Welcome

INTERMEDIATE SQL SERVER

SQL

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Instructor

datacamp

Course overview

- Chapter 1: Summarizing data

- Chapter 2: Date and math functions

- Chapter 3: Processing data with T-SQL

- Chapter 4: Window functions

Exploring Data with Aggregation

- Reviewing summarized values for each column is a common first step in analyzing data

- If the data exists in a database, fastest way to aggregate is to use SQL

Data Exploration with EconomicIndicators

```sql
SELECT Country, Year, InternetUse, GDP,
       ExportGoodsPercent, CellPhonesper100
FROM EconomicIndicators
```

```
+-------------+-----+-----------+------------+------------------+---------------+
|Country      |Year |InternetUse| GDP        |ExportGoodsPercent|CellPhonesper100|
+-------------+-----+-----------+------------+------------------+---------------+
|Swaziland    |2011 |20.43165813|7335004354  |56.30476059       |63.7015615     |
|Sweden       |2011 |90.88204559|394271163688|49.93022195       |118.5711258    |
|Switzerland  |2011 |82.98773087|395111518596|51.20242546       |130.0623629    |
...
+-------------+-----+-----------+------------+------------------+---------------+
```

Common summary statistics

- `MIN()` for the minimum value of a column

- `MAX()` for the maximum value of a column

- `AVG()` for the mean or average value of a column

Common summary statistics in T-SQL

This T-SQL query returns the aggregated values of column InternetUse

```
SELECT AVG(InternetUse) AS MeanInternetUse,
MIN(InternetUse) AS MINInternet,
MAX(InternetUse) AS MAXInternet
FROM EconomicIndicators
```

```
+--------------------+------------+-------------+

|MeanInternetUse     |MINInternet |  MAXInternet|

|--------------------+------------+-------------|

|    18.9854496196171|          0 |  375.5970064|

+--------------------+------------+-------------+
```

Filtering Summary Data with WHERE

This T-SQL query filters the aggregated values using a WHERE clause
Notice the text value is in

```sql
SELECT AVG(InternetUse) AS MeanInternetUse,
MIN(InternetUse) AS MININternet,
MAX(InternetUse) AS MAXInternet
FROM EconomicIndicators
WHERE Country = 'Solomon Islands'
```

```
+------------------+-----------+------------+
|MeanInternetUse   |MININternet |  MAXInternet|
|------------------+-----------+------------|
|          1.79621|         0 |       6.00|
+------------------+-----------+------------+
```

Subtotaling Aggregations into Groups with GROUP BY

```sql
SELECT Country, AVG(InternetUse) AS MeanInternetUse,
MIN(InternetUse) AS MINInternet,
MAX(InternetUse) AS MAXInternet
FROM EconomicIndicators
GROUP BY Country
```

```
+-------------------+----------------+-----------+------------+
| Country           |MeanInternetUse |MINInternet |  MAXInternet|
|-------------------+----------------+-----------+------------|
|Solomon Islands    |         1.79621|          0|        6.00|
|Hong Kong          |        245.1067|          0|      375.00|
|Liechtenstein      |         63.8821|    36.5152|       85.00|
...
+-------------------+----------------+-----------+------------+
```

HAVING is the WHERE for Aggregations

Cannot use `WHERE` with `GROUP BY` as it will give you an error

```
-- This throws an error

...

GROUP BY

WHERE Max(InternetUse) > 100
```

Instead, use `HAVING`

```
-- This is how you filter with a GROUP BY

...

GROUP BY

HAVING Max(InternetUse) > 100
```

HAVING is the WHERE for Aggregations

```sql
SELECT Country, AVG(InternetUse) AS MeanInternetUse,
MIN(GDP) AS SmallestGDP,
MAX(InternetUse) AS MAXInternetUse
FROM EconomicIndicators
GROUP BY Country
HAVING MAX(InternetUse) > 100
```

```
+--------------+------------------+--------------+--------------+
|Country       |MeanInternetUse   |SmallestGDP   | MAXInternetUse|
|--------------+------------------+--------------+--------------|
|Macedonia     |    71.3060150792857| -0.465059948|    110.5679538|
|Hong Kong     |   245.106718614286|            0|    375.5970064|
|Congo         |   60.8972476010714| -9.492757847|    104.6455529|
...
+--------------+------------------+--------------+--------------+
```

Examining UFO Data in the Incidents Table

- The exercise will explore data gathered from Mutual UFO Network

- UFO spotted all over the world are contained in the Incidents Table

Let's practice!

