

Databaser forår 2020

Kursusgang 3

30 April 2020

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Agenda

1. Opgaven - hvordan er det gået?
2. Import af CSV-filer
3. Normalisering 1, 2 og 3. normalform
4. Relationer
5. Opgave (skil en tabel ad)
6. Joins og views
7. Opgave (lav et autoværksted)
8. Næste gang - opgave 3

Normalisering

Vi ønsker et minimum af redundant data

Vi ønsker data som er nemt at vedligeholde og nemt at finde

1. Normal form (1NF)

Vi skal bruge et unik nøgle til vores data

Hvert felt i et row må kun indeholde en enkelt værdi

Der må ikke være gentagelser

1. Normal form (1NF)

Vi skal bruge et unik nøgle til vores data rows.
EmployeeID er den unikke nøgle (primary key)
Nedenstående tabel.

EmployeeID	LastName	FirstName	Title	TitleOfCourte...	BirthDate
1	Davolio	Nancy	Sales Representative	Ms.	1948-12-08 00:00:00
2	Fuller	Andrew	Vice President, Sales	Dr.	1952-02-19 00:00:00
3	Leverling	Janet	Sales Representative	Ms.	1963-08-30 00:00:00
4	Peacock	Margaret	Sales Representative	Mrs.	1937-09-19 00:00:00
5	Buchanan	Steven	Sales Manager	Mr.	1955-03-04 00:00:00
6	Suyama	Michael	Sales Representative	Mr.	1963-07-02 00:00:00
7	King	Robert	Sales Representative	Mr.	1960-05-29 00:00:00
8	Callahan	Laura	Inside Sales Coordinator	Ms.	1958-01-09 00:00:00
9	Dodsworth	Anne	Sales Representative	Ms.	1966-01-27 00:00:00

1. Normal form (1NF)

Hvert felt skal have en unik nøgle

Hvert felt i et row må kun indeholde en enkelt værdi.

customer

ID	Name	City	Contact
1	ACME Corp	Denver	Marcia Donald
2	Two Trees	Ojai	Helen Bale
3	Acacia	Edinburgh	Martin Brown, Karen Dick, Jack Watkins



Der må ikke være “repeating groups”

customer

ID	Name	City	Contact	Contact 2	Contact 3
1	ACME Corp	Denver	Marcia Donald		
2	Two Trees	Ojai	Helen Bale		
3	Acacia	Edinburgh	Martin Brown	Karen Dick	Jack Watkins



1. Normal form (1NF)

customer

ID	Name	City
1	ACME Corp	Denver
2	Two Trees	Ojai
3	Acacia	Edinburgh

customerContact

ID	CustID	Name
1	1	Marcia Donald
2	2	Helen Bale
3	3	Karen Dick
4	3	Jack Watkins
5	3	Martin Brown

2. Normal form (2NF)

-Et hvert felt som IKKE er en primary key bør være afhængig af (en hel) primary key. Vi kan løse dette problem ved IKKE at bruge “compound primary keys”. Vi bruger ikke compound primary keys I dette kursus.

events

ID	Date	CourseTitle	Seats	Room
SQL101	4/2/10	Intro to SQL	5	14
SQL101	5/4/10	Intro to SQL	2	11
SQL101	6/9/10	Intro to SQL	4	8
DB101	5/4/10	Database Design	6	11

compound primary key

events

ID	Date	CourseTitle	Seats	Room
SQL101	4/2/10	Intro to SQL	5	14
ASP101	5/4/10	Intro to SQL	2	11
SQL101	6/9/10	Intro to SQL	4	8
DB101	5/4/10	Database Design	6	11

compound primary key



events

ID	Date	Seats	Room
SQL101	4/2/10	5	14
ASP101	5/4/10	2	11
SQL101	6/9/10	4	8
DB101	5/4/10	6	11

courses

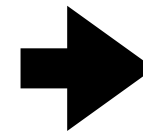
ID	Title
ASP101	Intro to ASP.NET
SQL101	Intro to SQL
DB101	Database Design

