

Aggregering

# Aggregeringsfunksjoner

Linjenr	Vare	Pris
1	Potetgull	40
2	Potetgull	35
3	Potetgull	40
4	Guacamole	25
5	Cola	20
6	Cola	20

```
SELECT sum(pris)  
FROM handleliste;
```

<b>Sum</b>
180

# GROUP BY

Linjenr	Vare	Pris
1	Potetgull	40
2	Potetgull	35
3	Potetgull	40
4	Guacamole	25
5	Cola	20
6	Cola	20

```
SELECT vare, sum(pris)  
FROM handleliste  
GROUP BY vare;
```

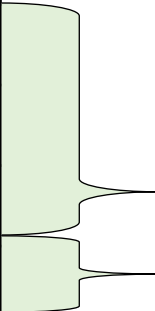
# GROUP BY

Linjenr	Vare	Pris
1	Potetgull	40
2	Potetgull	35
3	Potetgull	40
4	Guacamole	25
5	Cola	20
6	Cola	20

```
SELECT vare, sum(pris)
FROM handleliste
GROUP BY vare;
```

# GROUP BY

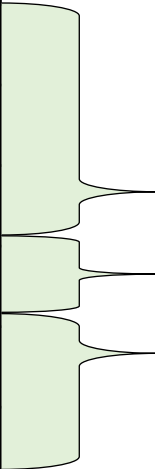
Linjenr	Vare	Pris
1	Potetgull	40
2	Potetgull	35
3	Potetgull	40
4	Guacamole	25
5	Cola	20
6	Cola	20



```
SELECT vare, sum(pris)
FROM handleliste
GROUP BY vare;
```

# GROUP BY

Linjenr	Vare	Pris
1	Potetgull	40
2	Potetgull	35
3	Potetgull	40
4	Guacamole	25
5	Cola	20
6	Cola	20



```
SELECT vare, sum(pris)  
FROM handleliste  
GROUP BY vare;
```

# GROUP BY

```
SELECT vare, sum(pris)  
FROM handleliste  
GROUP BY vare;
```

Linjenr	Vare	Pris
1	Potetgull	40
2	Potetgull	35
3	Potetgull	40
4	Guacamole	25
5	Cola	20
6	Cola	20

Vare	Sum
Potetgull	115
Guacamole	25
Cola	40

# GROUP BY

```
SELECT vare, sum(pris), Linjenr  
FROM handleliste  
GROUP BY vare;
```

Linjenr	Vare	Pris
1	Potetgull	40
2	Potetgull	35
3	Potetgull	40
4	Guacamole	25
5	Cola	20
6	Cola	20

Vare	Sum	Linjenr
Potetgull	115	<i>1, 2 eller 3??</i>
Guacamole	25	<i>4</i>
Cola	40	<i>5 eller 6?</i>



# GROUP BY

```
SELECT vare, sum(pris), Linjenr  
FROM handleliste  
GROUP BY vare;
```

Linjenr	Vare	Pris
1	Potetgull	40
2	Potetgull	35
3	Potetgull	40
4	Guacamole	25
5	Cola	20
6	Cola	20

Vare	Sum	Linjenr
Potetgull	115	1, 2 eller 3??
Guacamole	25	4
Cola	40	5 eller 6?

# GROUP BY

Linjenr	Vare	Pris
1	Potetgull	40
2	Potetgull	35
3	Potetgull	40
4	Guacamole	25
5	Cola	20
6	Cola	20

```
SELECT vare, sum(pris), Linjenr  
FROM handleliste  
GROUP BY vare;
```

Vare	Sum	Linjenr
Potetgull	115	<del>1, 2 eller 3??</del>
Guacamole	25	<del>4</del>
Cola	40	<del>5 eller 6?</del>

Attributtet du selecter må enten være:

- i GROUP BY (vare)
- i en aggregatfunksjon (pris)

# GROUP BY

Linjenr	Vare	Pris
1	Potetgull	40
2	Potetgull	35
3	Guacamole	25
4	Cola	20
5	Potetgull	40
6	Cola	20

```
SELECT vare, sum(pris)
FROM handleliste
GROUP BY vare;
```

Vare	Sum
Potetgull	115
Guacamole	25
Cola	40

# GROUP BY

```
SELECT vare, sum(pris)  
FROM handleliste  
GROUP BY vare;
```

Linjenr	Vare	Pris
1	Potetgull	40
2	Potetgull	35
3	Guacamole	25
4	Cola	20
5	Potetgull	40
6	Cola	20

Vare	Sum
Potetgull	115
Guacamole	25
Cola	40

# GROUP BY – flere attributter

Kvittering	Linjenr	Vare	Pris
1	1	Potetgull	40
1	2	Potetgull	35
1	3	Potetgull	40
1	4	Guacamole	25
2	1	Potetgull	50
2	2	Potetgull	35
2	3	Guacamole	20
2	4	Cola	20
2	5	Cola	20

```
SELECT kvittering, vare, sum(pris)
FROM handleliste
GROUP BY kvittering, vare;
```

