

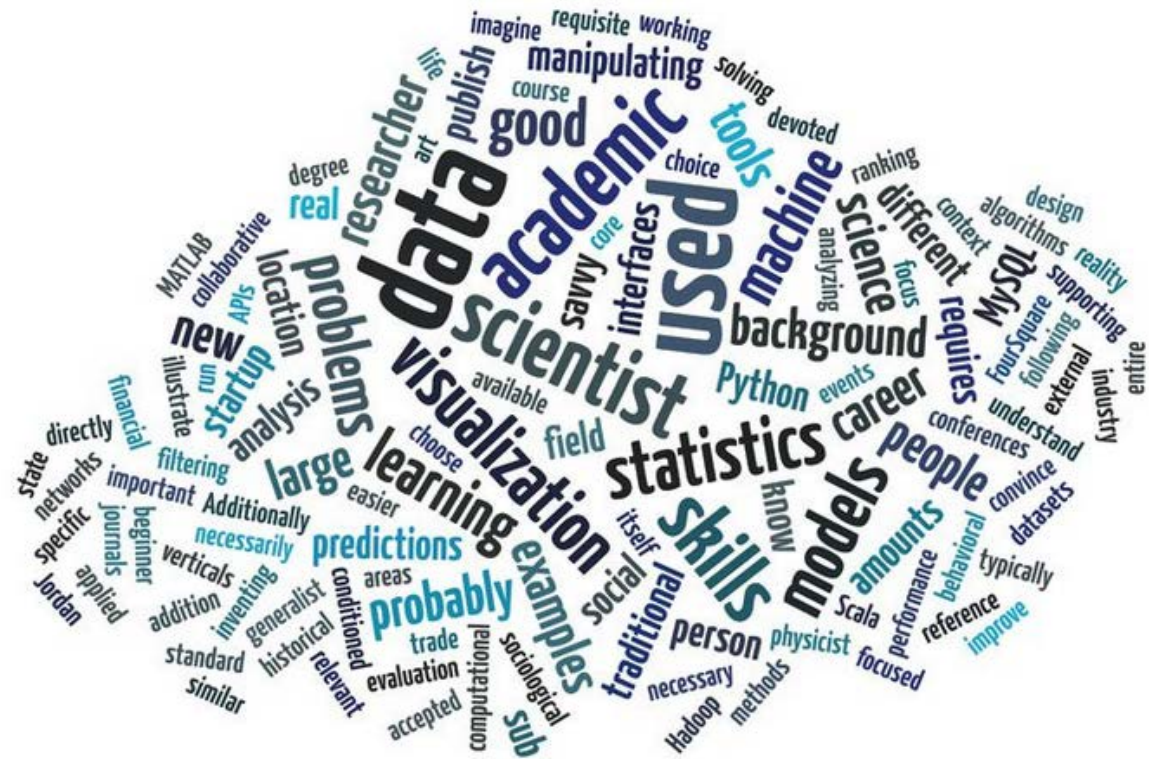


# Introduction to Databases

- Data
- Information
- Database Types
  - Relational
  - Hierarchical
- Database Objects
- ERD
- SQL Server
- T-SQL
- SQL Server Management Studio

# What is Data?

- Data is a collection of facts in a raw or unorganized form



# What is Information?

- Information is data that is specific and organized for a purpose
- Data presented within a context gives it meaning and relevance
- This leads to an increase in understanding and decrease in uncertainty