3. Normal form (3NF)

- Felter som ikke er primary key må ikke være afhængigt af andre felter

events

EventID	ID	Date	Available	Room	Capacity
78	SQL101	4/2/10	5	14	18
79	ASP101	5/4/10	2	11	24
80	SQL101	6/9/10	4	8	12
81	DB101	5/4/10	6	11	24

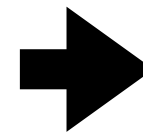


events

EventID	ID	Date	Available	Room
78	SQL101	4/2/10	5	14
79	ASP101	5/4/10	2	11
80	SQL101	6/9/10	4	8
81	DB101	5/4/10	6	11

orderItems

ID	ProductID	UnitPrice	Quantity	Total
2178	1002	12.00	4	48.00
2179	1009	78.00	1	78.00
2180	1002	400.00	3	1200.00
2181	1007	0.99	1	0.99



orderItems

ID	ProductID	UnitPrice	Quantity
2178	1002	12.00	4
2179	1009	78.00	1
2180	1002	400.00	3
2181	1007	0.99	1

Hvad kunne der gøres her i Northwind databases Employee tabel?

EmployeeID	LastName	FirstName	Title	TitleOfCourte...	BirthDate	HireDate	Address	City	Region	PostalCode
1	Davolio	Nancy	Sales Representative	Ms.	1948-12-08 00:00:00	1992-05-01 00:00:00	507 - 20th Ave. E.Apt	Seattle	WA	98122
2	Fuller	Andrew	Vice President, Sales	Dr.	1952-02-19 00:00:00	1992-08-14 00:00:00	908 W. Capital Way	Tacoma	WA	98401
3	Leverling	Janet	Sales Representative	Ms.	1963-08-30 00:00:00	1992-04-01 00:00:00	722 Moss Bay Blvd.	Kirkland	WA	98033
4	Peacock	Margaret	Sales Representative	Mrs.	1937-09-19 00:00:00	1993-05-03 00:00:00	4110 Old Redmond P	Redmond	WA	98052
5	Buchanan	Steven	Sales Manager	Mr.	1955-03-04 00:00:00	1993-10-17 00:00:00	14 Garrett Hill	London	NULL	SW1 8JR
6	Suyama	Michael	Sales Representative	Mr.	1963-07-02 00:00:00	1993-10-17 00:00:00	Coventry House Mine	London	NULL	EC2 7JR
7	King	Robert	Sales Representative	Mr.	1960-05-29 00:00:00	1994-01-02 00:00:00	Edgeham Hollow Wir	London	NULL	RG1 9SP
8	Callahan	Laura	Inside Sales Coordinator	Ms.	1958-01-09 00:00:00	1994-03-05 00:00:00	4726 - 11th Ave. N.E.	Seattle	WA	98105
9	Dodsworth	Anne	Sales Representative	Ms.	1966-01-27 00:00:00	1994-11-15 00:00:00	7 Houndstooth Rd.	London	NULL	WG2 7LT

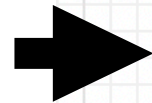
Country	HomePhone	Extension	Photo	Notes	ReportsTo	PhotoPath	Salary
USA	(206) 555-9857	5467	BLOB	Education includes a BA in psychology from Col...	2	http://accweb/emmployees/davolio.bmp	2954.55
USA	(206) 555-9482	3457	BLOB	Andrew received his BTS commercial in 1974 a...	NULL	http://accweb/emmployees/fuller.bmp	2254.49
USA	(206) 555-3412	3355	BLOB	Janet has a BS degree in chemistry from Bosto...	2	http://accweb/emmployees/leverling.bmp	3119.15
USA	(206) 555-8122	5176	BLOB	Margaret holds a BA in English literature from C...	2	http://accweb/emmployees/peacock.bmp	1861.08
UK	(71) 555-4848	3453	BLOB	Steven Buchanan graduated from St. Andrews...	2	http://accweb/emmployees/buchanan.bmp	1744.21
UK	(71) 555-7773	428	BLOB	Michael is a graduate of Sussex University (MA,...	5	http://accweb/emmployees/davolio.bmp	2004.07
UK	(71) 555-5598	465	BLOB	Robert King served in the Peace Corps and trav...	5	http://accweb/emmployees/davolio.bmp	1991.55
USA	(206) 555-1189	2344	BLOB	Laura received a BA in psychology from the Uni...	2	http://accweb/emmployees/davolio.bmp	2100.5
UK	(71) 555-4444	452	BLOB	Anne has a BA degree in English from St. Lawr...	5	http://accweb/emmployees/davolio.bmp	2333.33