# GROUP BY – flere attributter

Kvittering	Linjenr	Vare	Pris
1	1	Potetgull	40
1	2	Potetgull	35
1	3	Potetgull	40
1	4	Guacamole	25
2	1	Potetgull	50
2	2	Potetgull	35
2	3	Guacamole	20
2	4	Cola	20
2	5	Cola	20

```
SELECT kvittering, vare, sum(pris)
FROM handleliste
GROUP BY kvittering, vare;
```

# GROUP BY – flere attributter

Kvittering	Linjenr	Vare	Pris
1	1	Potetgull	40
1	2	Potetgull	35
1	3	Potetgull	40
1	4	Guacamole	25
2	1	Potetgull	50
2	2	Potetgull	35
2	3	Guacamole	20
2	4	Cola	20
2	5	Cola	20

```
SELECT kvittering, vare, sum(pris)
FROM handleliste
GROUP BY kvittering, vare;
```

# GROUP BY – flere attributter

Kvittering	Linjenr	Vare	Pris
1	1	Potetgull	40
1	2	Potetgull	35
1	3	Potetgull	40
1	4	Guacamole	25
2	1	Potetgull	50
2	2	Potetgull	35
2	3	Guacamole	20
2	4	Cola	20
2	5	Cola	20

```
SELECT kvittering, vare, sum(pris)
FROM handleliste
GROUP BY kvittering, vare;
```



# GROUP BY – flere attributter

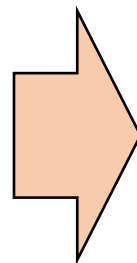
Kvittering	Linjenr	Vare	Pris
1	1	Potetgull	40
1	2	Potetgull	35
1	3	Potetgull	40
1	4	Guacamole	25
2	1	Potetgull	50
2	2	Potetgull	35
2	3	Guacamole	20
2	4	Cola	20
2	5	Cola	20

```
SELECT kvittering, vare, sum(pris)
FROM handleliste
GROUP BY kvittering, vare;
```

# GROUP BY – flere attributter

Kvittering	Linjenr	Vare	Pris
1	1	Potetgull	40
1	2	Potetgull	35
1	3	Potetgull	40
1	4	Guacamole	25
2	1	Potetgull	50
2	2	Potetgull	35
2	3	Guacamole	20
2	4	Cola	20
2	5	Cola	20

```
SELECT kvittering, vare, sum(pris)
FROM handleliste
GROUP BY kvittering, vare;
```

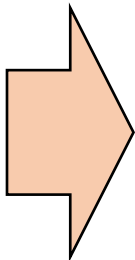


Kvittering	Vare	Sum
1	Potetgull	115
1	Guacamole	25
2	Potetgull	85
2	Guacamole	20
2	Cola	40

# HAVING – filtrere grupper

Kvittering	Linjenr	Vare	Pris
1	1	Potetgull	40
1	2	Potetgull	35
1	3	Potetgull	40
1	4	Guacamole	25
2	1	Potetgull	50
2	2	Potetgull	35
2	3	Guacamole	20
2	4	Cola	20
2	5	Cola	20

```
SELECT kvittering, vare, sum(pris)
FROM handleliste
GROUP BY kvittering, vare
HAVING sum(pris) > 50;
```



Kvittering	Vare	Sum
1	Potetgull	115
2	Potetgull	85

JOINS

# Select fra to tabeller, implisitt join

Person

PersonID	Navn
1	A
2	B

PersonInteresse

PersonID	Interesse
1	Programmering
1	SQL
2	Programmering

```
SELECT * FROM Person p, PersonInteresse pi;
```

# Select fra to tabeller, implisitt join

Person

PersonID	Navn
1	A
2	B

PersonInteresse

PersonID	Interesse
1	Programmering
1	SQL
2	Programmering

```
SELECT * FROM Person p, PersonInteresse pi;
```

p.PersonID	p.Navn	pi.PersonID	pi.Interesse
1	A	1	Programmering
1	A	1	SQL
1	A	2	Programmering
2	B	1	Programmering
2	B	1	SQL
2	B	2	Programmering


# Select fra to tabeller, implisitt join

Person

PersonID	Navn
1	A
2	B

PersonInteresse

PersonID	Interesse
1	Programmering
1	SQL
2	Programmering

SELECT \* FROM Person p, PersonInteresse pi;  Cross join

p.PersonID	p.Navn	pi.PersonID	pi.Interesse
1	A	1	Programmering
1	A	1	SQL
1	A	2	Programmering
2	B	1	Programmering
2	B	1	SQL
2	B	2	Programmering

 Kartesisk produkt

# Select fra to tabeller, implisitt join

Person

PersonID	Navn
1	A
2	B

PersonInteresse

PersonID	Interesse
1	Programmering
1	SQL
2	Programmering

```
SELECT * FROM Person p, PersonInteresse pi  
WHERE p.PersonID = pi.PersonID;
```

p.PersonID	p.Navn	pi.PersonID	pi.Interesse
1	A	1	Programmering
1	A	1	SQL
1	A	2	Programmering
2	B	1	Programmering
2	B	1	SQL
2	B	2	Programmering



