JOIN Types

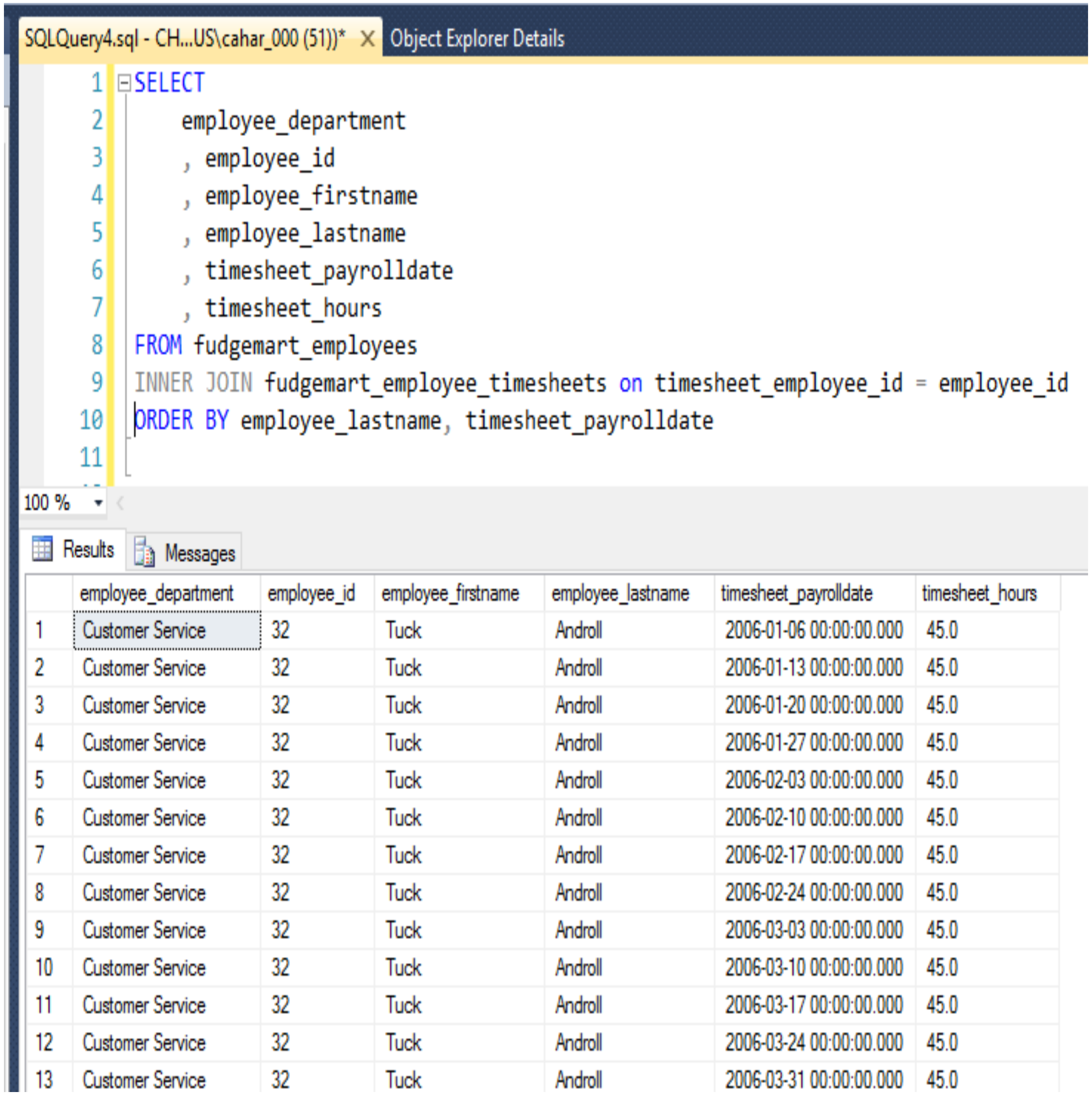
JOIN Types

Different data questions require us to JOIN our tables in different ways.

JOIN Types

- `[INNER] JOIN table_name ON colname1 = colname2`
  - Give me only those rows from both tables where `colname1 = colname2`. If there are rows in one table that aren't in the other, do not include them in the results! (NOTE: INNER is optional here!)
- `LEFT JOIN table_name ON colname1 = colname2`
  - Give me all rows from the table on the left and only those rows in the table on the right where `colname1 = colname2`.
- `RIGHT JOIN table_name ON colname1 = colname2`
  - Give me all rows from the table on the right and only those rows in the table on the left where `colname1 = colname2`.
- `FULL OUTER JOIN table_name ON colname1 = colname2`
  - Give me all rows from BOTH tables and match up all of the rows where `colname1 = colname2.`