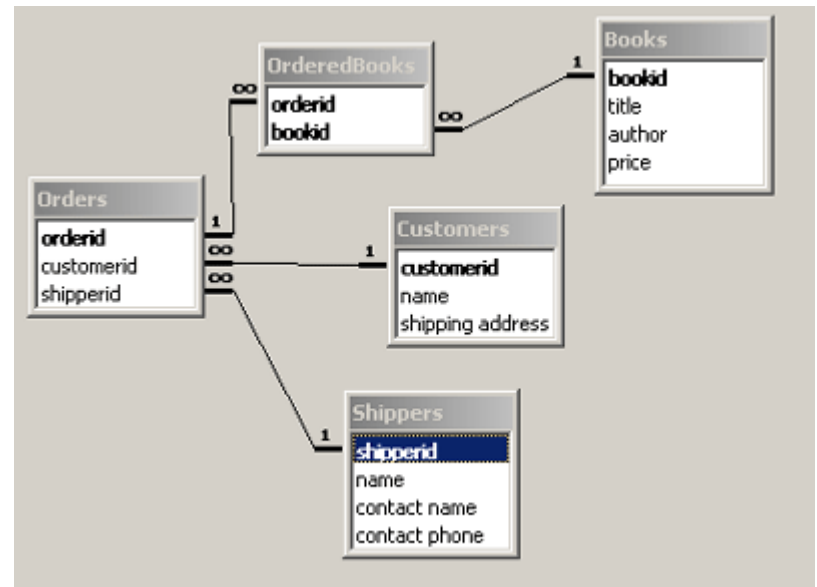
# What is a Database?

- A database is an organized or structured repository of data that allows for the easy retrieval, update and analysis of information
- Databases are usually organized as a group of linked data files (aka tables)



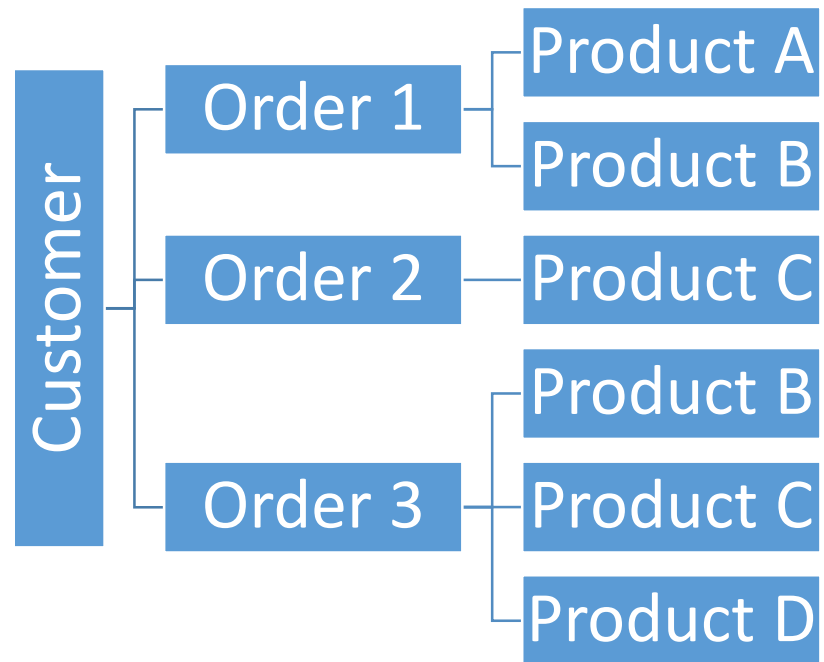
# What is a Relational Database?

- A relational database is a collection of data items organized as a set of formally-described tables
- Data can be accessed or reassembled in many different ways without having to reorganize the database tables.
- The relational database was invented by E. F. Codd at IBM in 1970.