# Select fra to tabeller, implisitt join

Person

PersonID	Navn
1	A
2	B

PersonInteresse

PersonID	Interesse
1	Programmering
1	SQL
2	Programmering

```
SELECT * FROM Person p, PersonInteresse pi
WHERE p.PersonID = pi.PersonID;
```

p.PersonID	p.Navn	pi.PersonID	pi.Interesse
1	A	1	Programmering
1	A	1	SQL
<del>1</del>	<del>A</del>	<del>2</del>	<del>Programmering</del>
<del>2</del>	<del>B</del>	<del>1</del>	<del>Programmering</del>
<del>2</del>	<del>B</del>	<del>1</del>	<del>SQL</del>
2	B	2	Programmering

# Select fra to tabeller, implisitt join

Person

PersonID	Navn
1	A
2	B

PersonInteresse

PersonID	Interesse
1	Programmering
1	SQL
2	Programmering

```
SELECT * FROM Person p, PersonInteresse pi  
WHERE p.PersonID = pi.PersonID;
```

p.PersonID	p.Navn	pi.PersonID	pi.Interesse
1	A	1	Programmering
1	A	1	SQL
2	B	2	Programmering

```
SELECT *  
FROM Person p INNER JOIN PersonInteresse pi  
ON p.PersonID = pi.PersonID;
```

# Select fra to tabeller, implisitt join

Person

PersonID	Navn
1	A
2	B

PersonInteresse

PersonID	Interesse
1	Programmering
1	SQL
2	Programmering

```
SELECT * FROM Person p, PersonInteresse pi  
WHERE p.PersonID = pi.PersonID;
```

} → Implisitt join

p.PersonID	p.Navn	pi.PersonID	pi.Interesse
1	A	1	Programmering
1	A	1	SQL
2	B	2	Programmering

```
SELECT *  
FROM Person p INNER JOIN PersonInteresse pi  
ON p.PersonID = pi.PersonID;
```

} → Eksplisitt join

# Kjært Barn...

- “INNER JOIN” er så vanlig at det er det en implisitt join (“,”) gjør
- Kan også skrive bare “JOIN”
  - ```
SELECT *  
FROM Person p JOIN PersonInteresse pi  
ON p.PersonID = pi.PersonID;
```
- Men det finnes andre typer Join også!

# Inner Joins

Film

| Title                       | FilmID |
|-----------------------------|--------|
| Titanic                     | 6      |
| James Bond: License to kill | 007    |
| The Godfather               | 8      |
| Den ukjente film            | 9      |

Filmrating

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 007    | 6.6    |
| 12     | 5.6    |
| 8      | 9.1    |

```
SELECT film.title, film.filmID, filmrating.rating
FROM film INNER JOIN filmrating
ON film.filmID = filmrating.filmID;
```

# Inner Joins

Film

| Title                       | FilmID |
|-----------------------------|--------|
| Titanic                     | 6      |
| James Bond: License to kill | 007    |
| The Godfather               | 8      |
| Den ukjente film            | 9      |

Filmrating

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 007    | 6.6    |
| 12     | 5.6    |
| 8      | 9.1    |

```
SELECT film.title, film.filmID, filmrating.rating
FROM film INNER JOIN filmrating
ON film.filmID = filmrating.filmID;
```

# Inner Joins

Film

| Title                       | FilmID |
|-----------------------------|--------|
| Titanic                     | 6      |
| James Bond: License to kill | 007    |
| The Godfather               | 8      |
| Den ukjente film            | 9      |

Filmrating

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 007    | 6.6    |
| 12     | 5.6    |
| 8      | 9.1    |

| Title | FilmID | Rating |
|-------|--------|--------|
|-------|--------|--------|

```
SELECT film.title, film.filmID, filmrating.rating  
FROM film INNER JOIN filmrating ON film.filmID = filmrating.filmID;
```



# Inner Joins

Film

| Title                       | FilmID |
|-----------------------------|--------|
| Titanic                     | 6      |
| James Bond: License to kill | 007    |
| The Godfather               | 8      |
| Den ukjente film            | 9      |

Filmrating

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 007    | 6.6    |
| 12     | 5.6    |
| 8      | 9.1    |

| Title   | FilmID | Rating |
|---------|--------|--------|
| Titanic | 6      | 7.0    |

```
SELECT film.title, film.filmID, filmrating.rating
FROM film INNER JOIN filmrating ON film.filmID = filmrating.filmID;
```



# Inner Joins

Film

| Title                       | FilmID |
|-----------------------------|--------|
| Titanic                     | 6      |
| James Bond: License to kill | 007    |
| The Godfather               | 8      |
| Den ukjente film            | 9      |

Filmrating

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 007    | 6.6    |
| 12     | 5.6    |
| 8      | 9.1    |

| Title                       | FilmID | Rating |
|-----------------------------|--------|--------|
| Titanic                     | 6      | 7.0    |
| James Bond: License to kill | 007    | 6.6    |

```
SELECT film.title, film.filmID, filmrating.rating  
FROM film INNER JOIN filmrating ON film.filmID = filmrating.filmID;
```

# Inner Joins

Film

| Title                       | FilmID |
|-----------------------------|--------|
| Titanic                     | 6      |
| James Bond: License to kill | 007    |
| The Godfather               | 8      |
| Den ukjente film            | 9      |