INNER JOIN

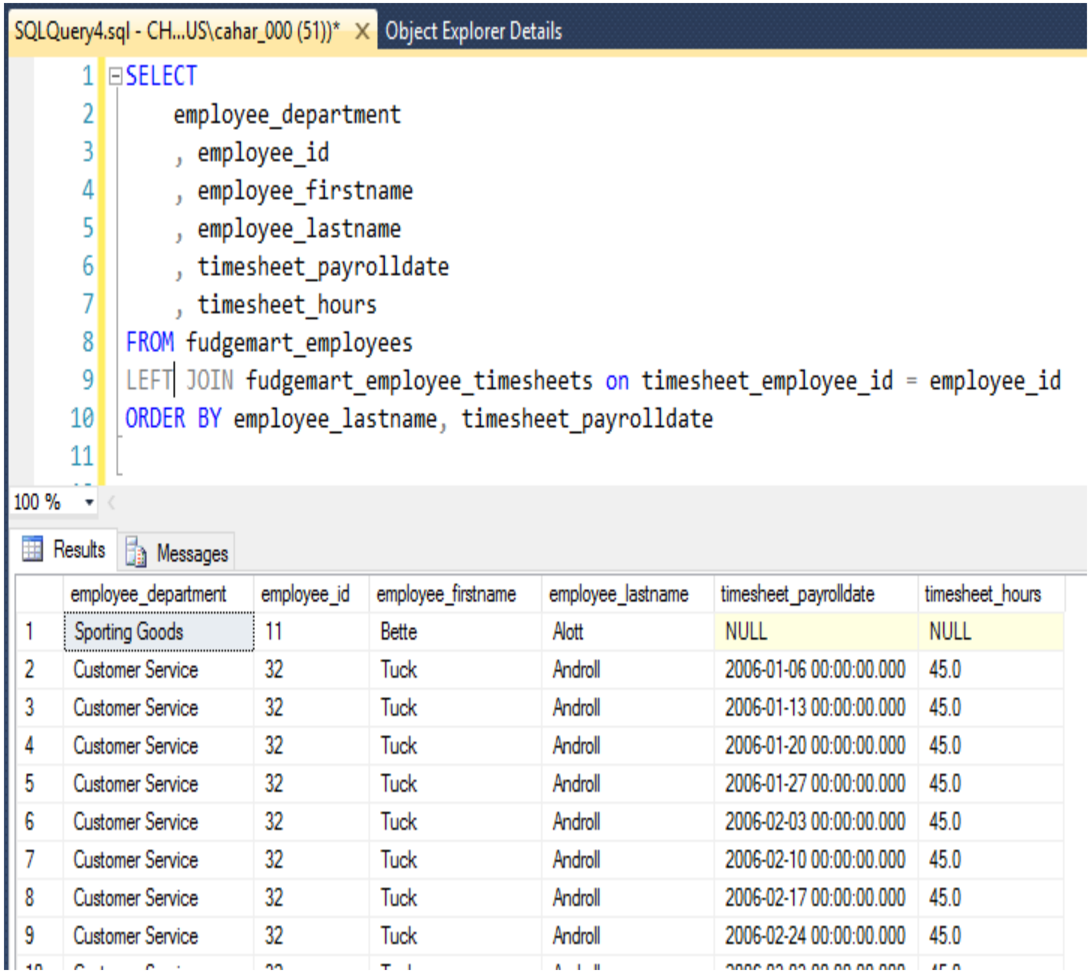


```sql
SELECT
	employee_department
	, employee_id
	, employee_firstname
	, employee_lastname
	, timesheet_payrolldate
	, timesheet_hours
FROM fudgemart_employees
INNER JOIN fudgemart_employee_timesheets on timesheet_employee_id = employee_id
ORDER BY employee_lastname, timesheet_payrolldate

```

	employee_department	employee_id	employee_firstname	employee_lastname	timesheet_payrolldate	timesheet_hours
1	Customer Service	32	Tuck	Androll	2006-01-06 00:00:00.000	45.0
2	Customer Service	32	Tuck	Androll	2006-01-13 00:00:00.000	45.0
3	Customer Service	32	Tuck	Androll	2006-01-20 00:00:00.000	45.0
4	Customer Service	32	Tuck	Androll	2006-01-27 00:00:00.000	45.0
5	Customer Service	32	Tuck	Androll	2006-02-03 00:00:00.000	45.0
6	Customer Service	32	Tuck	Androll	2006-02-10 00:00:00.000	45.0
7	Customer Service	32	Tuck	Androll	2006-02-17 00:00:00.000	45.0
8	Customer Service	32	Tuck	Androll	2006-02-24 00:00:00.000	45.0
9	Customer Service	32	Tuck	Androll	2006-03-03 00:00:00.000	45.0
10	Customer Service	32	Tuck	Androll	2006-03-10 00:00:00.000	45.0
11	Customer Service	32	Tuck	Androll	2006-03-17 00:00:00.000	45.0
12	Customer Service	32	Tuck	Androll	2006-03-24 00:00:00.000	45.0
13	Customer Service	32	Tuck	Androll	2006-03-31 00:00:00.000	45.0

