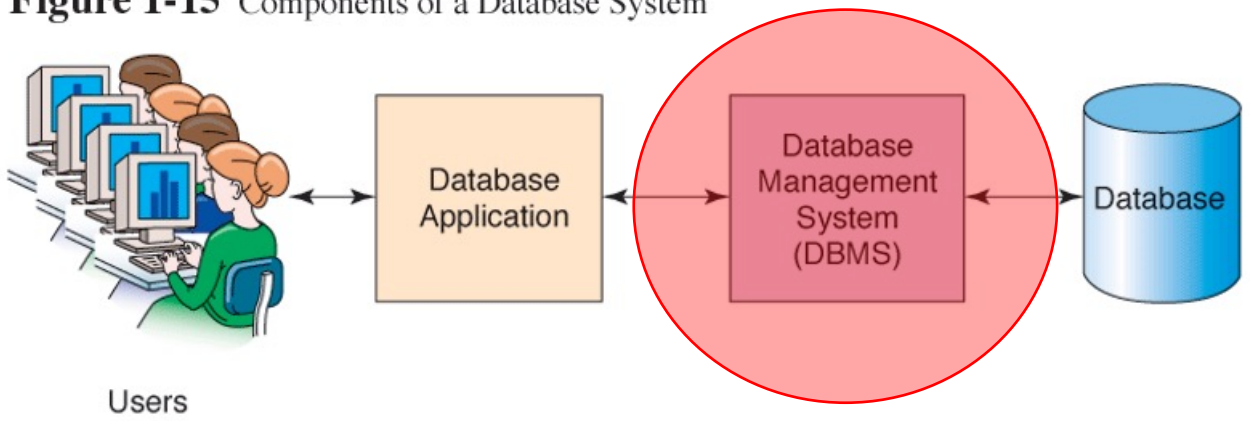
Agenda - CRUD

- Recap på Select (conditions,join,aggregation)
  - EMP-databasen
- UPDATE og INSERT
  - EMP-databasen
  - Øvelser i MySQL og R
- CREATE
  - Tilføj adresse
  - Øvelse

Database Management System (DBMS)

- Et **software system** som giver brugere mulighed for at definere, oprette og vedligeholde en database samt kontrolleret adgang til denne.

Figure 1-15 Components of a Database System



Relationel Database

Den mest udbredte DBMS type.

- En database har et navn
- En database har en eller flere tabeller

- Hver tabel har et navn
- Hver tabel har en eller flere kolonner
- Hver kolonne har navn og datatype

Eksempel:
Database hedder **test**
indeholder 9 tabeller

MySQL from R

- Connecting and disconnecting
  - Connecting to and disconnecting from databases
    - dbConnect(…)
- Tables
  - Reading and writing entire tables
    - dbReadTable(con, "mtcars")
- Results
  - More control for sending queries and executing statements
    - dbGetQuery(con, "SELECT * FROM city limit 3")
    - dbExecute (con,”INSERT INTO city (Name,Population) VALUES (‘Lviv’,123123)”)