Filmrating

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 007    | 6.6    |
| 12     | 5.6    |
| 8      | 9.1    |

| Title                       | FilmID | Rating |
|-----------------------------|--------|--------|
| Titanic                     | 6      | 7.0    |
| James Bond: License to kill | 007    | 6.6    |
| The Godfather               | 8      | 9.1    |

```
SELECT film.title, film.filmID, filmrating.rating
FROM film INNER JOIN filmrating ON film.filmID = filmrating.filmID;
```

# Inner Joins

Film

| Title                       | FilmID |
|-----------------------------|--------|
| Titanic                     | 6      |
| James Bond: License to kill | 007    |
| The Godfather               | 8      |
| Den ukjente film            | 9      |

Filmrating

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 007    | 6.6    |
| 12     | 5.6    |
| 8      | 9.1    |

| Title                       | FilmID | Rating |
|-----------------------------|--------|--------|
| Titanic                     | 6      | 7.0    |
| James Bond: License to kill | 007    | 6.6    |
| The Godfather               | 8      | 9.1    |
| Den ukjente film            | 9      |        |

```
SELECT film.title, film.filmID, filmrating.rating
FROM film INNER JOIN filmrating ON film.filmID = filmrating.filmID;
```

# Inner Joins

Film

| Title                       | FilmID |
|-----------------------------|--------|
| Titanic                     | 6      |
| James Bond: License to kill | 007    |
| The Godfather               | 8      |
| Den ukjente film            | 9      |

Filmrating

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 007    | 6.6    |
| 12     | 5.6    |
| 8      | 9.1    |

| Title                       | FilmID | Rating |
|-----------------------------|--------|--------|
| Titanic                     | 6      | 7.0    |
| James Bond: License to kill | 007    | 6.6    |
| The Godfather               | 8      | 9.1    |

```
SELECT film.title, film.filmID, filmrating.rating  
FROM film INNER JOIN filmrating ON film.filmID = filmrating.filmID;
```

# Inner Joins

Film

| Title                       | FilmID |
|-----------------------------|--------|
| Titanic                     | 6      |
| James Bond: License to kill | 007    |
| The Godfather               | 8      |
| Den ukjente film            | 9      |

Filmrating

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 007    | 6.6    |
| 12     | 5.6    |
| 8      | 9.1    |

| Title                       | FilmID | Rating |
|-----------------------------|--------|--------|
| Titanic                     | 6      | 7.0    |
| James Bond: License to kill | 007    | 6.6    |
| The Godfather               | 8      | 9.1    |

```
SELECT film.title, film.filmID, filmrating.rating
FROM film INNER JOIN filmrating ON film.filmID = filmrating.filmID;
```

# Natural join

Person

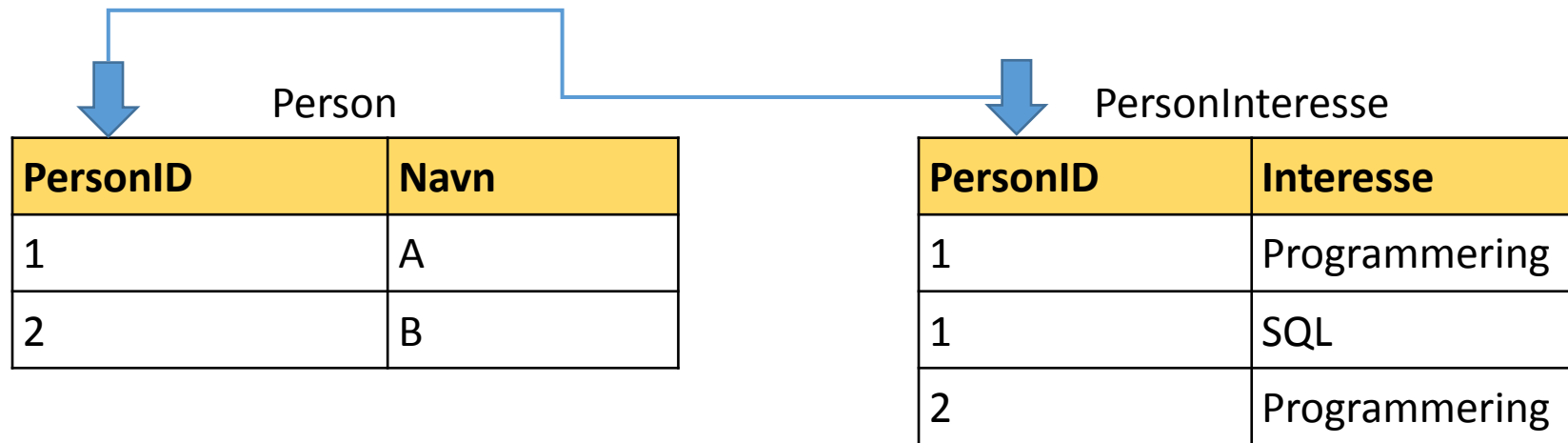
| PersonID | Navn |
|----------|------|
| 1        | A    |
| 2        | B    |