LEFT JOIN

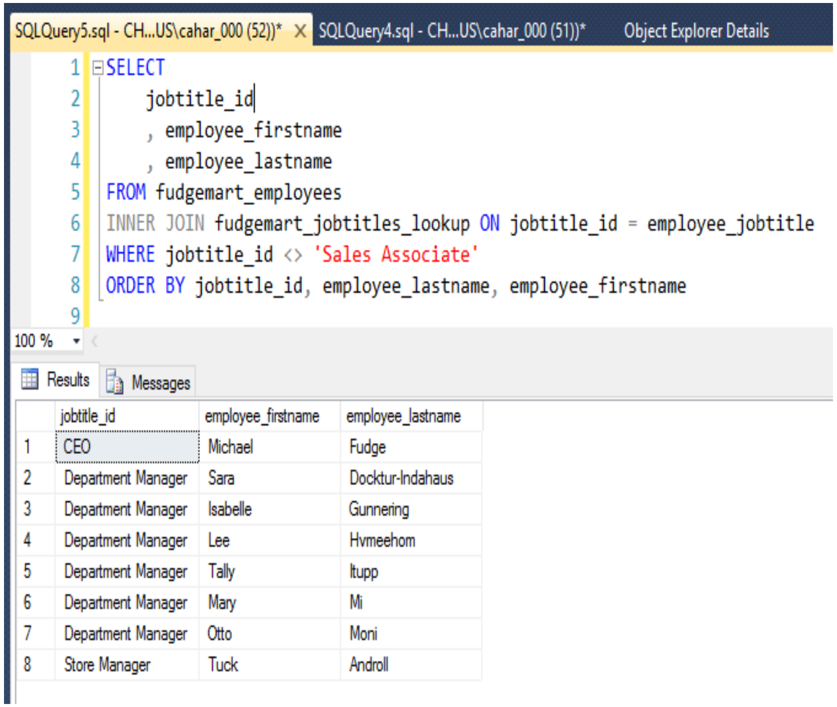


```
SELECT
    employee_department
    , employee_id
    , employee_firstname
    , employee_lastname
    , timesheet_payrolldate
    , timesheet_hours
FROM fudgemart_employees
LEFT JOIN fudgemart_employee_timesheets on timesheet_employee_id = employee_id
ORDER BY employee_lastname, timesheet_payrolldate

```

	employee_department	employee_id	employee_firstname	employee_lastname	timesheet_payrolldate	timesheet_hours
1	Sporting Goods	11	Bette	Alott	NULL	NULL
2	Customer Service	32	Tuck	Androll	2006-01-06 00:00:00.000	45.0
3	Customer Service	32	Tuck	Androll	2006-01-13 00:00:00.000	45.0
4	Customer Service	32	Tuck	Androll	2006-01-20 00:00:00.000	45.0
5	Customer Service	32	Tuck	Androll	2006-01-27 00:00:00.000	45.0
6	Customer Service	32	Tuck	Androll	2006-02-03 00:00:00.000	45.0
7	Customer Service	32	Tuck	Androll	2006-02-10 00:00:00.000	45.0
8	Customer Service	32	Tuck	Androll	2006-02-17 00:00:00.000	45.0
9	Customer Service	32	Tuck	Androll	2006-02-24 00:00:00.000	45.0

RIGHT JOIN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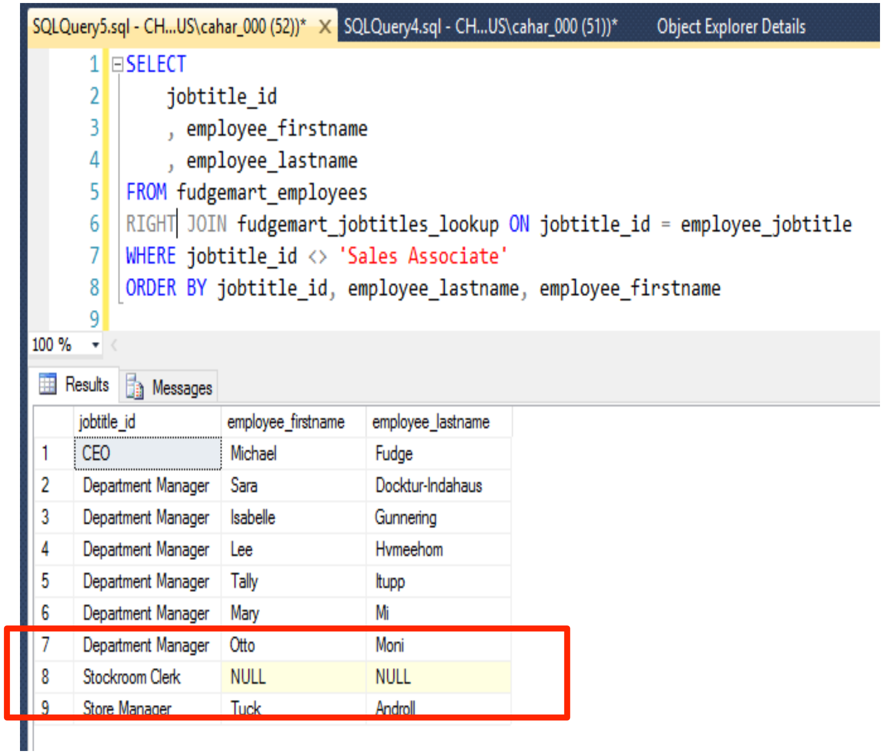
```sql
SELECT
    jobtitle_id
  , employee_firstname
  , employee_lastname
FROM fudgemart_employees
INNER JOIN fudgemart_jobtitles_lookup ON jobtitle_id = employee_jobtitle
WHERE jobtitle_id <> 'Sales Associate'
ORDER BY jobtitle_id, employee_lastname, employee_firstname
```