MySQL from R

rMariaTry.R* | res | dfEmpDB | suppl | sorted | cat | prod | cat_prod_join | nrs

Filter

	DEPTNO	EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DNAME	LOC
1	10	7782	CLARK	MANAGER	7839	1981-06-09	2450	NA	ACCOUNTING	NEW YORK
2	10	7839	KING	PRESIDENT	NA	1981-11-17	5000	NA	ACCOUNTING	NEW YORK
3	10	7934	MILLER	CLERK	7782	1982-01-23	1300	NA	ACCOUNTING	NEW YORK
4	20	7369	SMITH	CLERK	7902	1980-12-17	800	NA	RESEARCH	DALLAS
5	20	7876	ADAMS	CLERK	7788	1987-05-23	1100	NA	RESEARCH	DALLAS
6	20	7566	JONES	MANAGER	7839	1981-04-02	2975	NA	RESEARCH	DALLAS
7	20	7902	FORD	ANALYST	7566	1981-12-03	3000	NA	RESEARCH	DALLAS
8	20	7788	SCOTT	ANALYST	7566	1987-04-19	3000	NA	RESEARCH	DALLAS
9	30	7499	ALLEN	SALESMAN	7698	1981-02-20	1600	300	SALES	CHICAGO
10	30	7698	BLAKE	MANAGER	7839	1981-05-01	2850	NA	SALES	CHICAGO
11	30	7521	WARD	SALESMAN	7698	1981-02-22	1250	500	SALES	CHICAGO
12	30	7654	MARTIN	SALESMAN	7698	1981-09-28	1250	1400	SALES	CHICAGO
13	30	7844	TURNER	SALESMAN	7698	1981-09-08	1500	0	SALES	CHICAGO
14	30	7900	JAMES	CLERK	7698	1981-12-03	950	NA	SALES	CHICAGO

Indlæse tabellerne hver for sig.
Udfør operationer i R (merge,aggregate)

rMariaTry.R* | res

Filter

	DNAME	V1
1	ACCOUNTING	2916
2	RESEARCH	2175
3	SALES	1566

Tabel eksempel
Medarbejdere (emp)

Kolonner – har navn og simpel datatype

Rækker – indeholder relaterede værdier

empno	ename	job	mgr	hiredate	sal	deptno
7369	SMITH	CLERK	7902	12/17/1980	800	20
7499	ALLEN	SALESMAN	7698	02/20/1981	1600	30
7521	WARD	SALESMAN	7698	02/22/1981	1250	30
7566	JONES	MANAGER	7839	04-02-1981	2975	20
7654	MARTIN	SALESMAN	7698	09/28/1981	1250	30
7698	BLAKE	MANAGER	7839	05-01-1981	2850	30
7782	CLARK	MANAGER	7839	06-09-1981	2450	10
7788	SCOTT	ANALYST	7566	04/19/1987	3000	20
7839	KING	PRESIDENT		11/17/1981	5000	10
7844	TURNER	SALESMAN	7698	09-08-1981	1500	30
7876	ADAMS	CLERK	7788	05/23/1987	1100	20
7900	JAMES	CLERK	7698	12-03-1981	950	30
7902	FORD	ANALYST	7566	12-03-1981	3000	20
7934	MILLER	CLERK	7782	01/23/1982	1300	10

Tabel eksempel 2
Medarbejdere (emp)
Afdelinger (dept)

emp

empno	ename	job	mgr	hiredate	sal	deptno
7369	SMITH	CLERK	7902	12/17/1980	800	20
7499	ALLEN	SALESMAN	7698	02/20/1981	1600	30
7521	WARD	SALESMAN	7698	02/22/1981	1250	30
7566	JONES	MANAGER	7839	04-02-1981	2975	20
7654	MARTIN	SALESMAN	7698	09/28/1981	1250	30
7698	BLAKE	MANAGER	7839	05-01-1981	2850	30
7782	CLARK	MANAGER	7839	06-09-1981	2450	10
7788	SCOTT	ANALYST	7566	04/19/1987	3000	20
7839	KING	PRESIDENT		11/17/1981	5000	10
7844	TURNER	SALESMAN	7698	09-08-1981	1500	30
7876	ADAMS	CLERK	7788	05/23/1987	1100	20
7900	JAMES	CLERK	7698	12-03-1981	950	30
7902	FORD	ANALYST	7566	12-03-1981	3000	20
7934	MILLER	CLERK	7782	01/23/1982	1300	10

dept

deptno	dname	loc
10	ACCOUNTING	NEW YORK
20	RESEARCH	DALLAS
30	SALES	CHICAGO
40	OPERATIONS	BOSTON

Er tabellerne logisk forbundne?