Relationer

En til mange

Primærnøgler, fremmednøgler og relationer

Primærnøgle



customers
customer_id INT
company_name VARCHAR(45)
contact_name VARCHAR(45)
contact_title VARCHAR(45)
address VARCHAR(45)
city VARCHAR(45)
region VARCHAR(45)
postal_code VARCHAR(45)
country VARCHAR(45)
phone VARCHAR(45)
fax VARCHAR(45)
Indexes



orders
order_id INT
order_date DATETIME
shipped_date DATETIME
required_date DATETIME
shipped_via DATETIME
freight VARCHAR(45)
ship_name VARCHAR(45)
ship_city VARCHAR(45)
ship_region VARCHAR(45)
ship_postal_code VARCHAR(45)
ship_country VARCHAR(45)
customers_customer_id INT
Indexes

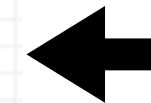
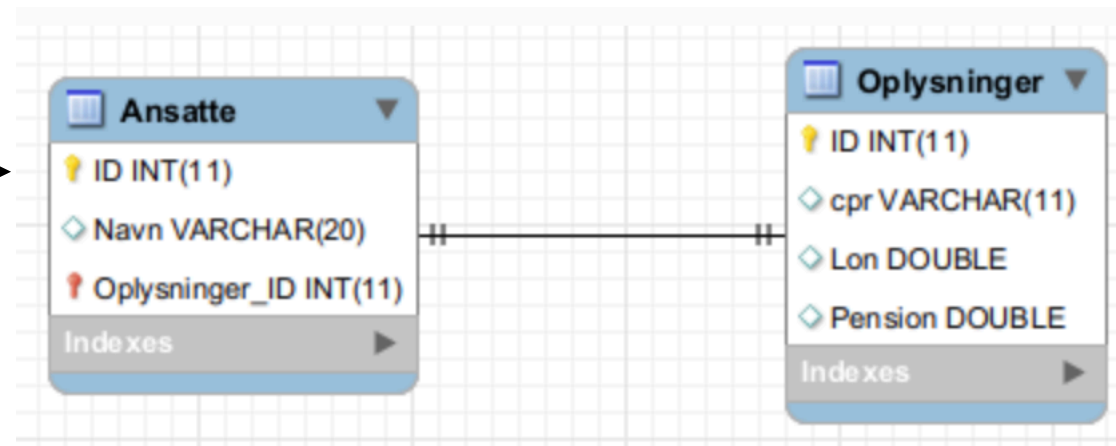
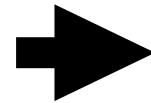