	jobtitle_id	employee_firstname	employee_lastname
1	CEO	Michael	Fudge
2	Department Manager	Sara	Docktur-Indahaus
3	Department Manager	Isabelle	Gunnering
4	Department Manager	Lee	Hvmeehom
5	Department Manager	Tally	Itupp
6	Department Manager	Mary	Mi
7	Department Manager	Otto	Moni
8	Store Manager	Tuck	Androll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```sql
SELECT
    jobtitle_id
  , employee_firstname
  , employee_lastname
FROM fudgemart_employees
RIGHT JOIN fudgemart_jobtitles_lookup ON jobtitle_id = employee_jobtitle
WHERE jobtitle_id <> 'Sales Associate'
ORDER BY jobtitle_id, employee_lastname, employee_firstname
```

	jobtitle_id	employee_firstname	employee_lastname
1	CEO	Michael	Fudge
2	Department Manager	Sara	Docktur-Indahaus
3	Department Manager	Isabelle	Gunnering
4	Department Manager	Lee	Hvmeehom
5	Department Manager	Tally	Itupp
6	Department Manager	Mary	Mi
7	Department Manager	Otto	Moni
8	Stockroom Clerk	NULL	NULL
9	Store Manager	Tuck	Androll

SQL Aggregates

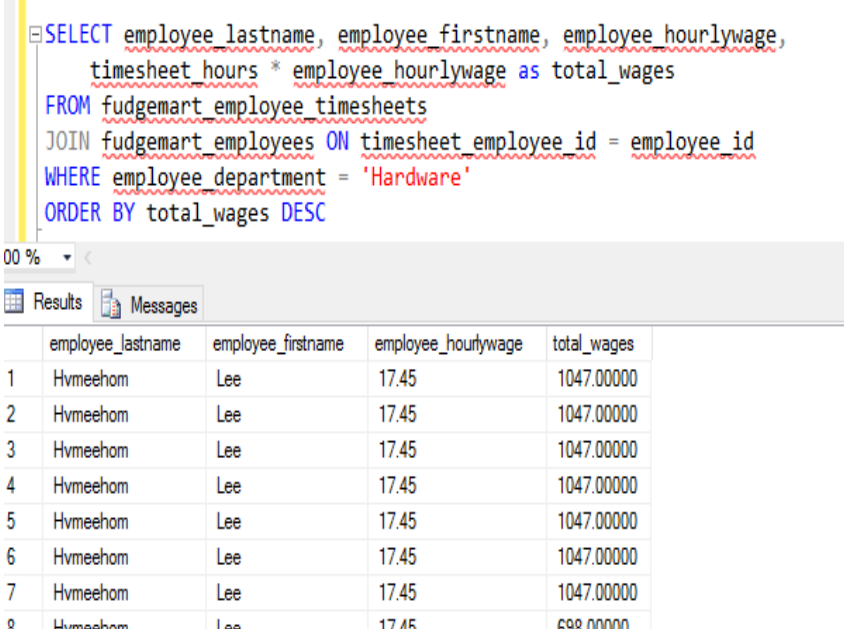
SQL Aggregates

- Use aggregates to summarize rows of data.
- Aggregate operators:
  - `COUNT`
    - Counts the number of rows in the summary
  - `SUM`
    - Adds all of the values in the summary together
  - `MIN`
    - Shows only the smallest value from the summarized rows
  - `MAX`
    - Shows only the largest value from the summarized rows
  - `AVG`
    - Calculates and returns the average for all values in the summarized rows
- Any field in your select NOT included in an aggregate must be in the `GROUP BY` clause.
- If you want to filter your aggregate results, you need a `HAVING` clause.

Aggregates in Action

- What are the total wages (hourly rate * hours) for people in the Hardware department who have made less than $30,000?
- Without aggregation, we can’t get to this number using SQL…

Each row in timesheet appears here, but how do we tally up all the dollars?



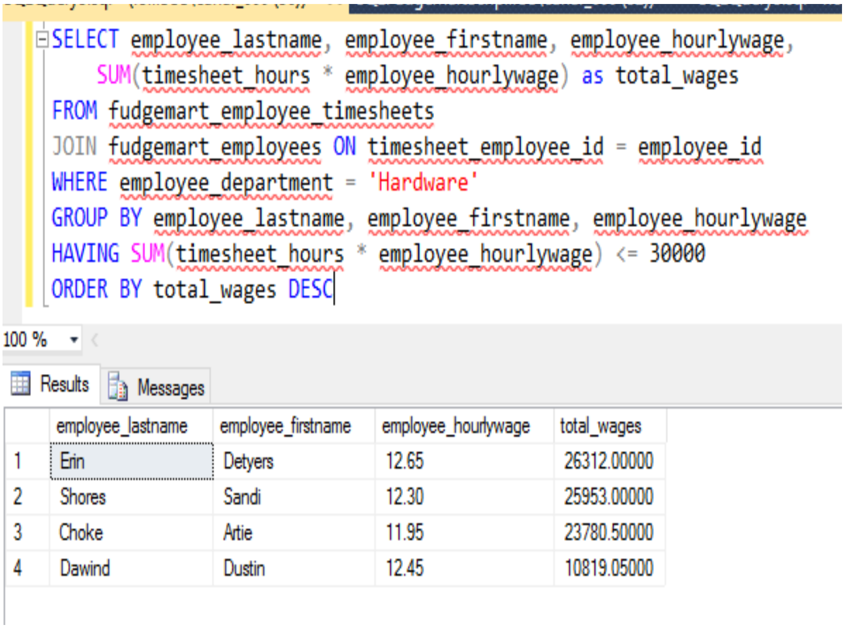
```sql
SELECT employee_lastname, employee_firstname, employee_hourlywage,
    timesheet_hours * employee_hourlywage as total_wages
FROM fudgemart_employee_timesheets
JOIN fudgemart_employees ON timesheet_employee_id = employee_id
WHERE employee_department = 'Hardware'
ORDER BY total_wages DESC
```

	employee_lastname	employee_firstname	employee_hourlywage	total_wages
1	Hvmeehom	Lee	17.45	1047.00000
2	Hvmeehom	Lee	17.45	1047.00000
3	Hvmeehom	Lee	17.45	1047.00000
4	Hvmeehom	Lee	17.45	1047.00000
5	Hvmeehom	Lee	17.45	1047.00000
6	Hvmeehom	Lee	17.45	1047.00000
7	Hvmeehom	Lee	17.45	1047.00000
8	Hvmeehom	Lee	17.45	698.00000

Aggregates in Action

- What are the total wages (hourly rate * hours) for people in the Hardware department who have made less than $30,000?
- With aggregation, we can see the totals!

Each line in the result set is now the total of all wages paid by employee!



