10.01 SQL I
10.02 SQL II

What is SQL?

- SQL stands for Structured Query Language
- SQL lets you access and manipulate databases
- SQL became a standard of the American National Standards Institute (ANSI) in 1986, and of the International Organization for Standardization (ISO) in 1987

What can SQL do?

- Execute queries against a database
- Retrieve data from a database
- Insert records in a database
- Update records in a database
- Delete records from a database
- Create new databases
- Create new tables in a database
- Create stored procedures in a database
- Create views in a database
- Set permissions on tables, procedures, and views

SQL is available in different versions

- Although SQL is an ANSI/ISO standard, there are different versions of the SQL language

- However, to be compliant with the ANSI standard, they all **support at least the major commands (such as SELECT, UPDATE, DELETE, INSERT, WHERE) in a similar manner**

- *Note: Most of the SQL database programs also have their own proprietary extensions in addition to the SQL standard*

SQL is available in different versions

Google BigQuery

Amazon RDS

Using SQL in Your Website / Applications

- To build a web site that shows data from a database, you will need:
  - An RDBMS database program (i.e. MS Access, SQL Server, MySQL)
  - To use a server-side scripting language, like PHP or Python
  - To use SQL to get the data you want
  - To use HTML / CSS to style the page

RDBMS

- RDBMS stands for Relational Database Management System.
- RDBMS is the basis for SQL, and for all modern database systems such as MS SQL Server, IBM DB2, Oracle, MySQL, and Microsoft Access.
- The data in RDBMS is stored in database objects called tables. A table is a collection of related data entries and it consists of columns and rows.

Database Tables

- A database most often contains one or more tables. Each table is identified by a name (e.g. "Customers" or "Orders"). Tables contain records (rows) with data.

- Below is a selection from the "Customers" table:

CustomerID	CustomerName	ContactName	Address	City	PostalCode	Country
1	Alfreds Futterkiste	Maria Anders	Obere Str. 57	Berlin	12209	Germany
2	Ana Trujillo Emparedados y helados	Ana Trujillo	Avda. de la Constitución 2222	México D.F.	05021	Mexico
3	Antonio Moreno Taquería	Antonio Moreno	Mataderos 2312	México D.F.	05023	Mexico
4	Around the Horn	Thomas Hardy	120 Hanover Sq.	London	WA1 1DP	UK
5	Berglunds snabbköp	Christina Berglund	Berguvsvägen 8	Luleå	S-958 22	Sweden

SQL Statements

- Most of the actions you need to perform on a database are done with SQL statements.

- The following SQL statement selects all the records in the "Customers" table:

  - *SELECT * FROM Customers;*

Sample Query – **SELECT * FROM Customers;**

CustomerID	CustomerName	ContactName	Address	City	PostalCode	Country
1	Alfreds Futterkiste	Maria Anders	Obere Str. 57	Berlin	12209	Germany
2	Ana Trujillo Emparedados y helados	Ana Trujillo	Avda. de la Constitución 2222	México D.F.	05021	Mexico
3	Antonio Moreno Taquería	Antonio Moreno	Mataderos 2312	México D.F.	05023	Mexico
4	Around the Horn	Thomas Hardy	120 Hanover Sq.	London	WA1 1DP	UK
5	Berglunds snabbköp	Christina Berglund	Berguvsvägen 8	Luleå	S-958 22	Sweden
6	Blauer See Delikatessen	Hanna Moos	Forsterstr. 57	Mannheim	68306	Germany
7	Blondel père et fils	Frédérique Citeaux	24, place Kléber	Strasbourg	67000	France
8	Bólido Comidas preparadas	Martín Sommer	C/ Araquil, 67	Madrid	28023	Spain
9	Bon app'	Laurence Lebihans	12, rue des Bouchers	Marseille	13008	France
10	Bottom-Dollar Marketse	Elizabeth Lincoln	23 Tsawassen Blvd.	Tsawassen	T2F 8M4	Canada

Every table is broken up into smaller entities called fields. The fields in the Customers table consist of CustomerID, CustomerName, ContactName, Address, City, PostalCode and Country. A field is a column in a table that is designed to maintain specific information about every record in the table.

A record, also called a row, is each individual entry that exists in a table. For example, there are 10 records in the above Customers table. A record is a horizontal entity in a table.

