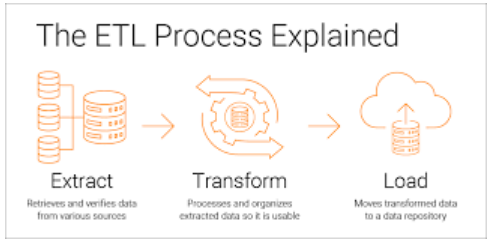
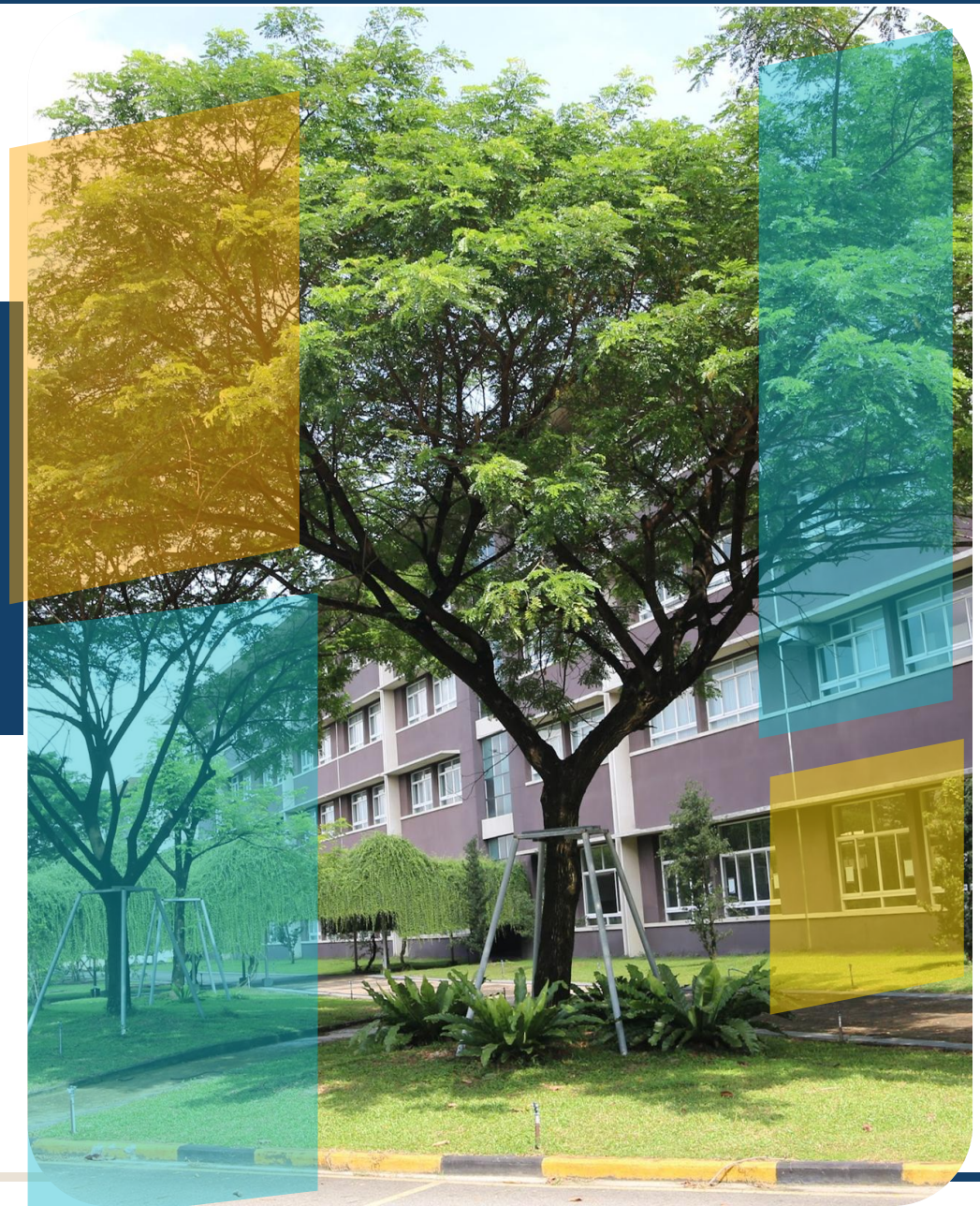
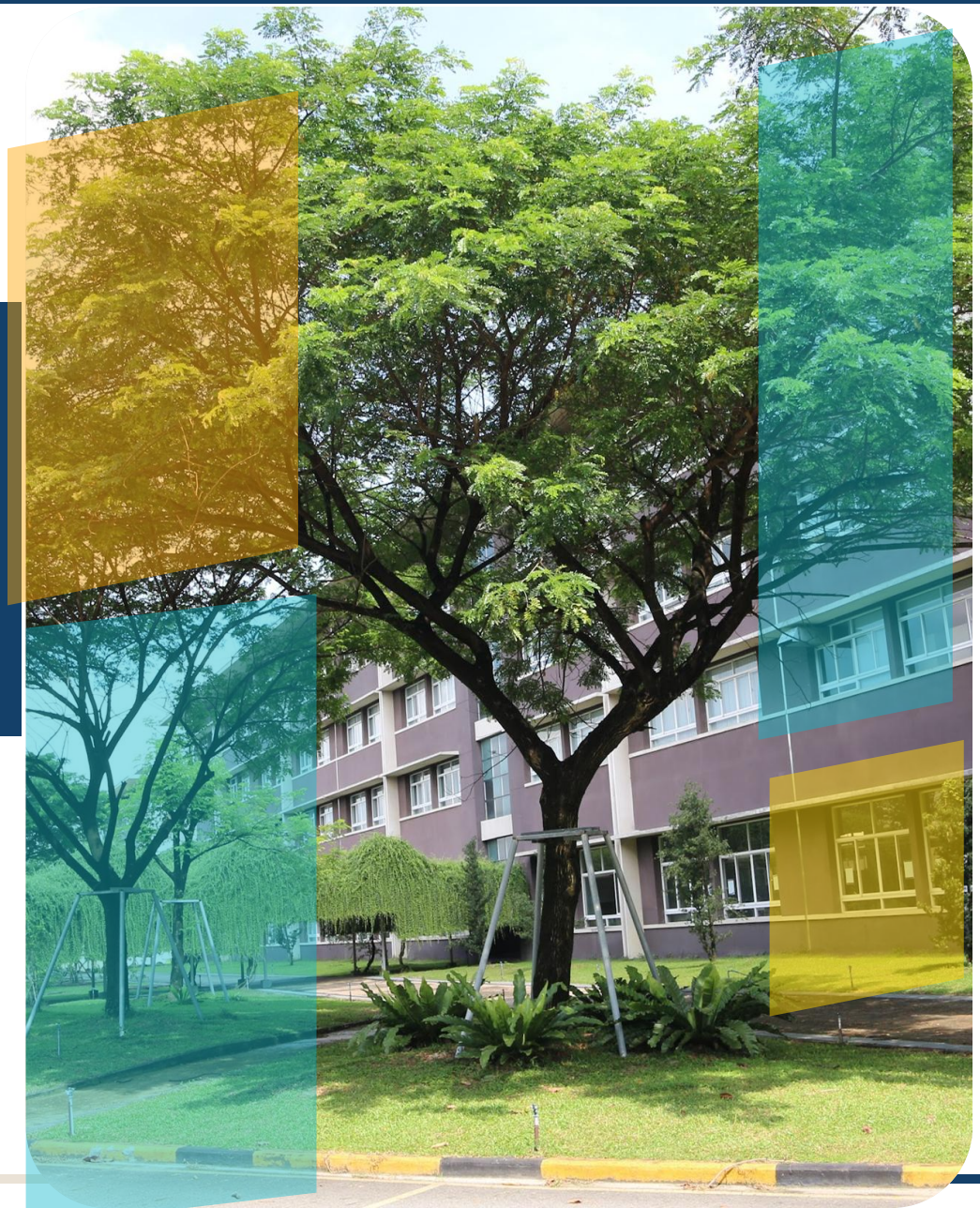
MIS 443: Business Data Management