SQL

Data Definition (DDL)

- **CREATE**
- ALTER
- DROP

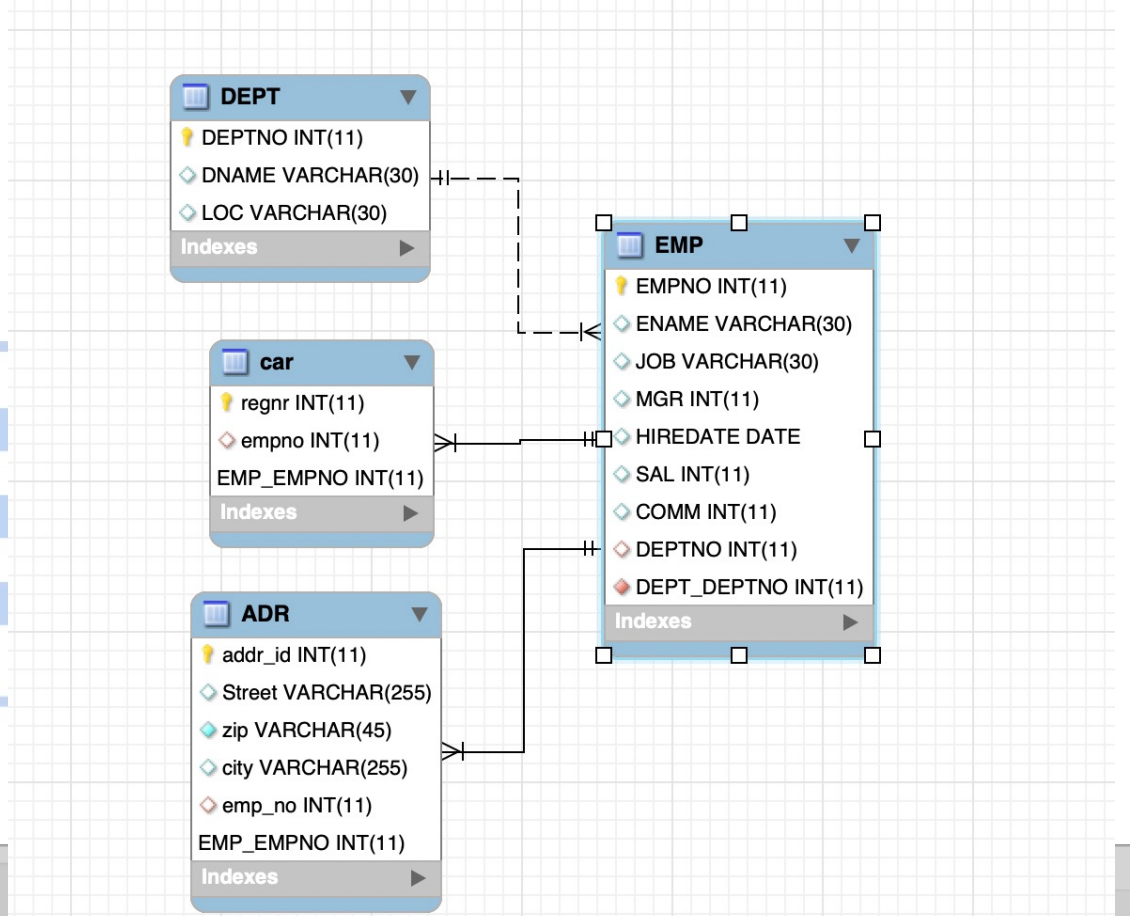
Data Manipulation (DML)

- **SELECT**
- **INSERT**
- **UPDATE**
- DELETE

MySQL Skema

Browsing

```
SHOW DATABASES
SHOW TABLES
SHOW FIELDS FROM table / DESCRIBE table
SHOW CREATE TABLE table
SHOW PROCESSLIST
KILL process_number
```