Fremmednøgle

En til En

Primærnøgler, fremmednøgler og relationer

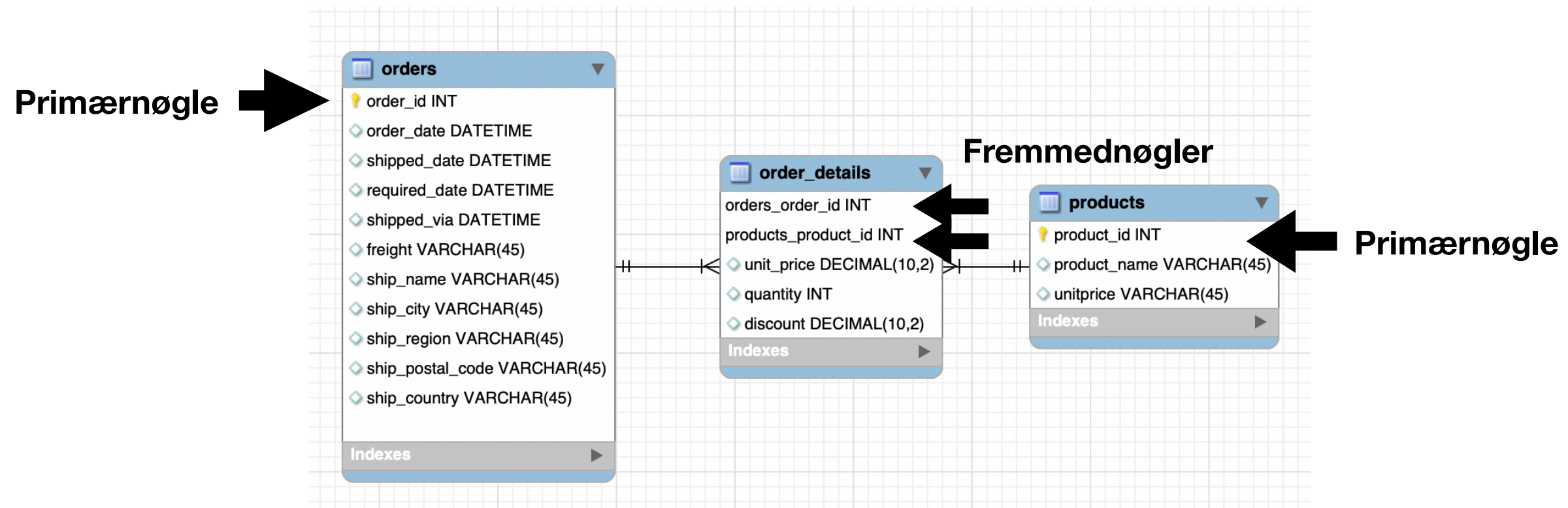
Primærnøgle



Primærnøgle

Mange til mange

Primærnøgler, fremmednøgler og relationer



NF 1

Elev nr.	Navn	Klasse	Klasselærer 1	Klasselærer 2	Matematik Mundtlig	Matematik Skriftlig	Dansk	Engelsk	Tysk
101	Ole Hansen	7 B	Peter Olsen	NULL	7	10	4	NULL	7
102	Pia Jensen	7 B	Peter Olsen	NULL	10	10	7	10	NULL
201	Kim Larsen	8 A	Peter Olsen	Bodil Klausen	7	7	2	7	10
202	Lise Madsen	8 A	Peter Olsen	Bodil Klausen	4	10	10	NULL	4

NF 2

Elev nr.	Navn	Klasse	Klasselærer 1	Klasselærer 2
101	Ole Hansen	7 B	Peter Olsen	NULL
102	Pia Jensen	7 B	Peter Olsen	NULL
201	Kim Larsen	8 A	Peter Olsen	Bodil Klausen
202	Lise Madsen	8 A	Peter Olsen	Bodil Klausen

Elev nr.	Matematik Mundtlig	Matematik Skriftlig	Dansk	Engelsk	Tysk
101	7	10	4	NULL	7
102	10	10	7	10	NULL
201	7	7	2	7	10
202	4	10	10	NULL	4