```
SELECT employee_lastname, employee_firstname, employee_hourlywage,
    SUM(timesheet_hours * employee_hourlywage) as total_wages
FROM fudgemart_employee_timesheets
JOIN fudgemart_employees ON timesheet_employee_id = employee_id
WHERE employee_department = 'Hardware'
GROUP BY employee_lastname, employee_firstname, employee_hourlywage
HAVING SUM(timesheet_hours * employee_hourlywage) <= 30000
ORDER BY total_wages DESC
```

	employee_lastname	employee_firstname	employee_hourlywage	total_wages
1	Erin	Detyers	12.65	26312.00000
2	Shores	Sandi	12.30	25953.00000
3	Choke	Artie	11.95	23780.50000
4	Dawind	Dustin	12.45	10819.05000

Aggregate SQL in Action

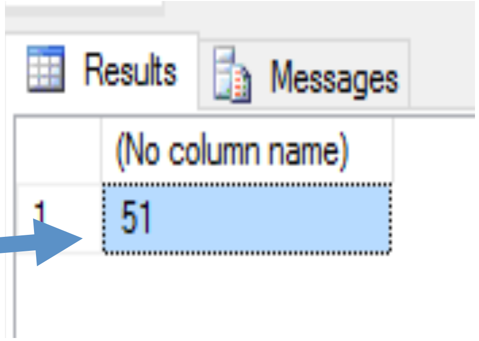
```
SELECT
        employee_lastname
        , employee_firstname
        , employee_hourlywage
        , SUM(timesheet_hours * employee_hourlywage)
as total_wages
FROM fudgemart_employee_timesheets
JOIN fudgemart_employees ON timesheet_employee_id =
employee_id
WHERE employee_department = 'Hardware'
GROUP BY employee_lastname, employee_firstname,
employee_hourlywage
HAVING SUM(timesheet_hours * employee_hourlywage) <=
30000
ORDER BY total_wages DESC
```

Aggregate SQL

- COUNT

```
SELECT COUNT(product_id)
FROM fudgemart_products
WHERE product_is_active = 1
```

Counts the number of product_ids in the result set and shows that number

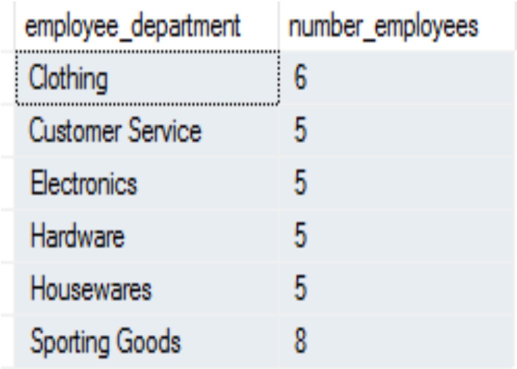


	(No column name)
1	51

Aggregate SQL

- More COUNTing
- Add categorical fields to count based on that field
- How many employees for each department?

```
SELECT
    employee_department
    , count(*) as number_employees
FROM fudgemart_employees
GROUP BY employee_department
```



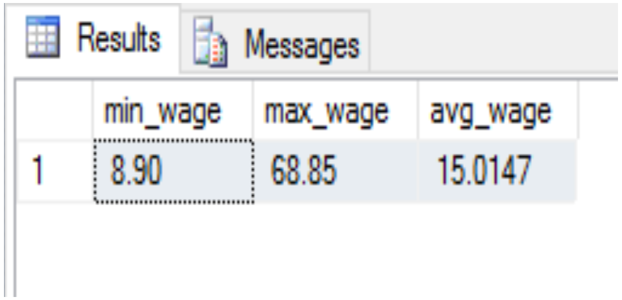
employee_department	number_employees
Clothing	6
Customer Service	5
Electronics	5
Hardware	5
Housewares	5
Sporting Goods	8

Aggregate SQL

- **MIN**, **MAX**, and **AVG**

```
SELECT
    MIN(employee_hourlywage) AS min_wage
    , MAX(employee_hourlywage) AS
max_wage
    , AVG(employee_hourlywage) AS
avg_wage
FROM fudgemart_employees
```

Shows the minimum, maximum, and average wage for all employees



	min_wage	max_wage	avg_wage
1	8.90	68.85	15.0147

Aggregate SQL

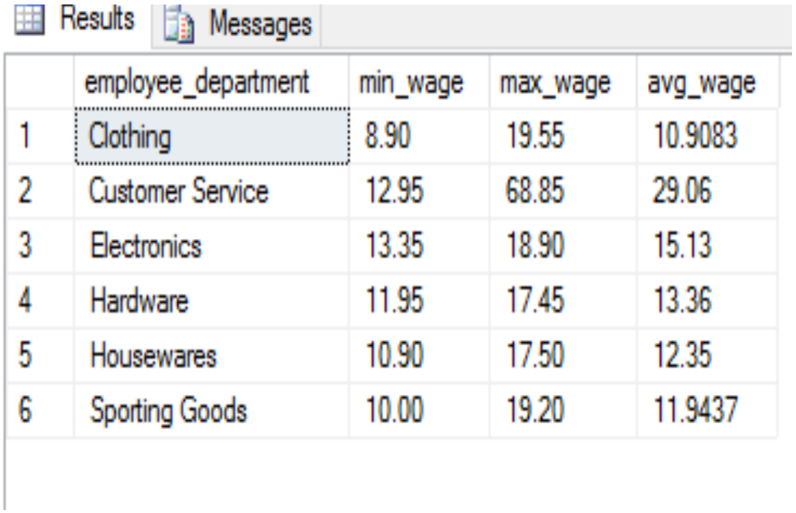
- More **MIN**, **MAX**, and **AVG**