Microsoft SQL Server ⟷ PostgreSQL





Week 9 - Revision Create Insert and check database use PGAdmin



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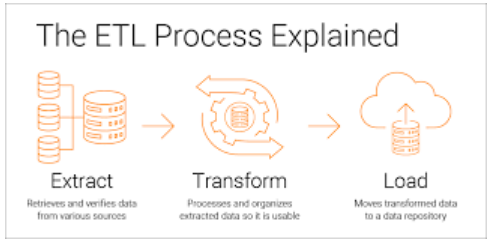


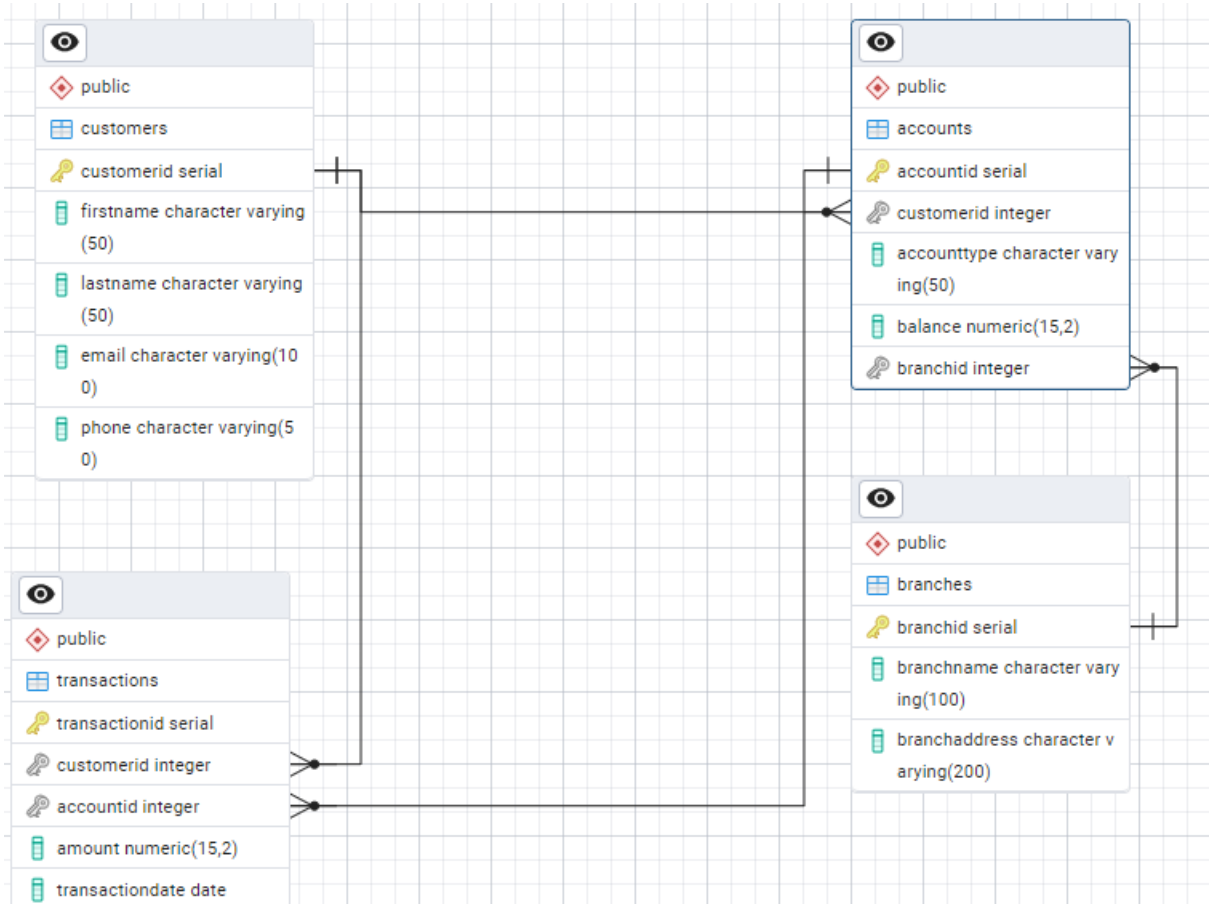
Objective

- Revision create database, tables
- Import data use SQL and PGAdmin
- Check data and ER
- Practice DML

Scenario

- Use SQL statements to create a database named “BankingDB” and the four tables described below with appropriate data types and constraints.
- Ensure each table includes at least one primary key and the Transactions table includes foreign keys that reference the Customers and Accounts tables.
  - Customers: Contains information about customers.
  - Accounts: Contains details of the bank accounts.