NF 3

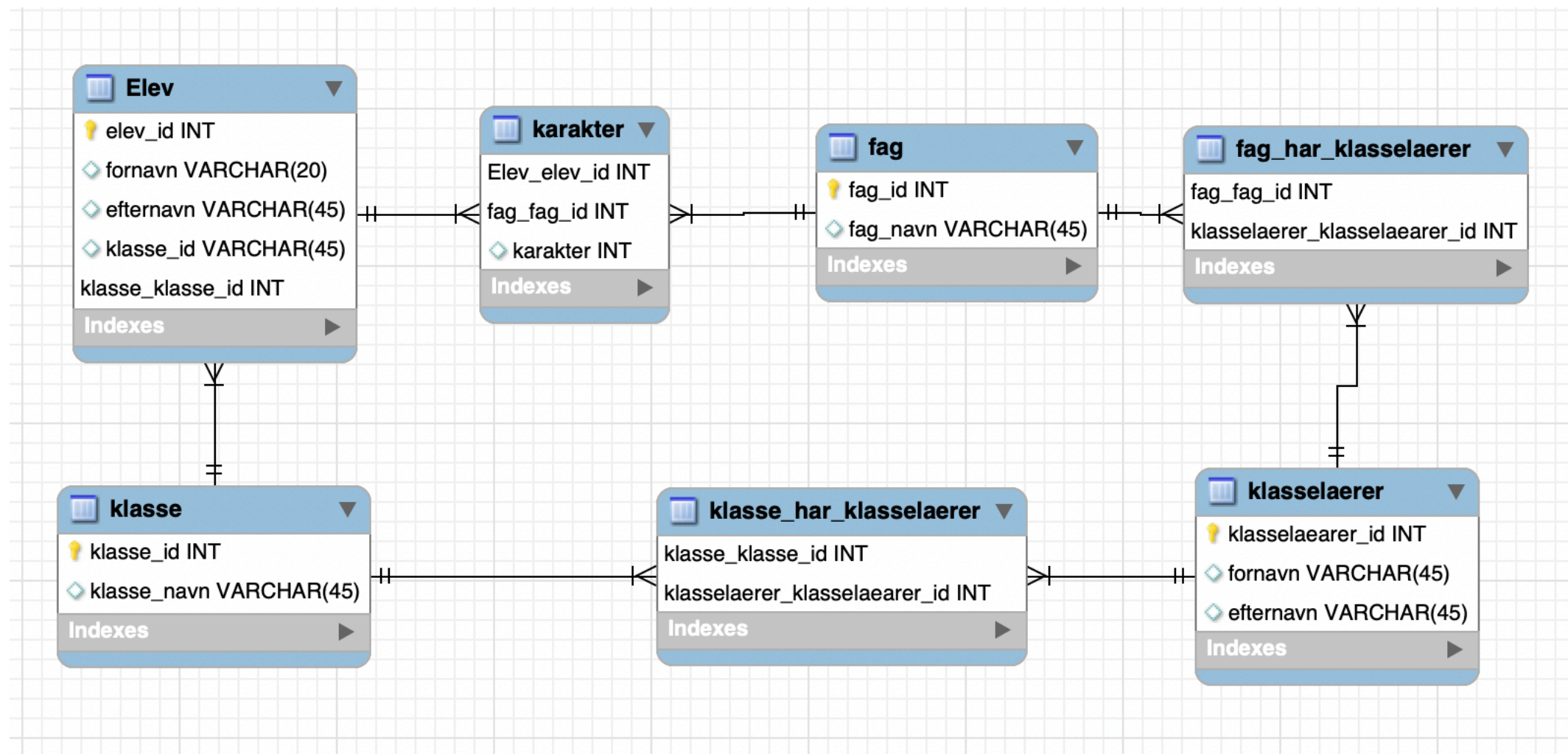
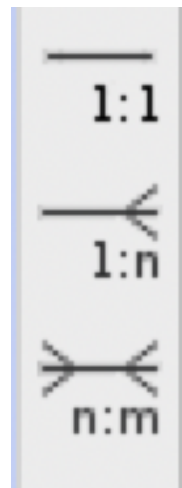
Elev nr.	Navn	Klasse
101	Ole Hansen	7 B
102	Pia Jensen	7 B
201	Kim Larsen	8 A
202	Lise Madsen	8 A