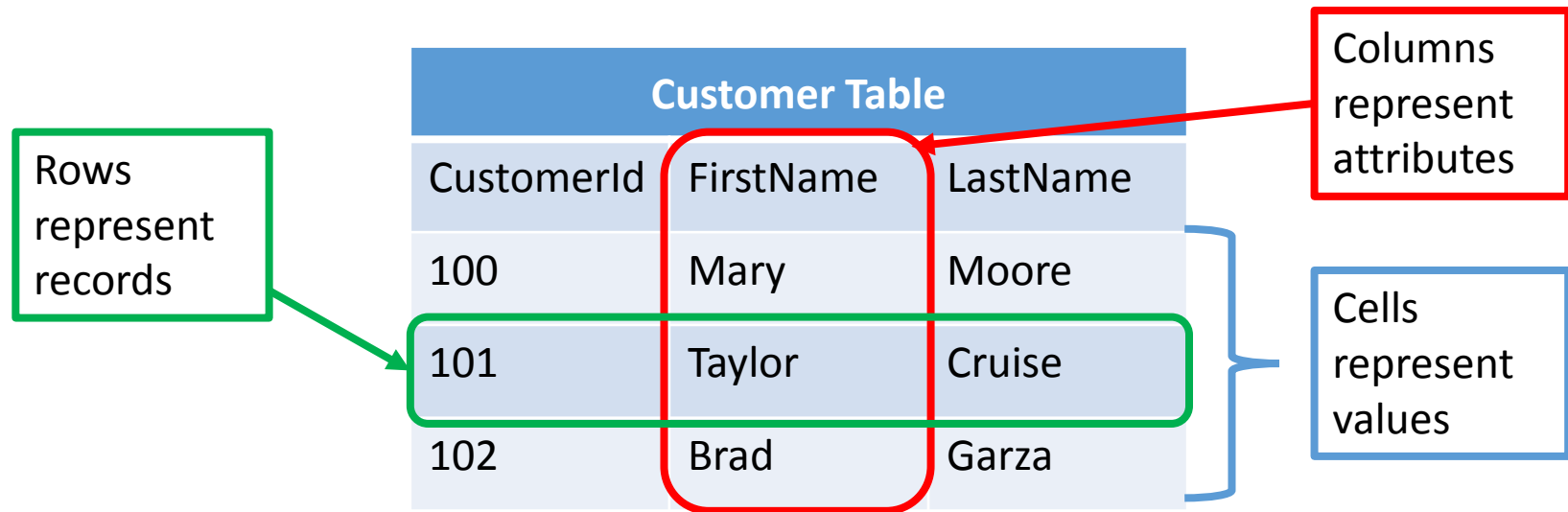
# What is a Hierarchical Database?

- Organizes data with multiple one to many relationships.
- One parent can have many children but children are allowed only one parent.
- Pros
  - Faster to query against
- Cons
  - Duplicate data
  - Cannot represent many to many relations in a single database



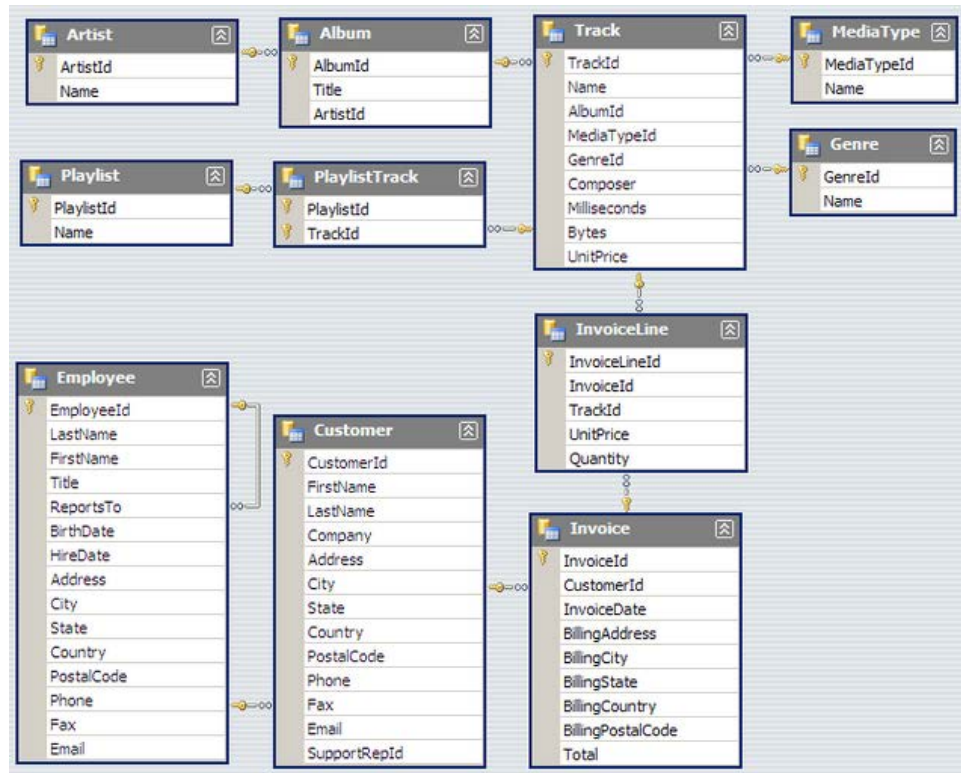
# What is a Table?