  - Transactions: Records each transaction made by the customers linking to the Customers and Accounts tables.
  - Branches: Lists the branches of the bank.

Scenario

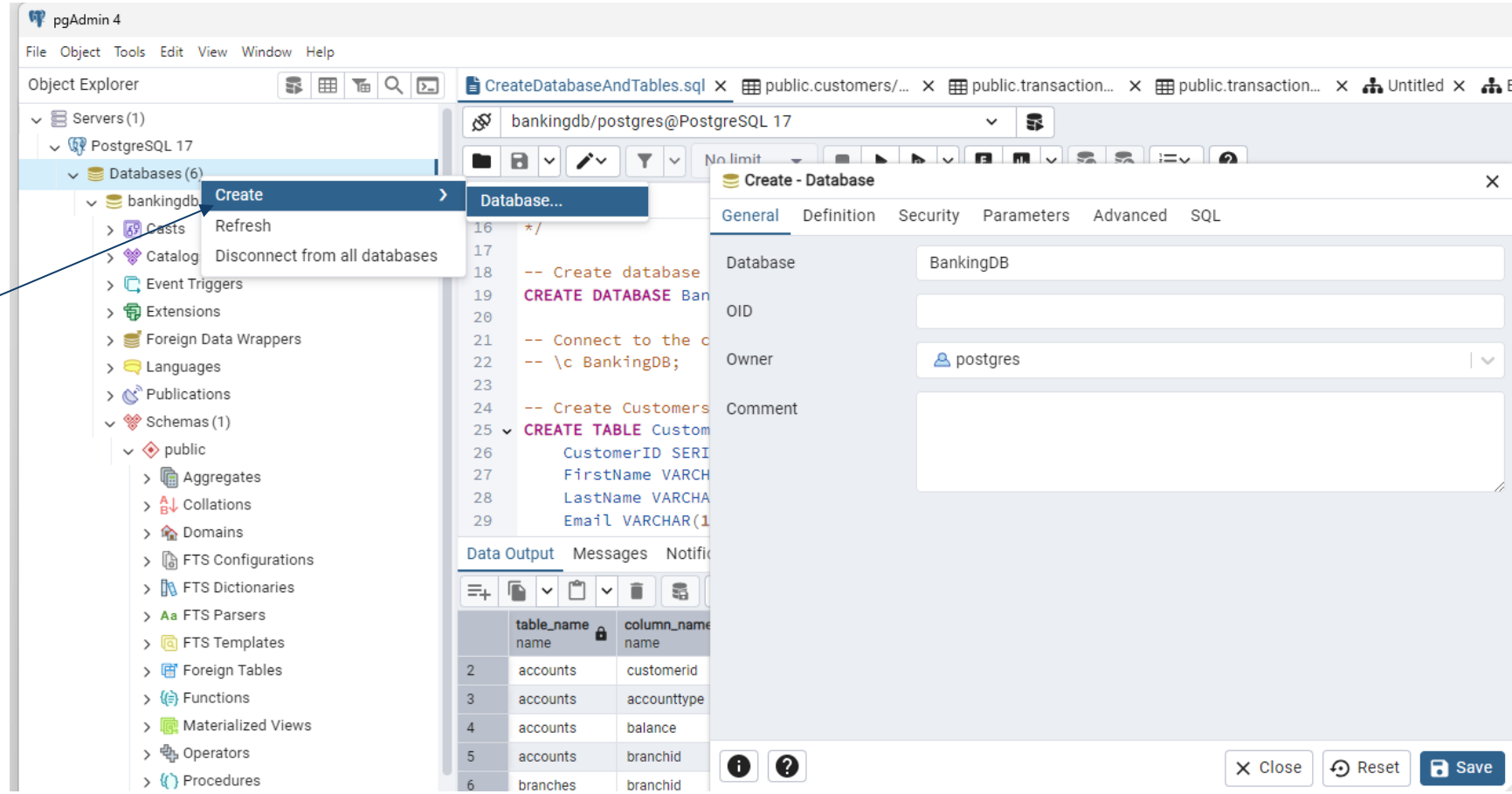

public
customers
customerid serial
firstname character varying (50)
lastname character varying (50)
email character varying(100)
phone character varying(50)
public
accounts
accountid serial
customerid integer
accounttype character varying(50)
balance numeric(15,2)
branchid integer
public
transactions
transactionid serial
customerid integer
accountid integer
amount numeric(15,2)
transactiondate date
public
branches
branchid serial
branchname character varying(100)
branchaddress character varying(200)