```
SELECT employee_department
   , MIN(employee_hourlywage) AS
min_wage
   , MAX(employee_hourlywage) AS
max_wage
   , AVG(employee_hourlywage) AS
avg_wage
FROM fudgemart_employees
GROUP BY employee_department
```

Aggregate SQL

- More **MIN**, **MAX**, and **AVG**

```
SELECT employee_department
     , MIN(employee_hourlywage) AS min_wage
     , MAX(employee_hourlywage) AS max_wage
     , AVG(employee_hourlywage) AS avg_wage
FROM fudgemart_employees
GROUP BY employee_department
```

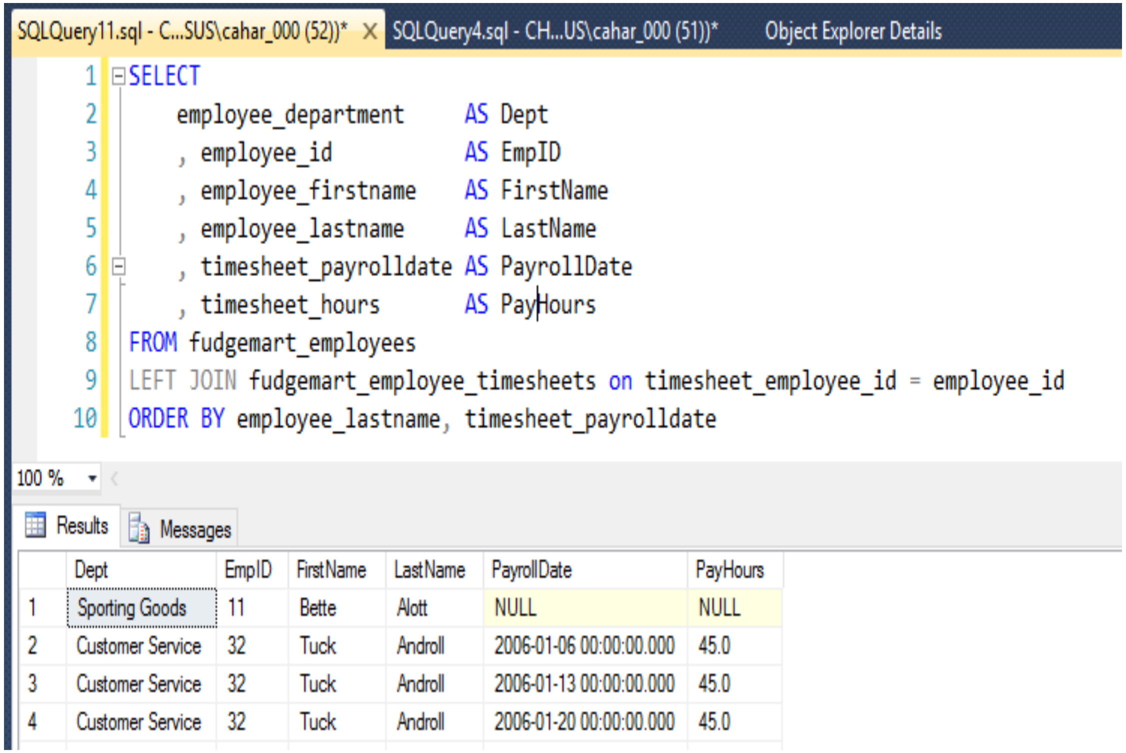


	employee_department	min_wage	max_wage	avg_wage
1	Clothing	8.90	19.55	10.9083
2	Customer Service	12.95	68.85	29.06
3	Electronics	13.35	18.90	15.13
4	Hardware	11.95	17.45	13.36
5	Housewares	10.90	17.50	12.35
6	Sporting Goods	10.00	19.20	11.9437

Aliasing Query Columns

Aliasing Can Help Name or Rename Columns

Use the AS keyword.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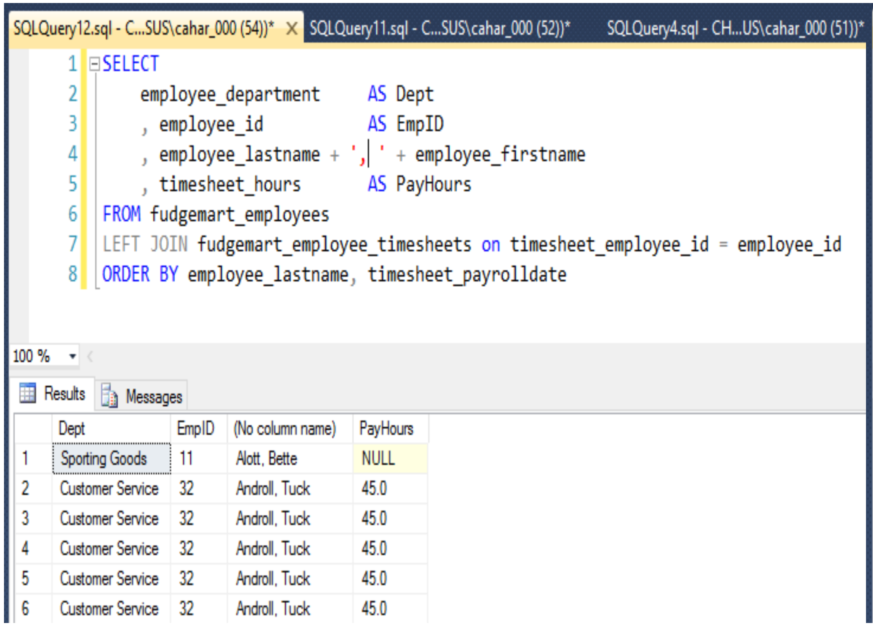
```
SELECT
    employee_department     AS Dept
  , employee_id             AS EmpID
  , employee_firstname      AS FirstName
  , employee_lastname       AS LastName
  , timesheet_payrolldate AS PayrollDate
  , timesheet_hours         AS PayHours
FROM fudgemart_employees
LEFT JOIN fudgemart_employee_timesheets on timesheet_employee_id = employee_id
ORDER BY employee_lastname, timesheet_payrolldate
```

	Dept	EmpID	FirstName	LastName	PayrollDate	PayHours
1	Sporting Goods	11	Bette	Alott	NULL	NULL
2	Customer Service	32	Tuck	Androll	2006-01-06 00:00:00.000	45.0
3	Customer Service	32	Tuck	Androll	2006-01-13 00:00:00.000	45.0