PersonInteresse

| PersonID | Interesse     |
|----------|---------------|
| 1        | Programmering |
| 1        | SQL           |
| 2        | Programmering |

```
SELECT *  
FROM Person p NATURAL JOIN PersonInteresse pi;
```

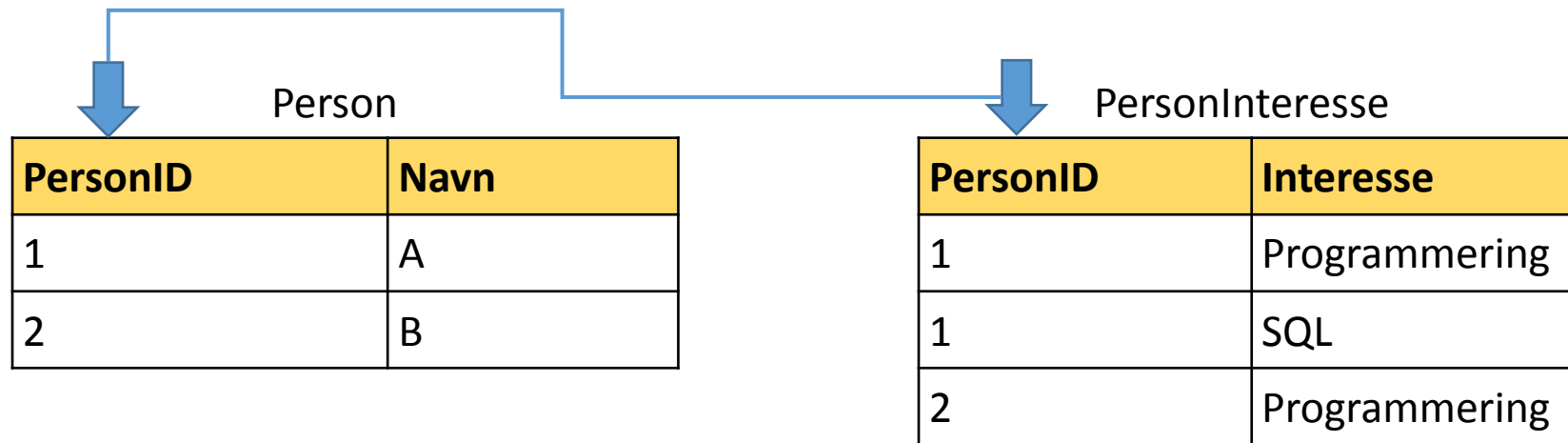
# Natural join



Felles attributt  
PersonID

```
SELECT *  
FROM Person p NATURAL JOIN PersonInteresse pi;
```

# Natural join



Felles attributt  
PersonID

```
SELECT *  
FROM Person p NATURAL JOIN PersonInteresse pi;
```

| p.PersonID | p.Navn | pi.Interesse  |
|------------|--------|---------------|
| 1          | A      | Programmering |
| 1          | A      | SQL           |
| 2          | B      | Programmering |



# Natural join: Det fungerer ikke altid!

Person


| PersonID | Navn |
|----------|------|
| 1        | A    |
| 2        | B    |

PersonInteresse

| PID | Interesse     |
|-----|---------------|
| 1   | Programmering |
| 1   | SQL           |
| 2   | Programmering |


```
SELECT *  
FROM Person p NATURAL JOIN PersonInteresse pi;
```

# Natural join: Det fungerer ikke altid!



Person

| PersonID | Navn |
|----------|------|
| 1        | A    |
| 2        | B    |




PersonInteresse

| PID | Interesse     |
|-----|---------------|
| 1   | Programmering |
| 1   | SQL           |
| 2   | Programmering |

Ingen attributter  
med samme navn


```
SELECT *  
FROM Person p NATURAL JOIN PersonInteresse pi;
```

# Natural join: Det fungerer ikke alltid!



Person

| PersonID | Navn |
|----------|------|
| 1        | A    |
| 2        | B    |



PersonInteresse

| PID | Interesse     |
|-----|---------------|
| 1   | Programmering |
| 1   | SQL           |
| 2   | Programmering |

Ingen attributter  
med samme navn

```
SELECT *  
FROM Person p NATURAL JOIN PersonInteresse pi;
```

| p.PersonID | p.Navn | pi.PID | pi.Interesse  |
|------------|--------|--------|---------------|
| 1          | A      | 1      | Programmering |
| 1          | A      | 1      | SQL           |
| 1          | A      | 2      | Programmering |
| 2          | B      | 1      | Programmering |
| 2          | B      | 1      | SQL           |
| 2          | B      | 2      | Programmering |

# Natural join: Det fungerer ikke alltid!

↓ Person

| PersonID | Navn |
|----------|------|
| 1        | A    |
| 2        | B    |

↓ PersonInteresse

| PID | Interesse     |
|-----|---------------|
| 1   | Programmering |
| 1   | SQL           |
| 2   | Programmering |

Ingen attributter med samme navn

```
SELECT *  
FROM Person p NATURAL JOIN PersonInteresse pi;
```

| p.PersonID | p.Navn | pi.PID | pi.Interesse  |
|------------|--------|--------|---------------|
| 1          | A      | 1      | Programmering |
| 1          | A      | 1      | SQL           |
| 1          | A      | 2      | Programmering |
| 2          | B      | 1      | Programmering |
| 2          | B      | 1      | SQL           |
| 2          | B      | 2      | Programmering |

Kartesisk produkt!