Create Database

- Use SQL

```
-- Create database
CREATE DATABASE BankingDB;
```

- Use pgAdmin GUI (Righ Click on Database → Create → …



Create Tables

- Remember SQL command will difference when use difference platform

PostgreSQL

```sql
-- Create Customers table
CREATE TABLE Customers (
    CustomerID SERIAL PRIMARY KEY,
    FirstName VARCHAR(50),
    LastName VARCHAR(50),
    Email VARCHAR(100),
    Phone VARCHAR(50)
);

-- Create Branches table
CREATE TABLE Branches (
    BranchID SERIAL PRIMARY KEY,
    BranchName VARCHAR(100),
    BranchAddress VARCHAR(200)
);
```

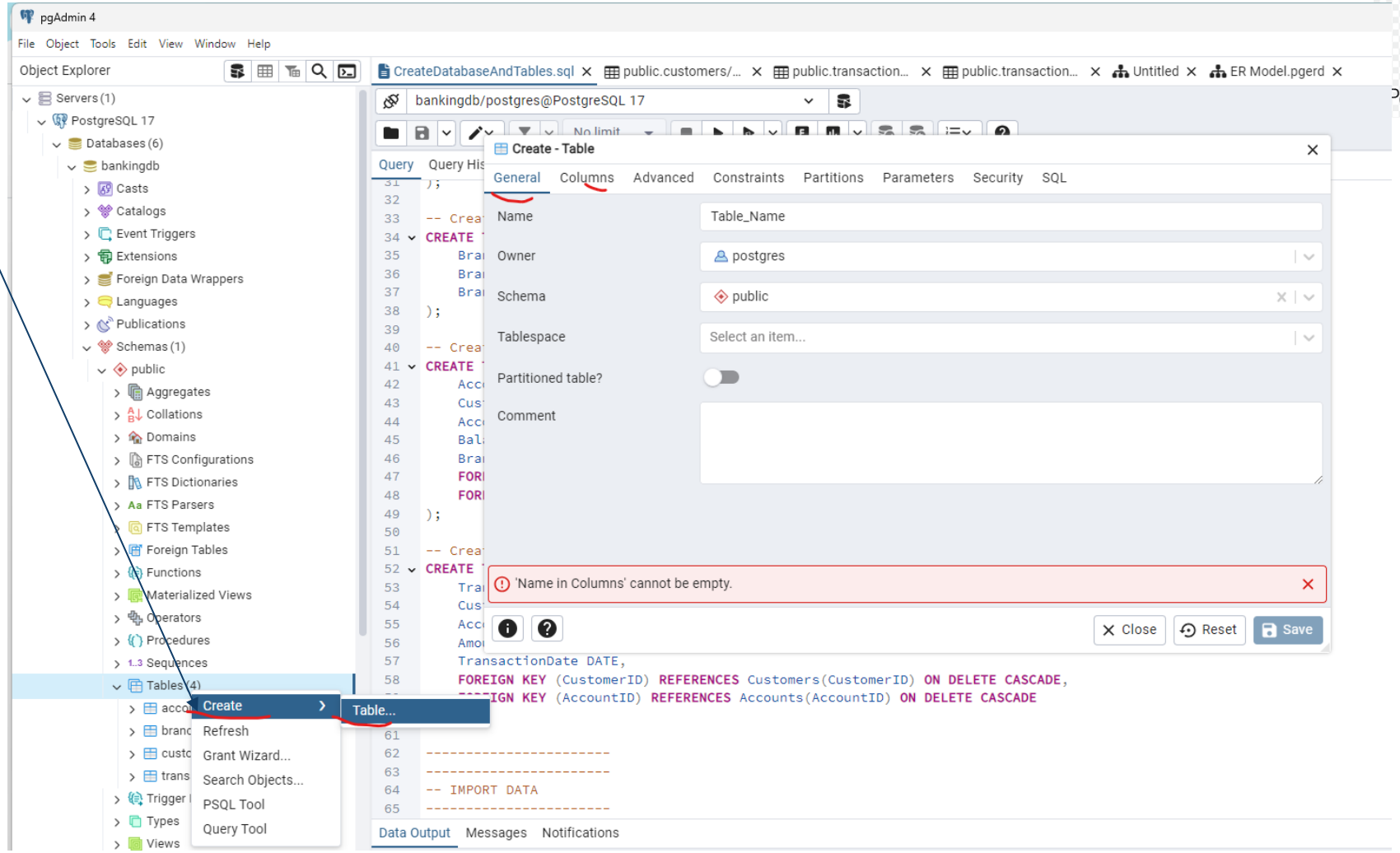
```sql
-- Create Accounts table
CREATE TABLE Accounts (
    AccountID SERIAL PRIMARY KEY,
    CustomerID INT,
    AccountType VARCHAR(50),
    Balance DECIMAL(15, 2),
    BranchID INT,
    FOREIGN KEY (CustomerID) REFERENCES Customers(CustomerID) ON DELETE CASCADE,
    FOREIGN KEY (BranchID) REFERENCES Branches(BranchID) ON DELETE SET NULL
);

-- Create Transactions table
CREATE TABLE Transactions (
    TransactionID SERIAL PRIMARY KEY,
    CustomerID INT,
    AccountID INT,
    Amount DECIMAL(15, 2),
    TransactionDate DATE,
    FOREIGN KEY (CustomerID) REFERENCES Customers(CustomerID) ON DELETE CASCADE,
    FOREIGN KEY (AccountID) REFERENCES Accounts(AccountID) ON DELETE CASCADE
);
```