- Tables are where data is stored in a database
- All tables have columns and may have zero or more rows
- Data can be read or “queried” from a table using a SELECT statement
- Data can also be inserted, updated and deleted from a table



# What is an Entity Relationship Diagram (ERD)?

- An ERD is a visual diagram that shows the relationships between tables in a database
- An ERD helps identify where data is stored and how it relates to other data

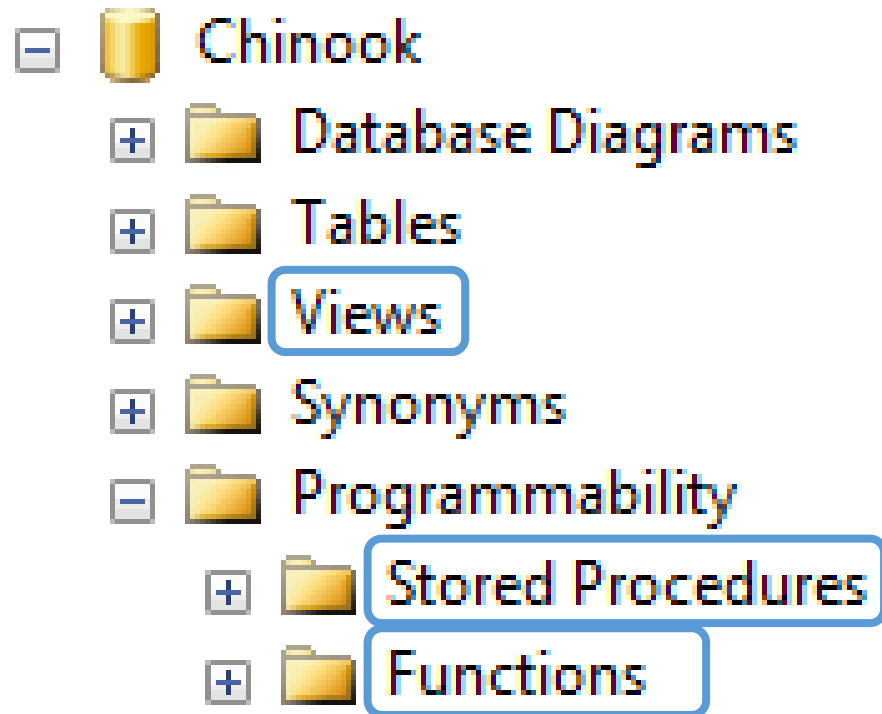






# Other Database Objects

- Views
  - Act like tables
  - Can reference data from multiple sources
- Stored Procedures
  - Container for SQL code
  - Multiple complex statements can be contained in a single stored procedure
- User Defined Functions
  - Snippets of reusable code





# What is SQL Server?

- SQL Server is Microsoft's name for their database server product
- There are several versions of SQL Server available from SQL Server Express which is used for desktops, to SQL Server Enterprise which is used by large corporations
- The difference between versions lies primarily in the amount of CPU and Memory available for use, as well as special abilities available only in the Enterprise version



# What is T-SQL?

- Stands for Transact-Structured Query Language
- Is Microsoft's version of the SQL language
- T-SQL conforms to the ANSI (American National Standards Institute) compliance standards for SQL
- Has additional some additional functionality unique to T-SQL

```
SELECT DISTINCT
    Country, State
    ,CASE
        WHEN Country IN('Brazil','Argentina','Chile') THEN 'South America'
        WHEN Country = 'USA' THEN
            CASE
                WHEN State IN ('CA','NV','WA') THEN 'USA-West'
                WHEN State IN ('MA','NY') THEN 'USA-Northeast'
                WHEN State IN ('TX','AZ') THEN 'USA-Southwest'
                ELSE 'USA-Other'
            END
        WHEN Country IN('Canada') THEN 'North America'
        WHEN Country = 'India' THEN 'Asia'
        WHEN Country = 'Australia' THEN Country
        ELSE 'Europe'
    END Region
FROM Customer
ORDER BY
    Country DESC, Region, State
```