# Natural join: Andre problemer

Person

| PersonID | Navn | Interesse   |
|----------|------|-------------|
| 1        | A    | <i>null</i> |
| 2        | B    | <i>null</i> |

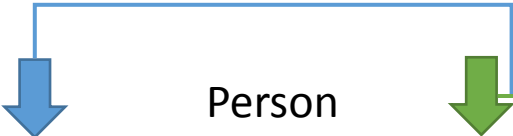
PersonInteresse

| PersonID | Interesse     |
|----------|---------------|
| 1        | Programmering |
| 1        | SQL           |
| 2        | Programmering |

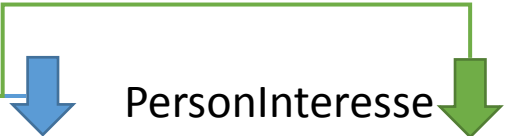
```
SELECT *
```

```
FROM Person p NATURAL JOIN PersonInteresse pi;
```

# Natural join: Andre problemer



| PersonID | Navn | Interesse   |
|----------|------|-------------|
| 1        | A    | <i>null</i> |
| 2        | B    | <i>null</i> |

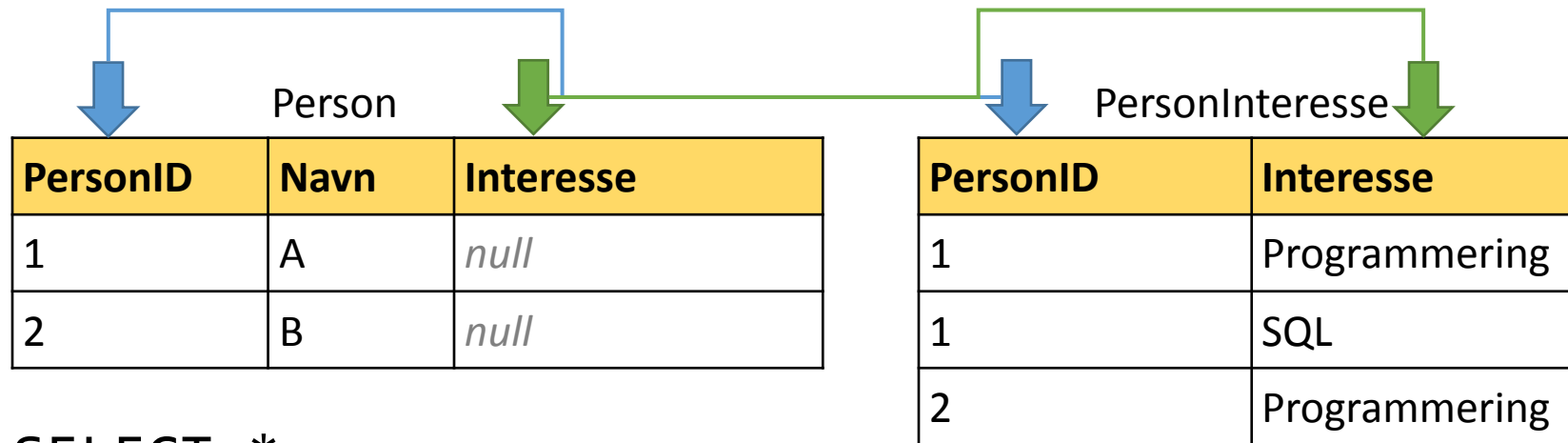


| PersonID | Interesse     |
|----------|---------------|
| 1        | Programmering |
| 1        | SQL           |
| 2        | Programmering |

To attributter  
med samme navn

```
SELECT *  
FROM Person p NATURAL JOIN PersonInteresse pi;
```