4	Customer Service	32	Tuck	Androll	2006-01-20 00:00:00.000	45.0

Works Well for Calculated Fields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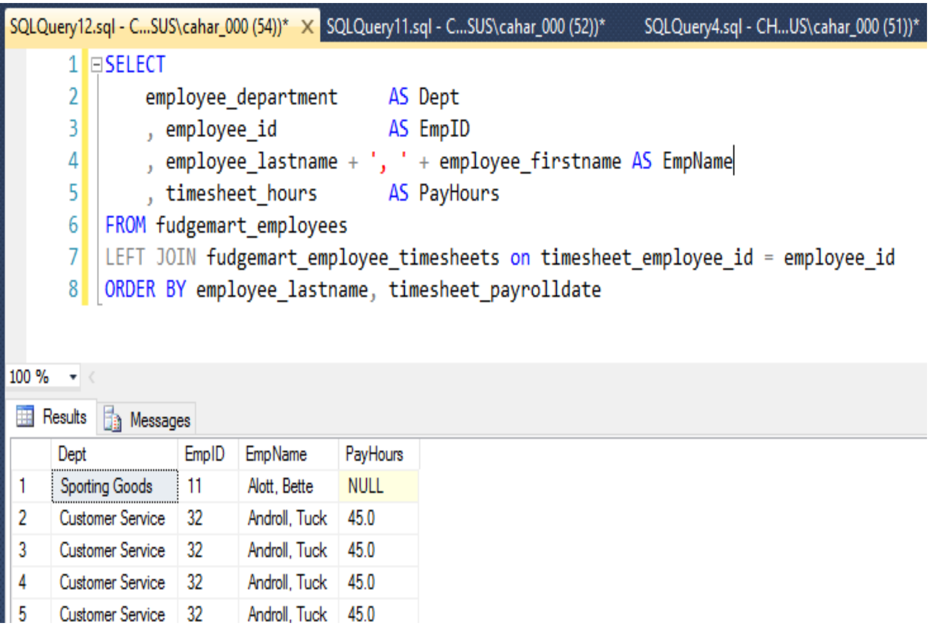
```sql
SELECT
    employee_department     AS Dept
  , employee_id             AS EmpID
  , employee_lastname + ', ' + employee_firstname
  , timesheet_hours         AS PayHours
FROM fudgemart_employees
LEFT JOIN fudgemart_employee_timesheets on timesheet_employee_id = employee_id
ORDER BY employee_lastname, timesheet_payrolldate
```

	Dept	EmpID	(No column name)	PayHours
1	Sporting Goods	11	Alott, Bette	NULL
2	Customer Service	32	Androll, Tuck	45.0
3	Customer Service	32	Androll, Tuck	45.0
4	Customer Service	32	Androll, Tuck	45.0
5	Customer Service	32	Androll, Tuck	45.0
6	Customer Service	32	Androll, Tuck	45.0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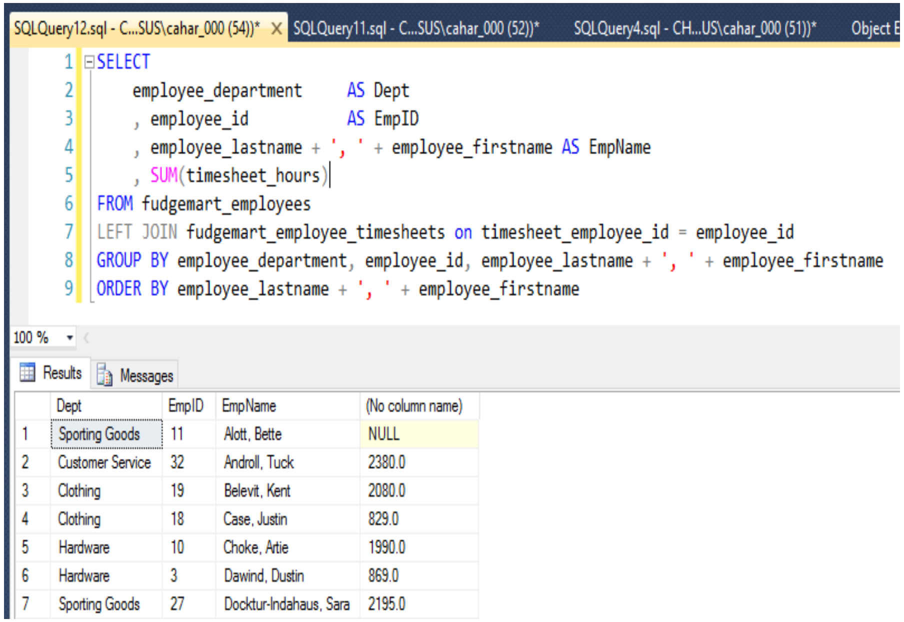
```sql
SELECT
    employee_department     AS Dept
  , employee_id             AS EmpID
  , employee_lastname + ', ' + employee_firstname AS EmpName
  , timesheet_hours         AS PayHours
FROM fudgemart_employees
LEFT JOIN fudgemart_employee_timesheets on timesheet_employee_id = employee_id
ORDER BY employee_lastname, timesheet_payrolldate
```

	Dept	EmpID	EmpName	PayHours
1	Sporting Goods	11	Alott, Bette	NULL
2	Customer Service	32	Androll, Tuck	45.0
3	Customer Service	32	Androll, Tuck	45.0
4	Customer Service	32	Androll, Tuck	45.0
5	Customer Service	32	Androll, Tuck	45.0

Aliasing Helps With Aggregates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SQLQuery11.sql - C...SUS\cahar_000 (52))*