Create table with primary key first

Create Tables

- Use pgAdmin

Not recommend



Check tables and attributes

```
-- Check tables and attributes
SELECT table_name, column_name, data_type
FROM information_schema.columns
WHERE table_schema = 'public'
ORDER BY table_name, ordinal_position;
```

```
97   -- Check tables and attributes
98   SELECT table_name, column_name, data_ty
99   FROM information_schema.columns
100  WHERE table_schema = 'public'
101  ORDER BY table_name, ordinal_position;
102
```

Data Output Messages Notifications

	table_name name	column_name name	data_type character varying
2	accounts	customerid	integer
3	accounts	accounttype	character varying
4	accounts	balance	numeric
5	accounts	branchid	integer
6	branches	branchid	integer
7	branches	branchname	character varying
8	branches	branchaddress	character varying
9	customers	customerid	integer
10	customers	firstname	character varying
11	customers	lastname	character varying
12	customers	email	character varying
13	customers	phone	character varying
14	transactions	transactionid	integer
15	transactions	customerid	integer
16	transactions	accountid	integer
17	transactions	amount	numeric
18	transactions	transactiondate	date

Import data into Tables

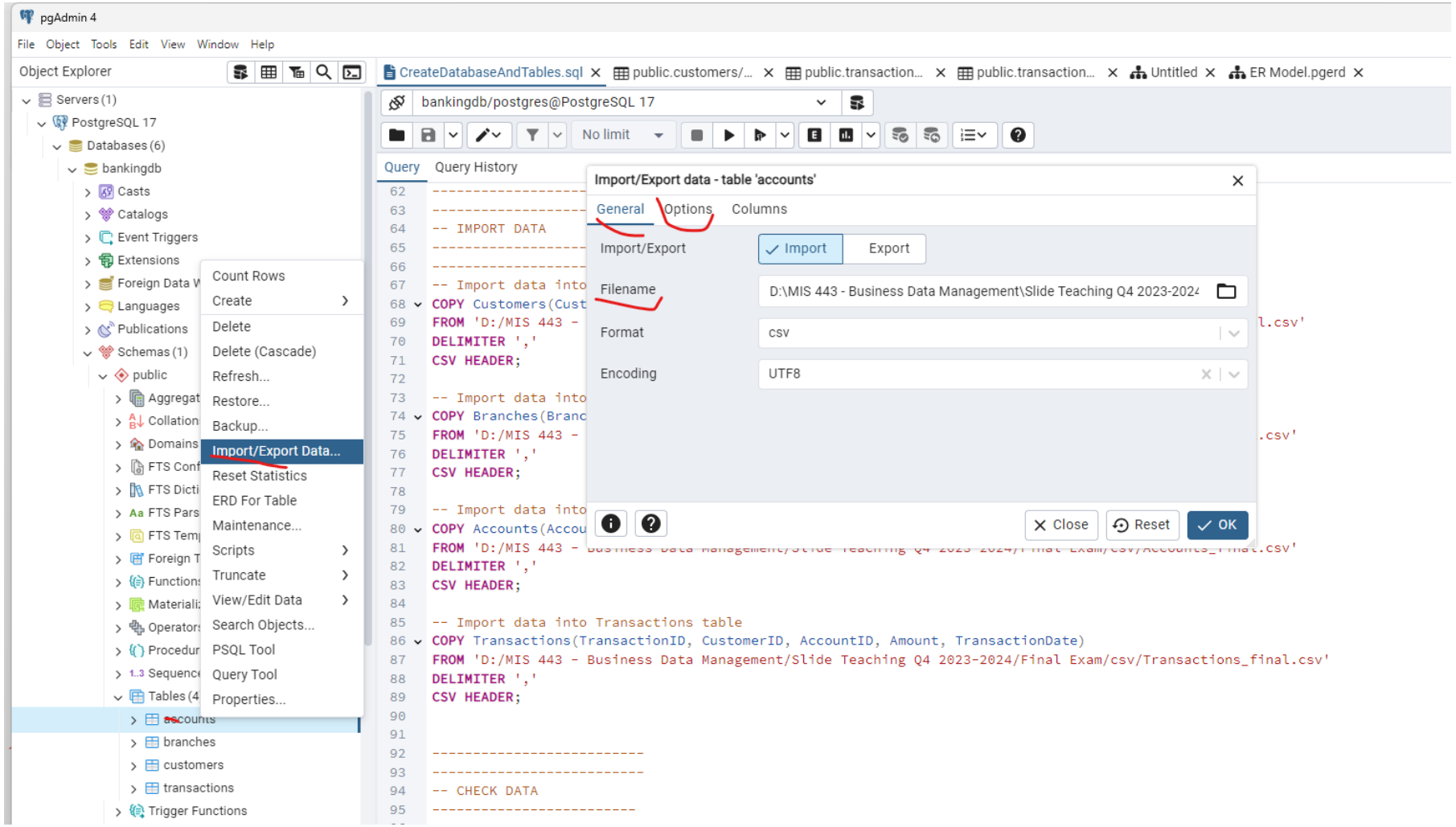
- Use SQL

```sql
-- Import data into Customers table
COPY Customers(CustomerID, FirstName, LastName, Email, Phone)
FROM 'D:/MIS 443 - Business Data Management/Slide Teaching Q4 2023-2024/Final Exam/csv/Customers_final.csv'
DELIMITER ','
CSV HEADER;                    -- REPLACE WITH YOUR FILE PATH

-- Import data into Branches table
COPY Branches(BranchID, BranchName, BranchAddress)
FROM 'D:/MIS 443 - Business Data Management/Slide Teaching Q4 2023-2024/Final Exam/csv/Branches_final.csv'
DELIMITER ','
CSV HEADER;

-- Import data into Accounts table
COPY Accounts(AccountID, CustomerID, AccountType, Balance, BranchID)
FROM 'D:/MIS 443 - Business Data Management/Slide Teaching Q4 2023-2024/Final Exam/csv/Accounts_final.csv'
DELIMITER ','
CSV HEADER;

-- Import data into Transactions table
COPY Transactions(TransactionID, CustomerID, AccountID, Amount, TransactionDate)
FROM 'D:/MIS 443 - Business Data Management/Slide Teaching Q4 2023-2024/Final Exam/csv/Transactions_final.csv'
DELIMITER ','
CSV HEADER;
```