# Natural join: Andre problemer



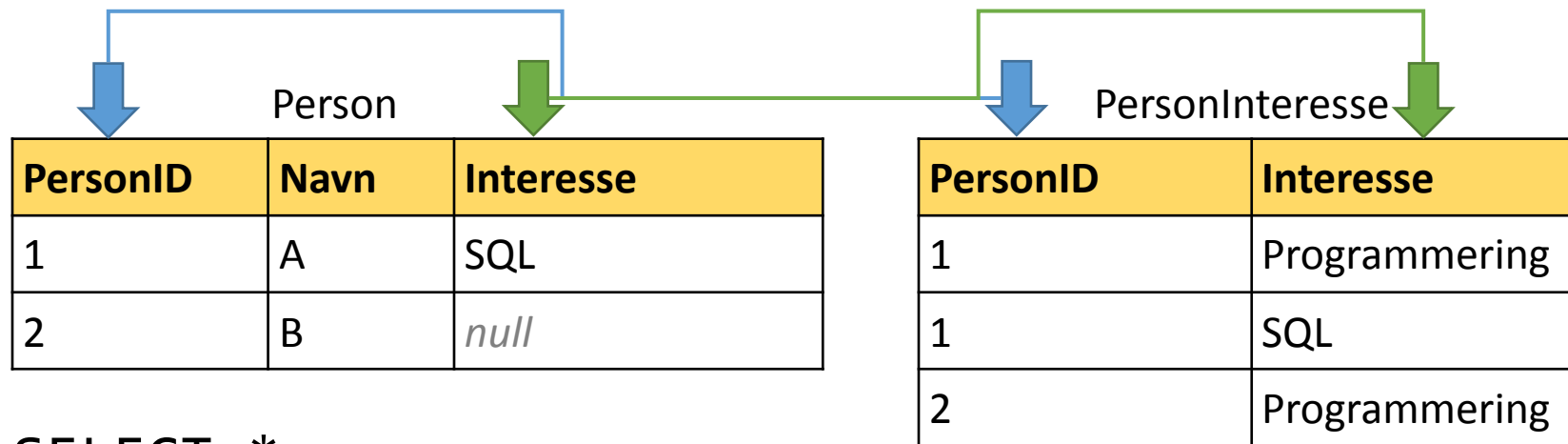
To attributter  
med samme navn

```
SELECT *  
FROM Person p NATURAL JOIN PersonInteresse pi;
```

| p.PersonID | p.Navn | p.Interesse |
|------------|--------|-------------|
|------------|--------|-------------|

(0 rader)

# Natural join: Andre problemer



To attributter  
med samme navn

```
SELECT *  
FROM Person p NATURAL JOIN PersonInteresse pi;
```

| p.PersonID | p.Navn | p.Interesse |
|------------|--------|-------------|
| 1          | A      | SQL         |



# LEFT (OUTER) JOIN

| FilmID | Title            |
|--------|------------------|
| 6      | Titanic          |
| 8      | The Godfather    |
| 9      | Den ukjente film |

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 8      | 9.1    |
| 10     | 7.8    |

# LEFT (OUTER) JOIN

| FilmID | Title            |
|--------|------------------|
| 6      | Titanic          |
| 8      | The Godfather    |
| 9      | Den ukjente film |

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 8      | 9.1    |
| 10     | 7.8    |

```
SELECT f.filmID, f.title, r.rating  
FROM film f LEFT JOIN filmrating r ON f.filmID = r.filmID;
```

# LEFT (OUTER) JOIN

| FilmID | Title            |
|--------|------------------|
| 6      | Titanic          |
| 8      | The Godfather    |
| 9      | Den ukjente film |

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 8      | 9.1    |
| 10     | 7.8    |

```
SELECT f.filmID, f.title, r.rating  
FROM film f LEFT JOIN filmrating r ON f.filmID = r.filmID;
```

| FilmID | Title            |
|--------|------------------|
| 6      | Titanic          |
| 8      | The Godfather    |
| 9      | Den ukjente film |

# LEFT (OUTER) JOIN

| FilmID | Title            |
|--------|------------------|
| 6      | Titanic          |
| 8      | The Godfather    |
| 9      | Den ukjente film |

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 8      | 9.1    |
| 10     | 7.8    |

```
SELECT f.filmID, f.title, r.rating  
FROM film f LEFT JOIN filmrating r ON f.filmID = r.filmID;
```

| FilmID | Title            | Rating      |
|--------|------------------|-------------|
| 6      | Titanic          | 7.0         |
| 8      | The Godfather    | 9.1         |
| 9      | Den ukjente film | <i>null</i> |

# LEFT (OUTER) JOIN

| FilmID | Title            |
|--------|------------------|
| 6      | Titanic          |
| 8      | The Godfather    |
| 9      | Den ukjente film |

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 8      | 9.1    |
| 10     | 7.8    |

```
SELECT f.filmID, f.title, r.rating  
FROM film f LEFT JOIN filmrating r ON f.filmID = r.filmID;
```

| FilmID | Title            | Rating      |
|--------|------------------|-------------|
| 6      | Titanic          | 7.0         |
| 8      | The Godfather    | 9.1         |
| 9      | Den ukjente film | <i>null</i> |

**LEFT JOIN** heter også **LEFT OUTER JOIN**

# RIGHT (OUTER) JOIN

| FilmID | Title            |
|--------|------------------|
| 6      | Titanic          |
| 8      | The Godfather    |
| 9      | Den ukjente film |

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 8      | 9.1    |
| 10     | 7.8    |

# RIGHT (OUTER) JOIN

| FilmID | Title            |
|--------|------------------|
| 6      | Titanic          |
| 8      | The Godfather    |
| 9      | Den ukjente film |

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 8      | 9.1    |
| 10     | 7.8    |

```
SELECT f.title, f.filmID, r.rating  
FROM film f RIGHT JOIN filmrating r ON f.filmID = r.filmID;
```

# RIGHT (OUTER) JOIN

| FilmID | Title            |
|--------|------------------|
| 6      | Titanic          |
| 8      | The Godfather    |
| 9      | Den ukjente film |

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 8      | 9.1    |
| 10     | 7.8    |

```
SELECT f.title, f.filmID, r.rating  
FROM film f RIGHT JOIN filmrating r ON f.filmID = r.filmID;
```

