-- Database Schema

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)

);

-- Sample Data

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);

-- Exercise 1: Creating a Non-Clustered Index

-- Goal: Create a non-clustered index on the ProductName column in the Products table and compare query execution time before and after index creation.

-- Step 1: Query to fetch product details before index creation

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

-- Step 2: Create a non-clustered index on ProductName

-- Step 2: Create a non-clustered index

CREATE NONCLUSTERED INDEX idx\_ProductName ON Products(ProductName);

-- Step 3: Query to fetch product details after index creation

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

-- Exercise 2: Creating a Clustered Index

-- Goal: Create a clustered index on the OrderDate column in the Orders table and compare query execution time before and after index creation.

-- Step 1: Query to fetch orders before index creation

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

-- Step 2: Create a clustered index on OrderDate

ALTER TABLE Orders DROP CONSTRAINT [PK\_\_Orders\_\_1b504b34df31b70281f2];

CREATE CLUSTERED INDEX idx\_OrderDate ON Orders(OrderDate);

-- Step 3: Query to fetch orders after index creation

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

-- Exercise 3: Creating a Composite Index

-- Goal: Create a composite index on the CustomerID and OrderDate columns in the Orders table and compare query execution time before and after index creation.

-- Step 1: Query to fetch orders before index creation

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

-- Step 2: Create a composite index on CustomerID and OrderDate

CREATE NONCLUSTERED INDEX idx\_Customer\_OrderDate

ON Orders(CustomerID, OrderDate);

-- Step 3: Query to fetch orders after index creation

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