Import data into Tables

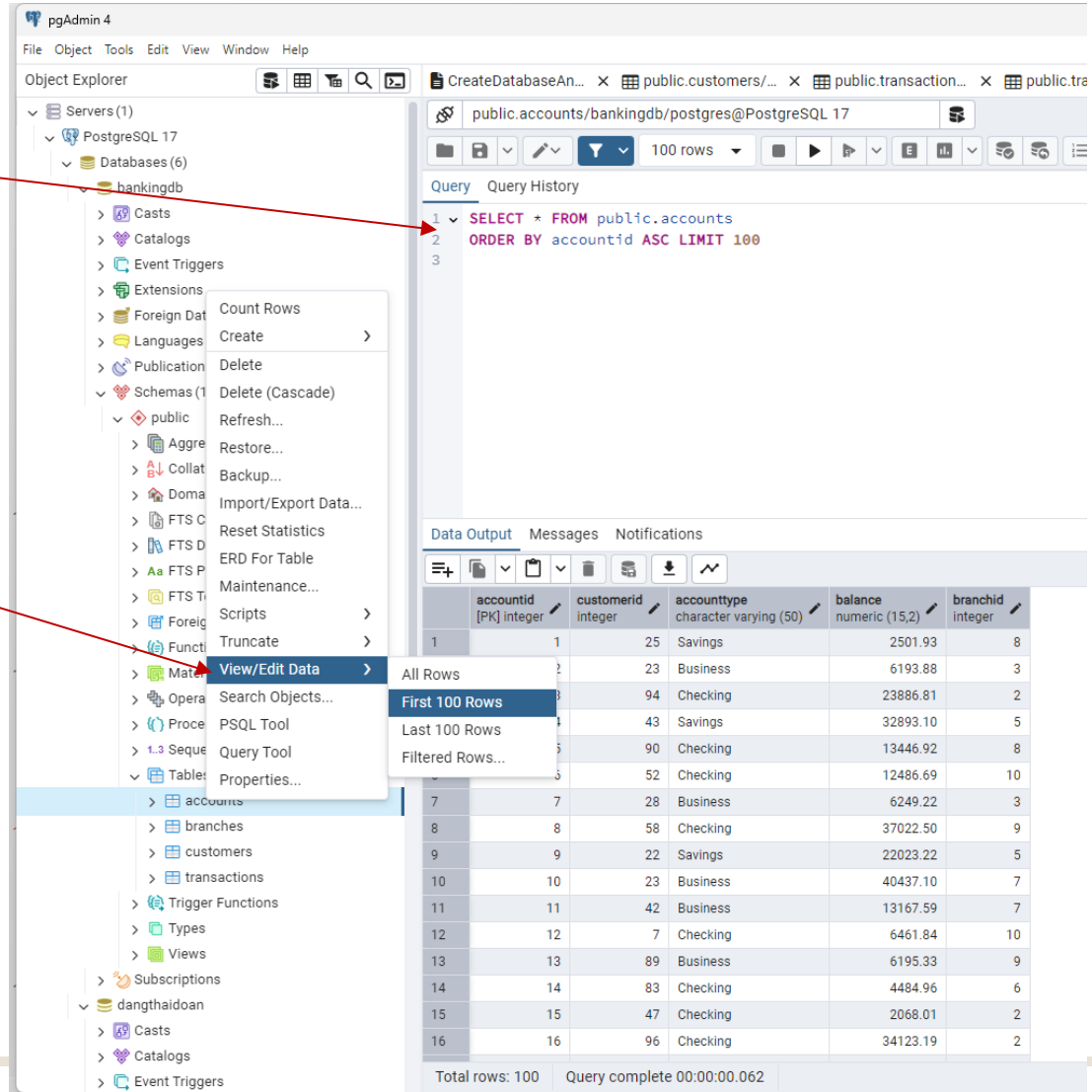
- Use pgAdmin

Not recommend

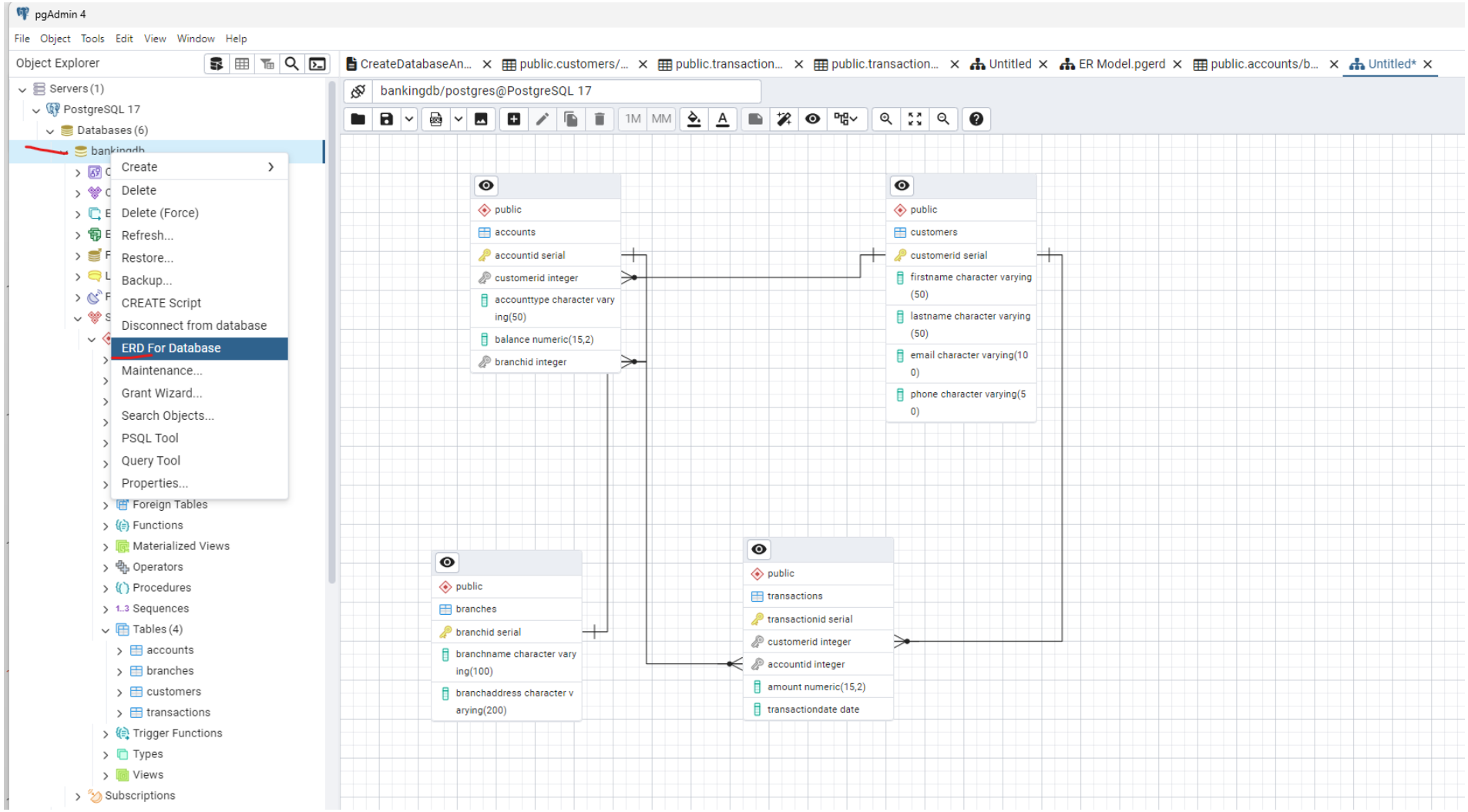


Always check data after import

- Use SQL
- Use GUI

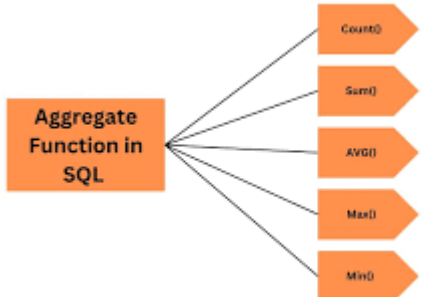


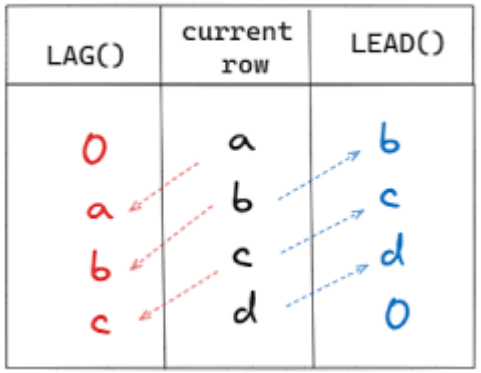
Check Diagram and Relationship

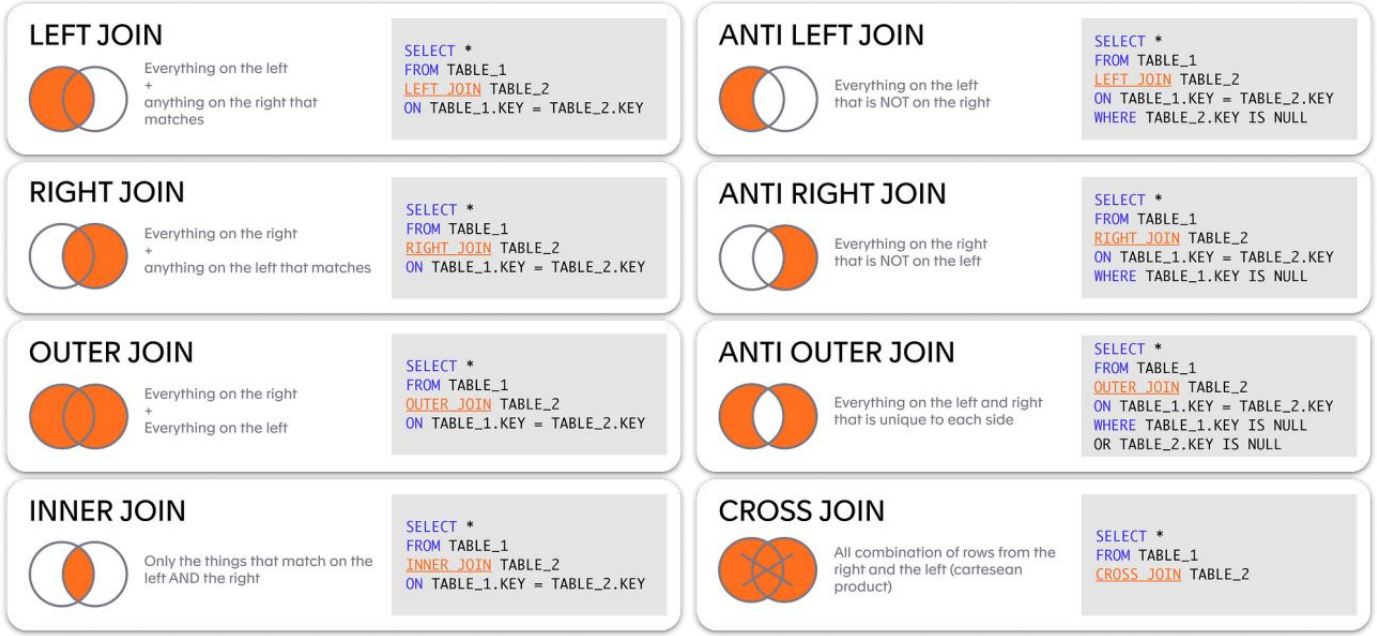


Order	Element
5	SELECT
1	FROM
2	WHERE
3	GROUP BY
4	HAVING
6	ORDER BY

Now We Are Ready For Retrieve Data







Question 1

Question 1 (10 marks): Create a database named BankingDB and the four tables: Customers, Accounts, Transactions, and Branches using SQL statements. Ensure each table includes appropriate primary and foreign keys, and data types. Submit the SQL script as part of your answer.

```sql
SELECT table_name, column_name, data_type
FROM information_schema.columns
WHERE table_schema = 'public'
ORDER BY table_name, ordinal_position;
```

Question 2

- Question 2 (10 marks): List all transactions that occurred in the year 2024 displaying the TransactionID, CustomerID, AccountID, and TransactionDate. Arrange the results by TransactionDate in ascending order.

```
SELECT TransactionID, CustomerID, AccountID, TransactionDate
FROM Transactions
WHERE EXTRACT(YEAR FROM TransactionDate) = 2024
ORDER BY TransactionDate ASC;
```

Question 3