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Finding and Resolving Missing Data

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Detecting missing values

- When you have no data, the empty database field contains the word `NULL`

- Because `NULL` is not a number, it is not possible to use `=`, `<`, or `>` to find or compare missing values

- To determine if a column contains a `NULL` value, use `IS NULL` and `IS NOT NULL`

Returning No NULL Values in T-SQL

```
SELECT Country, InternetUse, Year
FROM EconomicIndicators
WHERE InternetUse IS NOT NULL
```

```
+------------------+-------------------+------------+
|Country           |InternetUse        |Year        |
|------------------+-------------------+------------+
|Afghanistan       |4.58066992         |2011        |
|Albania           |49                 |2011        |
|Algeria           |14                 |2011        |
....
+------------------+-------------------+------------+
```

Detecting NULLs in T-SQL

```sql
SELECT  Country, InternetUse, Year
FROM EconomicIndicators
WHERE InternetUse IS NULL
```

```
+------------------+--------------------+-----------+
|Country           |InternetUse         |Year       |
|------------------+--------------------+-----------+
|Angola            |NULL                |2013       |
|Argentina         |NULL                |2013       |
|Armenia           |NULL                |2013       |
....
+------------------+--------------------+-----------+
```

Blank is not NULL

- A blank is not the same as a NULL value

- May show up in columns containing text

- An empty string `''` can be used to find blank values

- The best way is to look for a column where the Length or LEN > 0

Blank is not NULL

```
SELECT Country, GDP, Year
FROM EconomicIndicators
WHERE LEN(GDP) > 0
```

```
+-------------------+-------------------+------------+
|Country            |GDP                |Year        |
|-------------------+-------------------+------------+
|Afghanistan        |54852215624        |2011        |
|Albania            |29334492905        |2011        |
|Algeria            |453558093404       |2011        |
....
+-------------------+-------------------+------------+
```

Substituting missing data with a specific value using ISNULL

```sql
SELECT GDP, Country,
ISNULL(Country, 'Unknown') AS NewCountry
FROM EconomicIndicators
```

```
+------------------+---------------+----------------+
|GDP               |Country        |NewCountry      |
|------------------+---------------+----------------+
|5867920022        |NULL           |Unknown         |
|597873038497      |South Africa   |South Africa    |
|1474091271101     |NULL           |Unknown         |
...
+------------------+---------------+----------------+
```

Substituting missing data with a column using ISNULL

```sql
/*Substituting values from one column for another with ISNULL*/
SELECT TradeGDPPercent, ImportGoodPercent,
ISNULL(TradeGDPPercent, ImportGoodPercent) AS NewPercent
FROM EconomicIndicators
```

```
+------------------+------------------+----------------+
|TradeGDPPercent   |ImportGoodPercent |NewPercent      |
|------------------+------------------+----------------+
|NULL              |56.7              |56.7            |
|52.18720739       |51.75273421       |52.18720739     |
|NULL              |NULL              |NULL            |
...
+------------------+------------------+----------------+
```

Substituting NULL values using COALESCE

`COALESCE` returns the first non-missing value

```
COALESCE( value_1, value_2, value_3, ... value_n )
```

- If `value_1` is `NULL` and `value_2` is not `NULL` , return `value_2`

- If `value_1` and `value_2` are `NULL` and `value_3` is not `NULL` , return `value_3`

- …

SQL Statement using COALESCE

```sql
SELECT TradeGDPPercent, ImportGoodPercent,
COALESCE(TradeGDPPercent, ImportGoodPercent, 'N/A') AS NewPercent
FROM EconomicIndicators
```

```
+-------------------+--------------------+----------------+
|TradeGDPPercent    |ImportGoodPercent   |NewPercent      |
|-------------------+--------------------+----------------+
|NULL               |56.7                |56.7            |
|NULL               |NULL                |N/A             |
|52.18720739        |51.75273421         |52.18720739     |
+-------------------+--------------------+----------------+
```

Let's practice!

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Binning Data with Case

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Changing column values with CASE

```
CASE
    WHEN Boolean_expression THEN result_expression [ ...n ]
    [ ELSE else_result_expression ]
END
```

Changing column values with CASE in T-SQL

```sql
SELECT Continent,
CASE WHEN Continent = 'Europe' or Continent = 'Asia' THEN 'Eurasia'
    ELSE 'Other'
    END AS NewContinent
FROM EconomicIndicators
```

```
+----------+--------------+
|Continent |NewContinent  |
+----------+--------------+
|Europe    |Eurasia       |
|Asia      |Eurasia       |
|Americas  |Other         |
...
+----------+--------------+
```

Changing column values with CASE in T-SQL

```sql
SELECT Continent,
CASE WHEN Continent = 'Europe' or Continent = 'Asia' THEN 'Eurasia'
    ELSE Continent
    END AS NewContinent
FROM EconomicIndicators
```

```
+----------+-------------+
|Continent |NewContinent |
+----------+-------------+
|Europe    |Eurasia      |
|Asia      |Eurasia      |
|Americas  |Americas     |
...
+----------+-------------+
```

Using CASE statements to create value groups

```sql
-- We are binning the data here into discrete groups
SELECT Country, LifeExp,
CASE WHEN LifeExp < 30 THEN 1
     WHEN LifeExp > 29 AND LifeExp < 40 THEN 2
     WHEN LifeExp > 39 AND LifeExp < 50 THEN 3
     WHEN LifeExp > 49 AND LifeExp < 60 THEN 4
     ELSE 5
     END AS LifeExpGroup
FROM EconomicIndicators
WHERE Year = 2007
```

```
+----------+-------------+
|LifeExp    |LifeExpGroup |
+----------+-------------+
|25         |1           |
|30         |2           |
|65         |5           |
...
+----------+-------------+
```

Let's practice!

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