

CIS560 & CIS562

Single-Table Queries - Part 1



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Topics

- Schemas & Objects
- Minimum Table Requirements
- DDL vs. DML
- Booleans
- SELECT Statement
 - SELECT
 - FROM
 - WHERE
 - GROUP BY
 - HAVING



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SQL Server Schemas & Objects

- Almost everything inside a database is an object such as a table, view, procedure, function, and index.
- A schema is a container that holds objects, similar to a namespace.
- A schema cannot hold other schemas.
- A fully-qualified object name includes the schema name:

```
SELECT *  
FROM Sales.Orders;
```



Table Requirements

- Table
 - Each table belongs to a schema
 - Has one or more columns
- Minimum column requirements
 - Unique name within the table
 - Data type
 - Nullability (NULL vs. NOT NULL)



Query Basics

- SQL is a declarative language
 - Define what you want, not how to get it.
- SQL is a set-oriented language
 - Not procedural like C# or other programming languages.
 - Order rarely matters to accomplish what you want.
- What is the most common problem with beginners' solutions?
 - They disregard one or both of these properties.



Query Basics: DDL vs. DML

- Data Manipulation Language (DML)
 - SELECT
 - INSERT
 - UPDATE
 - DELETE
 - MERGE
- Data Definition Language (DDL)
 - CREATE | ALTER TABLE
 - CREATE | ALTER VIEW
 - ...



SELECT Element

- SELECT is the only element required in a SELECT statement.
- Usually, though, you have SELECT and FROM
- Column aliasing is supported, at times required
- The SELECT element provides support for the **projection** operation.



FROM Element

- FROM defines which table(s)
- In other words, where to get the data
- Table aliasing is supported
- Resulting column names in SELECT element inherit the column names from table



WHERE Element

- WHERE provides filtering.
- Accepts any predicate or boolean expression
- The WHERE element provides support for the **selection** operation.



Booleans

- Booleans are only supported as expressions
 - There is no boolean data type.
 - They cannot be stored in a variable, column, or result set.
- What are they used for?
 - WHERE clauses
 - Control statements such as IF and WHILE
 - CASE function (SQL's switch statement)
- Comparison operators:
 - Standard: =, >, <, >=, <=, <>
 - !=, !<, !> supported but not ISO standard



Booleans (cont.)

- QUIZ: How many resulting values are possible for a boolean expression?

Answer

Three: TRUE, FALSE, and UNKNOWN

- See Example



GROUP BY Element

- Defines a distinct set by one or more columns or expressions
- Allows aggregated computation over that set.
- ANSI Elements
 - Simple column list
 - Expressions
 - GROUPING SETS
 - CUBE
 - ROLLUP
- Can be combined with aggregates such as MAX, MIN, AVG, COUNT, etc.



GROUP BY Element - Aggregates

- Almost all aggregate functions have this syntax:

```
<Function Name> ( [ ALL | DISTINCT ] expression )
```

- Examples are MIN, MAX, AVG, and SUM.
- COUNT and COUNT_BIG are similar but allow for no expression (*).

```
COUNT ( { [ [ ALL | DISTINCT ] expression ] | * } )
```

The asterisk (*) means just count the rows.

- Can be used with the OVER clause to define partitions.

```
OVER ( [ PARTITION BY value_expression , ... [ n ] ] )
```

- Null values are ignored.



HAVING Element

- Provides a post-grouping filter
- Like WHERE, accepts any boolean expression
- Aggregated computations can be used in the filter



SELECT Statement Processing Order

- Major elements of SELECT
- ANSI Processing Order (Logical)

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



Syntax

```
SELECT select_list  
[ FROM table ]  
[ WHERE search_condition ]  
[ GROUP BY group_by_expression ]  
[ HAVING search_condition ]
```



Examples

```
SELECT O.OrderID, O.OrderDate,  
       O.CustomerID, O.SalespersonPersonID  
FROM Sales.Orders O  
WHERE O.OrderDate >= '2016-01-01'  
      AND O.OrderDate < '2017-01-01'
```

```
SELECT YEAR(O.OrderDate) AS OrderYear,  
       COUNT(*) AS OrderCount  
FROM Sales.Orders O  
GROUP BY YEAR(O.OrderDate)  
HAVING COUNT(*) > 20000;
```



Questions?