- Question 3 (20 marks): Calculate the total number of transactions made by each customer. Show the customer's ID, name, and their total number of transactions. Display the top 5 customers with the highest number of transactions. Order the results by the total number of transactions in descending order.

```sql
SELECT Customers.CustomerID, Customers.FirstName, Customers.LastName, COUNT(Transactions.TransactionID) AS TotalTransactions
FROM Customers
JOIN Transactions ON Customers.CustomerID = Transactions.CustomerID
GROUP BY Customers.CustomerID, Customers.FirstName, Customers.LastName
ORDER BY TotalTransactions DESC
LIMIT 5;
```

Question 4

- Question 4 (20 marks): Display of the top 5 customers who made the most recent transactions. Include the customer's ID, name, and the date of their most recent transaction. For customers who haven't made any transactions, their last transaction date should be shown as NULL. Order the list by the date of the last transaction in descending order.
- *Notes: Using a Common Table Expression (CTE)*

```sql
-- Get top 5 customers with the latest transactions
SELECT Customers.CustomerID, Customers.FirstName, Customers.LastName, MAX(Transactions.TransactionDate) AS LastTransactionDate
FROM Customers
LEFT JOIN Transactions ON Customers.CustomerID = Transactions.CustomerID
GROUP BY Customers.CustomerID, Customers.FirstName, Customers.LastName
ORDER BY LastTransactionDate DESC
LIMIT 5;

-- Using a Common Table Expression (CTE) to get the latest transaction date per customer
WITH LatestTransaction AS (
    SELECT CustomerID, MAX(TransactionDate) AS LastTransactionDate