A column is a vertical entity in a table that contains all information associated with a specific field in a table.

SQL: Important Notes

- SQL keywords are NOT case sensitive: select is the same as SELECT

- Semicolon after SQL Statements?
  - Some database systems require a semicolon at end of each SQL statement
  - Semicolon is the standard way to separate each SQL statement in database systems that allow more than one SQL statement to be executed in the same call to the server

Key SQL Commands

- SELECT - extracts data from a database
- UPDATE - updates data in a database
- DELETE - deletes data from a database
- INSERT INTO - inserts new data into a database
- CREATE DATABASE - creates a new database
- ALTER DATABASE - modifies a database
- CREATE TABLE - creates a new table
- ALTER TABLE - modifies a table
- DROP TABLE - deletes a table
- CREATE INDEX - creates an index (search key)
- DROP INDEX - deletes an index

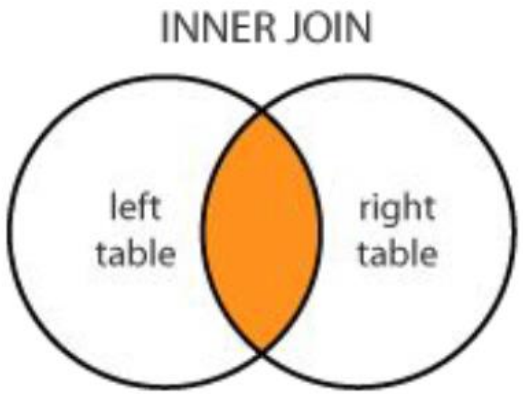
SQL Joins

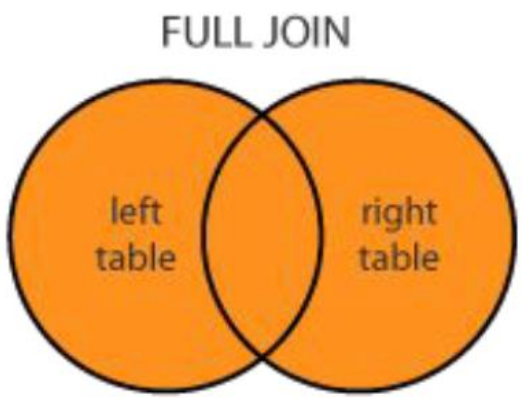
- It’s common to want to combine information from multiple tables into one query

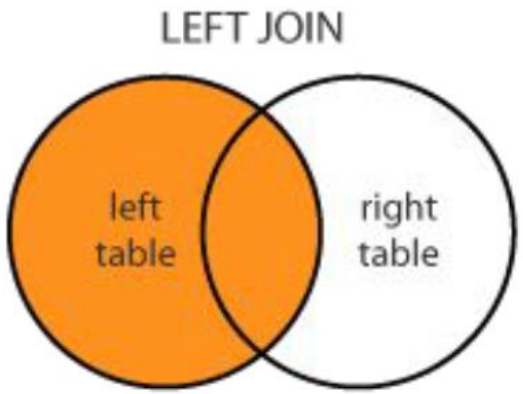
- There are several types of joins:
  - Inner Join
  - Left Join
  - Right Join
  - Full (Outer) Join

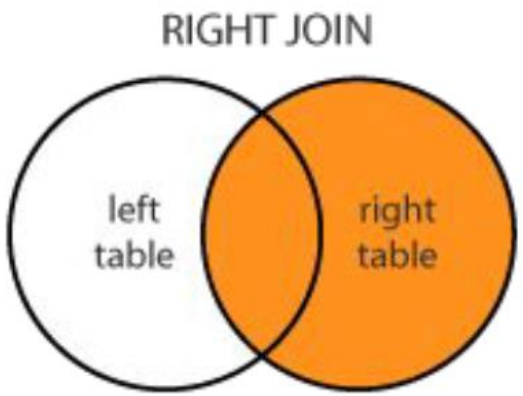
- The simplest and most common form of a join is the SQL inner join
  - It’s the default SQL join you get when you use the join keyword by itself

SQL Joins


INNER JOIN
left table
right table


FULL JOIN
left table
right table


LEFT JOIN
left table
right table


RIGHT JOIN
left table
right table