Klasse	Klasselærer ID
7 B	1
8 A	1
8 A	2

Elev nr.	Fag Id	Karakter
101	1	7
101	2	10
101	3	4
101	5	7
102	1	10
102	2	10
102	3	7
102	4	10
201	1	7
201	2	7
201	3	2
201	4	7
201	5	10
202	1	4
202	2	10
202	3	10
202	5	4

Klasselærer ID	Klasselærer
1	Peter Olsen
2	Bodil Klausen

Fag Id	Fag
1	Matematik Mundtlig
2	Matematik Skriftlig
3	Dansk
4	Engelsk
5	Tysk



5 Opgave skil en tabel ad

id	album-title	publiseret-år	sanger-fornavn	sanger-efternavn	sanger-nationalitet	sanger-fødselsdag	album-genre
1	Thriller	1982	Michael	Jackson	USA	29. august 1958	pop, funk, rock, post-disco

Fremgangsmåde!

- **Bestem dig for hvilket noget data som databasen skal indeholde.**
- **Tænk over hvordan du kan opdele dine data**
- **Kontroller at tabellerne overholder normalformerne**
- **Spørg dig frem for hver tabel for at finde relationerne fx:**

Kan en elev have flere fag? JA

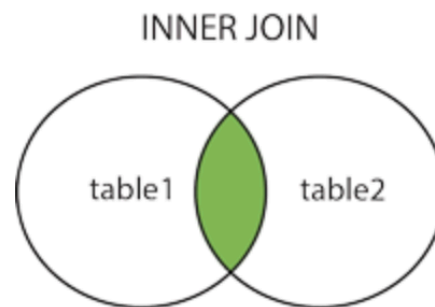
Kan et fag have flere elever?JA

Altså er der tale om: en mange til mange relation.

INNER JOIN Syntax

```
SELECT column_name(s)
FROM table1 ← Left tabel
INNER JOIN table2 ← Right tabel
ON table1.column_name = table2.column_name;
```

Den første tabel vi vælger fra kaldes
“left”, den vi joiner kaldes “right”



Elever

elev_id	elev_navn	fk_fag_id
1	Niels	1
2	John	1
3	Maria	2
4	Tina	2
5	Dan	4

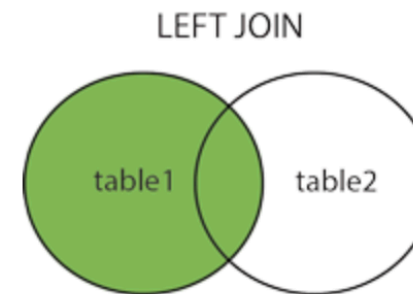
Fag

fag_id	fag_navn
1	Databaser
2	Backend
3	Frontend

LEFT JOIN Syntax

```
SELECT column_name(s)
FROM table1
LEFT JOIN table2
ON table1.column_name = table2.column_name;
```

Note: In some databases LEFT JOIN is called LEFT OUTER JOIN.



Elever

elev_id	elev_navn	fk_fag_id
1	Niels	1
2	John	1
3	Maria	2
4	Tina	2
5	Dan	4

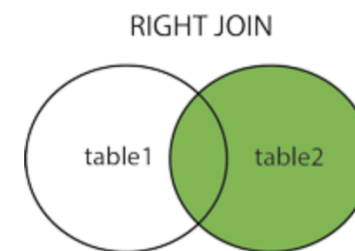
Fag

fag_id	fag_navn
1	Databaser
2	Backend
3	Frontend

RIGHT JOIN Syntax

```
SELECT column_name(s)
FROM table1
RIGHT JOIN table2
ON table1.column_name = table2.column_name;
```

Note: In some databases RIGHT JOIN is called RIGHT OUTER JOIN.



Elever

elev_id	elev_navn	fk_fag_id
1	Niels	1
2	John	1
3	Maria	2
4	Tina	2
5	Dan	4

Fag

fag_id	fag_navn
1	Databaser
2	Backend
3	Frontend