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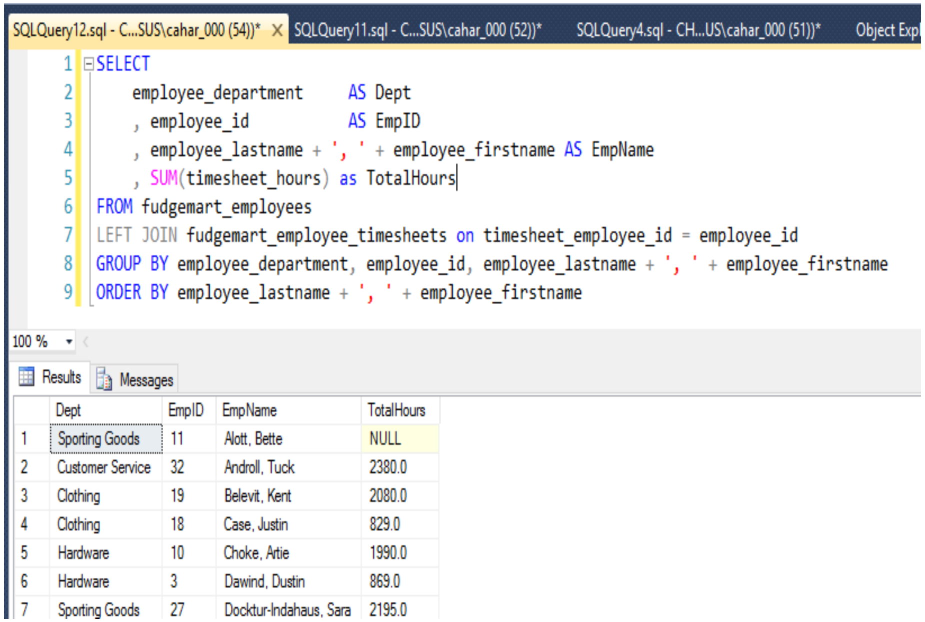
```
SELECT
    employee_department     AS Dept
    , employee_id           AS EmpID
    , employee_lastname + ', ' + employee_firstname AS EmpName
    , SUM(timesheet_hours)
FROM fudgemart_employees
LEFT JOIN fudgemart_employee_timesheets on timesheet_employee_id = employee_id
GROUP BY employee_department, employee_id, employee_lastname + ', ' + employee_firstname
ORDER BY employee_lastname + ', ' + employee_firstname
```

	Dept	EmpID	EmpName	(No column name)
1	Sporting Goods	11	Alott, Bette	NULL
2	Customer Service	32	Androll, Tuck	2380.0
3	Clothing	19	Belevit, Kent	2080.0
4	Clothing	18	Case, Justin	829.0
5	Hardware	10	Choke, Artie	1990.0
6	Hardware	3	Dawind, Dustin	869.0
7	Sporting Goods	27	Docktur-Indahaus, Sara	2195.0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```
SELECT
    employee_department     AS Dept
    , employee_id           AS EmpID
    , employee_lastname + ', ' + employee_firstname AS EmpName
    , SUM(timesheet_hours) as TotalHours
FROM fudgemart_employees
LEFT JOIN fudgemart_employee_timesheets on timesheet_employee_id = employee_id
GROUP BY employee_department, employee_id, employee_lastname + ', ' + employee_firstname
ORDER BY employee_lastname + ', ' + employee_firstname
```

	Dept	EmpID	EmpName	TotalHours
1	Sporting Goods	11	Alott, Bette	NULL
2	Customer Service	32	Androll, Tuck	2380.0
3	Clothing	19	Belevit, Kent	2080.0
4	Clothing	18	Case, Justin	829.0
5	Hardware	10	Choke, Artie	1990.0
6	Hardware	3	Dawind, Dustin	869.0
7	Sporting Goods	27	Docktur-Indahaus, Sara	2195.0