    FROM Transactions
    GROUP BY CustomerID
)
SELECT c.CustomerID, c.FirstName, c.LastName, lt.LastTransactionDate
FROM Customers c
LEFT JOIN LatestTransaction lt ON c.CustomerID = lt.CustomerID
ORDER BY lt.LastTransactionDate DESC
LIMIT 5;
```

Question 5

- Question 5 (20 marks): List each transaction, including the customer's ID, name, account type, amount, and the transaction date. Order the results by transaction date in descending order.

```
SELECT Customers.FirstName, Customers.LastName, Accounts.AccountType, Transactions.Amount, Transactions.TransactionDate
FROM Transactions
JOIN Customers ON Transactions.CustomerID = Customers.CustomerID
JOIN Accounts ON Transactions.AccountID = Accounts.AccountID
ORDER BY Transactions.TransactionDate DESC;
```

Question 6

- Question 6 (20 marks): Rank the branches based on the total amount of transactions handled. Display the branch name, total transaction amount, and its rank. Branches with the same transaction amount should share the same rank.

```sql
SELECT Branches.BranchName, SUM(Transactions.Amount) AS TotalTransactionAmount,
    RANK() OVER (ORDER BY SUM(Transactions.Amount) DESC) AS Ranking
FROM Transactions
JOIN Accounts ON Transactions.AccountID = Accounts.AccountID
JOIN Branches ON Accounts.BranchID = Branches.BranchID
GROUP BY Branches.BranchID, Branches.BranchName
ORDER BY TotalTransactionAmount DESC;
```


Thank You!


Thanks
for your
time