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 8      | 9.1    |
| 10     | 7.8    |



# RIGHT (OUTER) JOIN

| FilmID | Title            |
|--------|------------------|
| 6      | Titanic          |
| 8      | The Godfather    |
| 9      | Den ukjente film |

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 8      | 9.1    |
| 10     | 7.8    |

```
SELECT f.title, f.filmID, r.rating  
FROM film f RIGHT JOIN filmrating r ON f.filmID = r.filmID;
```

| Title         | FilmID | Rating |
|---------------|--------|--------|
| Titanic       | 6      | 7.0    |
| The Godfather | 8      | 9.1    |
| <i>null</i>   | 10     | 7.8    |

# RIGHT (OUTER) JOIN

| FilmID | Title            |
|--------|------------------|
| 6      | Titanic          |
| 8      | The Godfather    |
| 9      | Den ukjente film |

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 8      | 9.1    |
| 10     | 7.8    |

```
SELECT f.title, f.filmID, r.rating  
FROM film f RIGHT JOIN filmrating r ON f.filmID = r.filmID;
```

| Title         | FilmID | Rating |
|---------------|--------|--------|
| Titanic       | 6      | 7.0    |
| The Godfather | 8      | 9.1    |
| <i>null</i>   | 10     | 7.8    |

**RIGHT JOIN** heter også **RIGHT OUTER JOIN**

# (FULL) OUTER JOIN

| FilmID | Title            |
|--------|------------------|
| 6      | Titanic          |
| 8      | The Godfather    |
| 9      | Den ukjente film |

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 8      | 9.1    |
| 10     | 7.8    |

# (FULL) OUTER JOIN

| FilmID | Title            |
|--------|------------------|
| 6      | Titanic          |
| 8      | The Godfather    |
| 9      | Den ukjente film |

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 8      | 9.1    |
| 10     | 7.8    |

```
SELECT f.title, f.filmID, r.rating  
FROM film f OUTER JOIN filmrating r ON f.filmID = r.filmID;
```

# (FULL) OUTER JOIN

| FilmID | Title            |
|--------|------------------|
| 6      | Titanic          |
| 8      | The Godfather    |
| 9      | Den ukjente film |

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 8      | 9.1    |
| 10     | 7.8    |

```
SELECT f.title, f.filmID, r.rating  
FROM film f OUTER JOIN filmrating r ON f.filmID = r.filmID;
```

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 8      | 9.1    |
| 10     | 7.8    |

# (FULL) OUTER JOIN

| FilmID | Title            |
|--------|------------------|
| 6      | Titanic          |
| 8      | The Godfather    |
| 9      | Den ukjente film |

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 8      | 9.1    |
| 10     | 7.8    |

```
SELECT f.title, f.filmID, r.rating  
FROM film f OUTER JOIN filmrating r ON f.filmID = r.filmID;
```

| Title         | FilmID | Rating |
|---------------|--------|--------|
| Titanic       | 6      | 7.0    |
| The Godfather | 8      | 9.1    |
| <i>null</i>   | 10     | 7.8    |

# (FULL) OUTER JOIN

| FilmID | Title            |
|--------|------------------|
| 6      | Titanic          |
| 8      | The Godfather    |
| 9      | Den ukjente film |

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 8      | 9.1    |
| 10     | 7.8    |

```
SELECT f.title, f.filmID, r.rating  
FROM film f OUTER JOIN filmrating r ON f.filmID = r.filmID;
```

| Title            | FilmID | Rating |
|------------------|--------|--------|
| Titanic          | 6      | 7.0    |
| The Godfather    | 8      | 9.1    |
| <i>null</i>      | 10     | 7.8    |
| Den ukjente Film | 9      |        |

# (FULL) OUTER JOIN

| FilmID | Title            |
|--------|------------------|
| 6      | Titanic          |
| 8      | The Godfather    |
| 9      | Den ukjente film |

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 8      | 9.1    |
| 10     | 7.8    |

```
SELECT f.title, f.filmID, r.rating  
FROM film f OUTER JOIN filmrating r ON f.filmID = r.filmID;
```

| Title            | FilmID | Rating      |
|------------------|--------|-------------|
| Titanic          | 6      | 7.0         |
| The Godfather    | 8      | 9.1         |
| <i>null</i>      | 10     | 7.8         |
| Den ukjente Film | 9      | <i>null</i> |



# (FULL) OUTER JOIN

| FilmID | Title            |
|--------|------------------|
| 6      | Titanic          |
| 8      | The Godfather    |
| 9      | Den ukjente film |

| FilmID | Rating |
|--------|--------|
| 6      | 7.0    |
| 8      | 9.1    |
| 10     | 7.8    |

```
SELECT f.title, f.filmID, r.rating  
FROM film f OUTER JOIN filmrating r ON f.filmID = r.filmID;
```

| Title            | FilmID | Rating      |
|------------------|--------|-------------|
| Titanic          | 6      | 7.0         |
| The Godfather    | 8      | 9.1         |
| <i>null</i>      | 10     | 7.8         |
| Den ukjente Film | 9      | <i>null</i> |

**OUTER JOIN** heter også **FULL OUTER JOIN**