com', '555-8765', 'IT Manager', 9),
(6, 'Fiona Brown', 'fiona@greenenergy.com', '555-5432', 'Environmental Specialist',
null),
(7, 'George Turner', 'george@healthcare.com', '555-2109', 'Medical Director', 1),
(8, 'Holly White', 'holly@infiniteinnovations.com', '555-6789', 'Research Scientist', 6),
(9, 'Ian Martinez', 'ian@financedynamics.com', '555-3456', 'Financial Planner', 3),
(10, 'Jasmine Anderson', 'jasmine@smarttechsolutions.com', '555-7890', 'Technology
Consultant', 7);
```

FOR OPPORTUNITY TABLE:

```
INSERT INTO Opportunity (OpportunityID, Name, Description, Status, Expected_Revenue,
CustomerID) VALUES
(1, 'Project A', 'New project opportunity', 'Open', 100000, 2),
(2, 'Expansion Plan', 'Market expansion opportunity', 'Pending', 150000, null),
(3, 'Product Launch', 'Launching a new product line', 'Open', 120000, 5),
(4, 'Global Partnerships', 'Exploring international partnerships', 'Pending', 200000, 1),
(5, 'IT System Upgrade', 'Upgrading company-wide IT systems', 'Closed', 80000, null),
(6, 'Sustainable Initiatives', 'Implementing eco-friendly practices', 'Open', 180000, 6),
(7, 'Healthcare Expansion', 'Expanding healthcare services', 'Pending', 250000, 1),
(8, 'Innovation Research', 'Conducting research on new innovations', 'Open', 160000, 3),
(9, 'Financial Advisory Services', 'Providing financial advisory services', 'Closed',
90000, null),
```

```
(10, 'Technology Integration', 'Integrating new technologies', 'Pending', 220000, 5);
```

FOR ACTIVITY TABLE:

```
INSERT INTO Activity (ActivityID, Type, Date, Time, Description, OpportunityID) VALUES
(1, 'Meeting', '2024-01-10', '14:00:00', 'Discuss project details', 1),
(2, 'Call', '2024-01-11', '10:30:00', 'Follow-up on expansion plan', 4),
(3, 'Presentation', '2024-01-12', '15:30:00', 'Presenting new product features', null),
(4, 'Meeting', '2024-01-13', '11:00:00', 'Discussing global partnerships strategy', 4),
(5, 'Training Session', '2024-01-14', '09:00:00', 'Training employees on new IT systems', 2),
(6, 'Workshop', '2024-01-15', '14:30:00', 'Workshop on sustainable practices', null),
(7, 'Conference Call', '2024-01-16', '10:45:00', 'Healthcare expansion planning', 7),
(8, 'Research Meeting', '2024-01-17', '13:00:00', 'Discussing innovation research findings', 8),
(9, 'Advisory Session', '2024-01-18', '12:15:00', 'Financial advisory session', 1),
(10, 'Tech Demo', '2024-01-19', '16:00:00', 'Demonstrating new technology integration', 9);
```

FOR INTERACTION TABLE:

```
INSERT INTO Interaction (InteractionID, Date, Time, Description, Medium, ContactPersonID, CompanyID) VALUES
(1, '2024-01-10', '15:30:00', 'Discussion with Alice', 'Email', 1, NULL),
(2, '2024-01-11', '11:45:00', 'Meeting with Bob', 'Phone', NULL, 9),
(3, '2024-01-12', '14:00:00', 'Email exchange with Charlie', 'Email', 3, 8),
(4, '2024-01-13', '10:30:00', 'Phone call with Diana', 'Phone', NULL, 4),
(5, '2024-01-14', '09:15:00', 'Meeting with Ethan', 'Meeting', 5, NULL),
(6, '2024-01-15', '15:45:00', 'Discussion on eco-friendly practices with Fiona', 'Email', 4, 10),
(7, '2024-01-16', '11:30:00', 'Conference call with George', 'Phone', 1, 6),
(8, '2024-01-17', '12:45:00', 'Email communication with Holly', 'Email', 8, NULL),
(9, '2024-01-18', '14:30:00', 'Meeting with Ian', 'Meeting', 9, 3),
(10, '2024-01-19', '16:30:00', 'Phone call with Jasmine', 'Phone', NULL, 5);
```

QUERY TESTING:

```
SELECT * FROM Customer
```

```
SELECT * FROM Company
```

```
SELECT * FROM Opportunity
```

```
SELECT * FROM ContactPerson
```

```
SELECT * FROM Activity
```

```
SELECT * FROM Interaction
```

```
UPDATE CUSTOMER
```

```
SET Phone = '876-249-1035'
```

```
WHERE CustomerID = 3
```

```
UPDATE Interaction
```

```
SET Medium = 'Meeting'
```

```
WHERE InteractionID = 8
```



```
UPDATE Opportunity
SET Status = 'Closed'
WHERE OpportunityID = 3
```

```
UPDATE Company
SET Address = '423 Data Lane'
WHERE CompanyID = 5
```

DATA VALIDATION:

```
select *
from Opportunity
where CustomerID is not null and CustomerID not in (select CustomerID from Customer)
```

```
select *
from Activity
where OpportunityID is not null and OpportunityID not in (select OpportunityID from Opportunity)
```

```
select *
from Company
where CustomerID is not null and CustomerID not in (select CustomerID from Customer)
```

INDEXING:

```
create index idx_CustomerID on Customer(CustomerID)
select * from Customer
```

```
create index idx_Status on Opportunity(Status)
select * from Opportunity
```

```
create index idx_Date on Activity(date)
select * from Activity
```

KEY ACHEIVEMENTS:

1. Entity-Relationship Model: The initial design phase yielded a comprehensive entity-relationship model, capturing the core entities such as Customer, Company, ContactPerson, Opportunity, Activity, and Interaction, along with their relationships. This model served as the blueprint for the subsequent database development.
2. Schema Implementation: The actualization of the schema in SQL Server demonstrated careful consideration of data types, constraints, and relationships. Tables were created with attention to normalization principles, ensuring data integrity and reducing redundancy.
3. Data Insertion and Query Testing: The insertion of data into the CRM database was executed successfully, providing a diverse set of records for testing and validation. A

series of test queries verified the system's ability to retrieve, update, and delete data effectively.

4. Orphan Record Checks: Implementation of checks for orphan records safeguarded data integrity, preventing instances where foreign key relationships were violated. This meticulous approach enhances the reliability of the CRM system.
5. Indexing and Query Optimization: Strategic indexing was employed to optimize query performance. The project considered the balance between read and write operations, enhancing the system's responsiveness without compromising data modification efficiency.

CONCLUSION:

The CRM database project has successfully translated the conceptual CRM idea into a functional and efficient system. By aligning with best practices in database design and SQL Server implementation, the CRM system is poised to contribute significantly to the organization's customer relationship management strategies and operational excellence. The iterative nature of database development ensures adaptability to evolving business requirements and sets the stage for continuous improvement in the realm of customer relationship management.