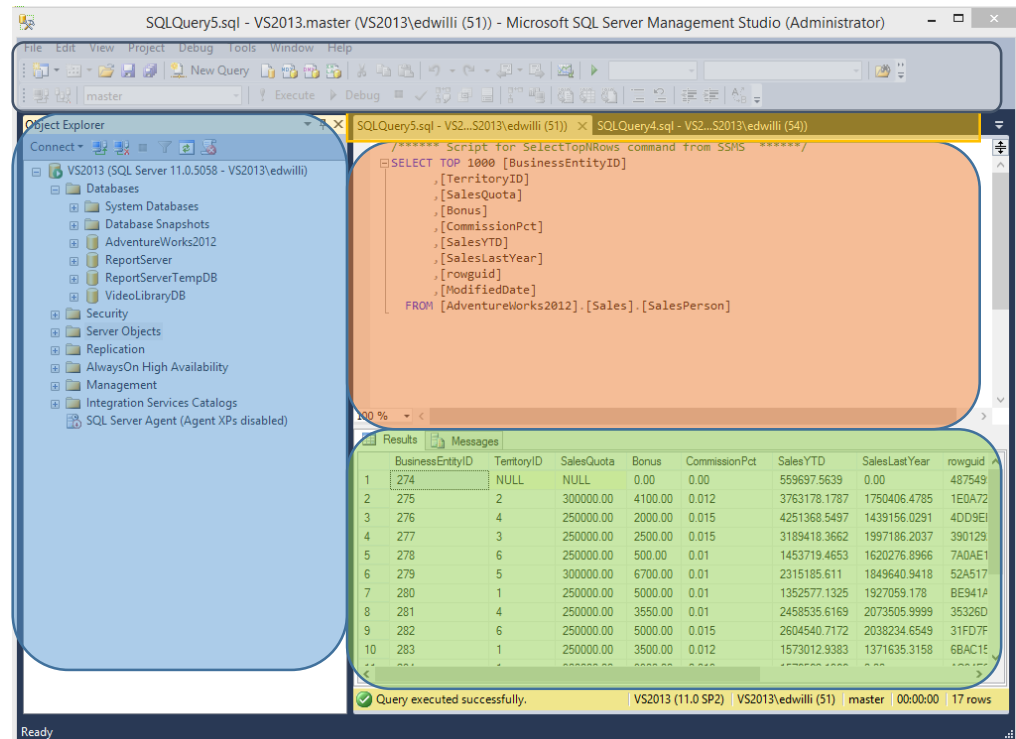
# SQL Server Management Studio (SSMS)

- SQL Server Management studio (SSMS) is a client tool used for connecting to your SQL Servers
- You can connect to a local server on your desktop or to a remote server.
- SSMS is a free download from Microsoft.



# SQL Server Management Studio Layout

- Management Studio screen is divided into various menus, windows and tabs
  - Menu bar
    - Across the top in grey
  - Object Explorer
    - Left side in blue
  - Query window
    - Tabs
      - Top yellow
    - Editor Window
      - Middle orange
    - Result Window
      - Bottom green



