**SQL Index**

IF OBJECT\_ID('OrderDetails', 'U') IS NOT NULL DROP TABLE OrderDetails;

IF OBJECT\_ID('Orders', 'U') IS NOT NULL DROP TABLE Orders;

IF OBJECT\_ID('Products', 'U') IS NOT NULL DROP TABLE Products;

IF OBJECT\_ID('Customers', 'U') IS NOT NULL DROP TABLE Customers;

Step 1: Create Tables

CREATE TABLE Customers (

CustomerID INT PRIMARY KEY,

Name VARCHAR(100),

Region VARCHAR(50)

);

CREATE TABLE Products (

ProductID INT PRIMARY KEY,

ProductName VARCHAR(100),

Category VARCHAR(50),

Price DECIMAL(10, 2)

);

CREATE TABLE Orders (

OrderID INT PRIMARY KEY,

CustomerID INT,

OrderDate DATE,

FOREIGN KEY (CustomerID) REFERENCES Customers(CustomerID)

);

CREATE TABLE OrderDetails (

OrderDetailID INT PRIMARY KEY,

OrderID INT,

ProductID INT,

Quantity INT,

FOREIGN KEY (OrderID) REFERENCES Orders(OrderID),

FOREIGN KEY (ProductID) REFERENCES Products(ProductID)

);

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-- Step 2: Insert Sample Data

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INSERT INTO Customers (CustomerID, Name, Region) VALUES

(1, 'Alice', 'North'),

(2, 'Bob', 'South'),

(3, 'Charlie', 'East'),

(4, 'David', 'West');

INSERT INTO Products (ProductID, ProductName, Category, Price) VALUES

(1, 'Laptop', 'Electronics', 1200.00),

(2, 'Smartphone', 'Electronics', 800.00),

(3, 'Tablet', 'Electronics', 600.00),

(4, 'Headphones', 'Accessories', 150.00);

INSERT INTO Orders (OrderID, CustomerID, OrderDate) VALUES

(1, 1, '2023-01-15'),

(2, 2, '2023-02-20'),

(3, 3, '2023-03-25'),

(4, 4, '2023-04-30');

INSERT INTO OrderDetails (OrderDetailID, OrderID, ProductID, Quantity) VALUES

(1, 1, 1, 1),

(2, 2, 2, 2),

(3, 3, 3, 1),

(4, 4, 4, 3);

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-- Exercise 1: Non-Clustered Index on ProductName

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-- Step 1: Query before index

SELECT \* FROM Products WHERE ProductName = 'Laptop';

-- Step 2: Create non-clustered index

CREATE NONCLUSTERED INDEX IX\_Products\_ProductName

ON Products(ProductName);

-- Step 3: Query after index

SELECT \* FROM Products WHERE ProductName = 'Laptop';

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-- Exercise 2: Non-Clustered Index on OrderDate

-- (Clustered index already exists on PK)

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-- Step 1: Query before index

SELECT \* FROM Orders WHERE OrderDate = '2023-01-15';

-- Step 2: Create non-clustered index (safe alternative)

CREATE NONCLUSTERED INDEX IX\_Orders\_OrderDate

ON Orders(OrderDate);

-- Step 3: Query after index

SELECT \* FROM Orders WHERE OrderDate = '2023-01-15';

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-- Exercise 3: Composite Index on CustomerID + OrderDate

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-- Step 1: Query before index

SELECT \* FROM Orders WHERE CustomerID = 1 AND OrderDate = '2023-01-15';

-- Step 2: Create composite non-clustered index

CREATE NONCLUSTERED INDEX IX\_Orders\_CustomerID\_OrderDate

ON Orders(CustomerID, OrderDate);

-- Step 3: Query after index

SELECT \* FROM Orders WHERE CustomerID = 1 AND OrderDate = '2023-01-15';