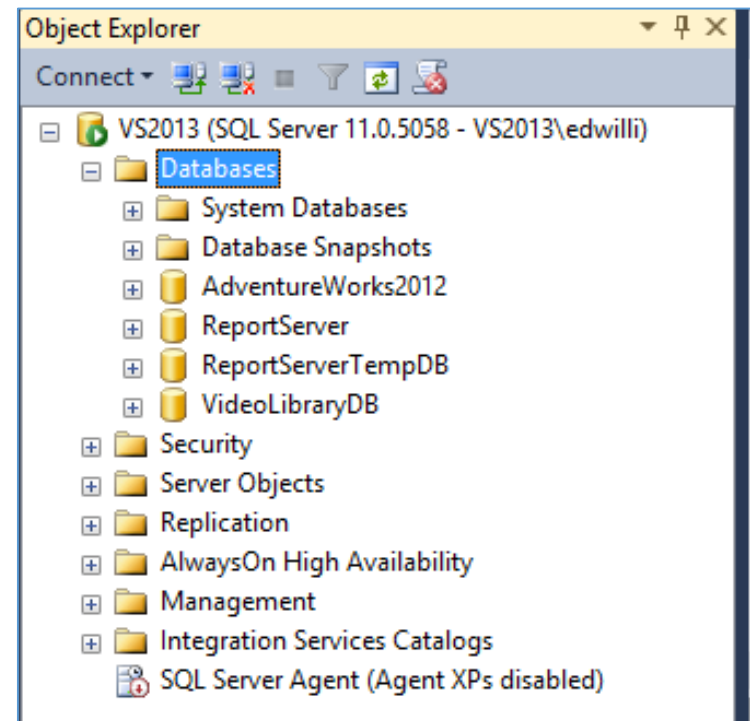
# Management Studio Menu Bar



- The menu bar contains buttons and menus for interacting with your database and SQL scripts
- Hovering over a button will activate a tool tip showing the button description and its keyboard shortcut (if it has one)
- NOTE: Several buttons on the menu are for administrative features we won't be discussing in this course

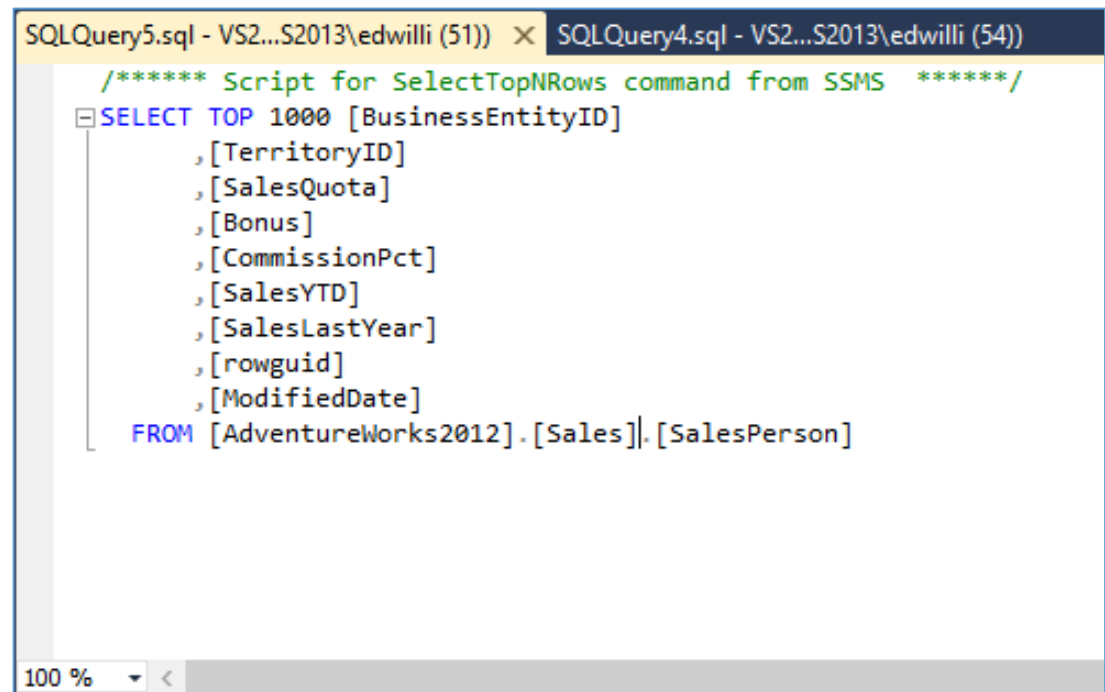
# Management Studio Object Explorer

- The Object Explorer displays the objects present in your SQL Server
- Clicking the plus sign will expand the display to show child objects contained within the parent object
- Right clicking on an object will display a menu relative to interacting with that object
- It is possible to connect to more than one SQL Server within Management Studio by clicking on the “Connect” button



# Management Studio Editor Window

- SQL you want to execute is typed or copied into this window
- Clicking the “Execute” button on the menu bar, or pressing F5 executes the script
- Tabs are displayed directly above the editor window

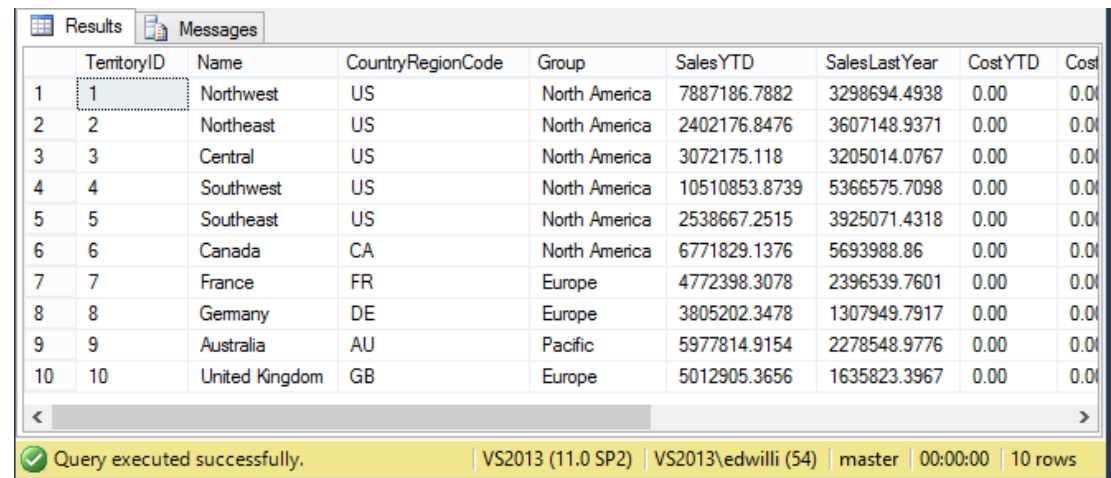


```
/* Script for SelectTopNRows command from SSMS */
SELECT TOP 1000 [BusinessEntityID]
, [TerritoryID]
, [SalesQuota]
, [Bonus]
, [CommissionPct]
, [SalesYTD]
, [SalesLastYear]
, [rowguid]
, [ModifiedDate]
FROM [AdventureWorks2012].[Sales].[SalesPerson]
```



# Management Studio Results Window

- Results of the SQL script execution (if any) are displayed here
- A text view is available in addition to the grid view
- The lower right corner displays information about the session
  - The user who executed the script
  - The database it ran on
  - Time it took to complete
  - Number of rows returned



The screenshot shows the 'Results' tab of the SQL Server Enterprise Manager. It displays a grid view of query results with 10 rows and 8 columns. The columns are: TerritoryID, Name, CountryRegionCode, Group, SalesYTD, SalesLastYear, CostYTD, and Cost. The rows represent different territories: Northwest, Northeast, Central, Southwest, Southeast, Canada, France, Germany, Australia, and United Kingdom. The status bar at the bottom indicates that the query was executed successfully, showing the server name 'VS2013 (11.0 SP2)', the user 'VS2013\edwilli (54)', the database 'master', the execution time '00:00:00', and the number of rows returned '10 rows'.

	TerritoryID	Name	CountryRegionCode	Group	SalesYTD	SalesLastYear	CostYTD	Cost
1	1	Northwest	US	North America	7887186.7882	3298694.4938	0.00	0.00
2	2	Northeast	US	North America	2402176.8476	3607148.9371	0.00	0.00
3	3	Central	US	North America	3072175.118	3205014.0767	0.00	0.00
4	4	Southwest	US	North America	10510853.8739	5366575.7098	0.00	0.00
5	5	Southeast	US	North America	2538667.2515	3925071.4318	0.00	0.00
6	6	Canada	CA	North America	6771829.1376	5693988.86	0.00	0.00
7	7	France	FR	Europe	4772398.3078	2396539.7601	0.00	0.00
8	8	Germany	DE	Europe	3805202.3478	1307949.7917	0.00	0.00
9	9	Australia	AU	Pacific	5977814.9154	2278548.9776	0.00	0.00
10	10	United Kingdom	GB	Europe	5012905.3656	1635823.3967	0.00	0.00

Query executed successfully. VS2013 (11.0 SP2) VS2013\edwilli (54) master 00:00:00 10 rows



# Summary

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