Info | Columns | Indexes

Column	Type	Default...	Nullable	Charac			ement
addr_id	int(11)		NO				
Street	varchar(255)		YES	utf8mb4	utf8mb4_090...	select,insert,update,references	
zip	varchar(45)		NO	utf8mb4	utf8mb4_090...	select,insert,update,references	
city	varchar(255)		YES	utf8mb4	utf8mb4_090...	select,insert,update,references	
emp_no	int(11)		YES			select,insert,update,references	

Mysql – Filtre

Select

```
SELECT * FROM table
SELECT * FROM table1, table2, ...
SELECT field1, field2, ... FROM table1, table2, ...
SELECT ... FROM ... WHERE condition
SELECT ... FROM ... WHERE condition GROUPBY field
SELECT ... FROM ... WHERE condition GROUPBY field HAVING condition2
SELECT ... FROM ... WHERE condition ORDER BY field1, field2
SELECT ... FROM ... WHERE condition ORDER BY field1, field2 DESC
SELECT ... FROM ... WHERE condition LIMIT 10
SELECT DISTINCT field1 FROM ...
SELECT DISTINCT field1, field2 FROM ...
```

Conditions

```
field1 = value1
field1 <> value1
field1 LIKE 'value _ %'
field1 IS NULL
field1 IS NOT NULL
field1 IS IN (value1, value2)
field1 IS NOT IN (value1, value2)
condition1 AND condition2
condition1 OR condition2
```

Insert

```
start transaction;
insert into adr (Street,city,zip,emp_no) values
("Syrenvej","Horsens","7500",7369);
rollback;

show create table adr;
```

JOIN

11. Select * from City and Join the Country table on countryCode.

What is Inner Join?

An Inner Join returns only the rows that have matching values in both the tables (we are considering here the join is done between the two tables).

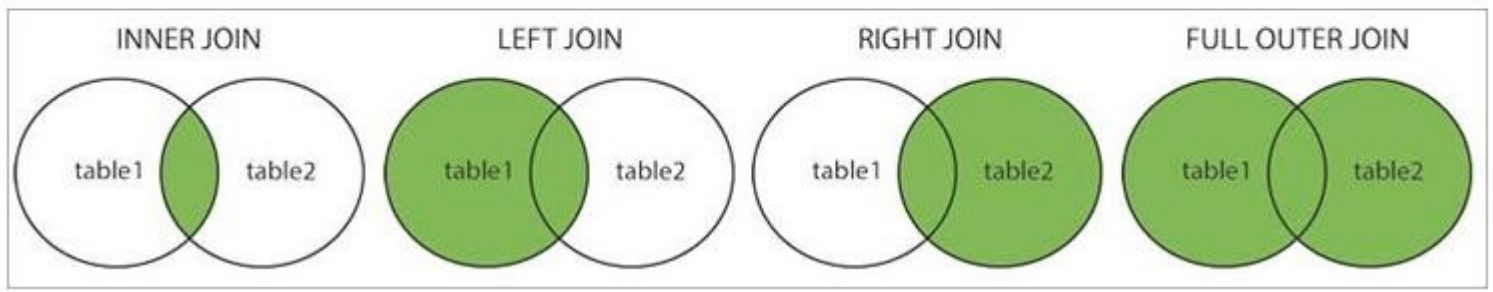
What is Outer Join?

The Outer Join includes the matching rows as well as some of the non-matching rows between the two tables. An Outer join basically differs from the Inner join in how it handles the false match condition.

There are 3 types of Outer Join:

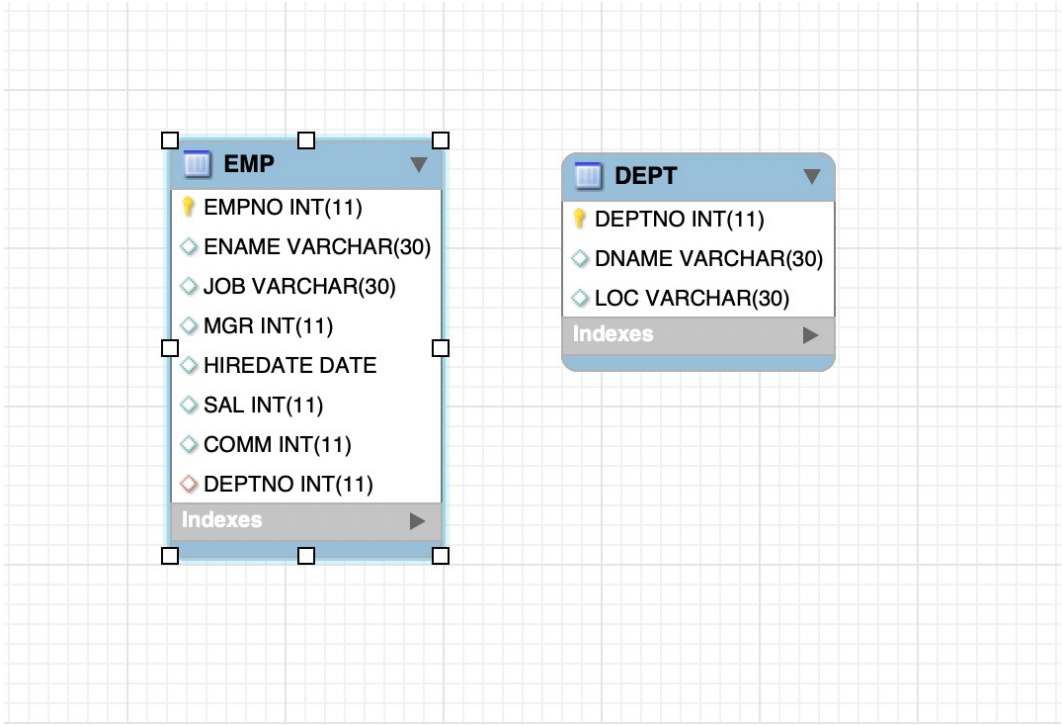
- **Left Outer Join**: Returns all the rows from the LEFT table and matching records between both the tables.
- **Right Outer Join**: Returns all the rows from the RIGHT table and matching records between both the tables.
- **Full Outer Join**: It combines the result of the Left Outer Join and Right Outer Join.

Difference between Inner and Outer Join



https://www.softwaretestinghelp.com/inner-join-vs-outer-join/

EMPLOYEE Databasen



Øvelse:

Find max-værdien af DEPTNO

Indsæt en ny afdeling, DATASCIENCE (Seattle) med passende DEPTNO

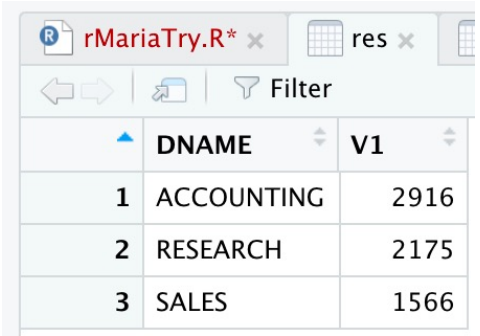
Tilføj dig selv som medarbejder med passende data (brug transaktion)

Prøv at tilføje en medarbejder til en ikke-eksisterende dept

Kan du lave en query så du får flg:

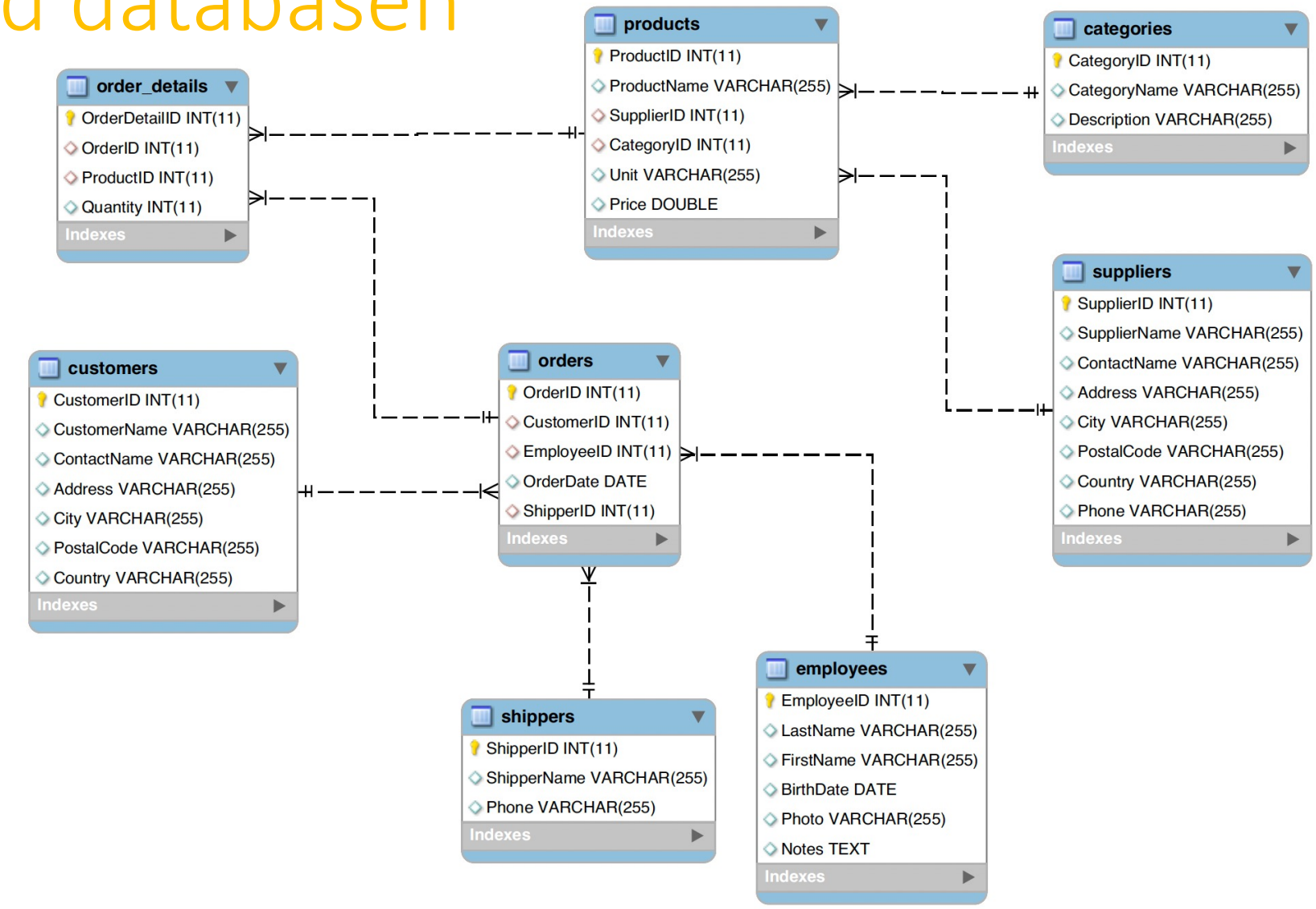
gennemsnit	afdeling
1566	SALES
2175	RESEARCH
2916	ACCOUNTING

Og samme resultat i R



	DNAME	V1
1	ACCOUNTING	2916
2	RESEARCH	2175
3	SALES	1566

Northwind databasen

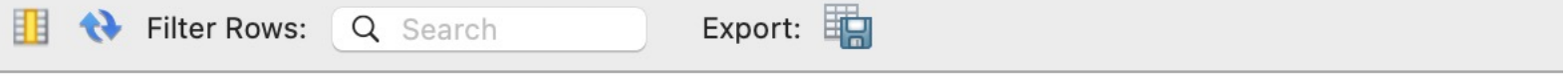


Northwind databasen

firstname	lastname	sum_total
Margaret	Peacock	105696
Nancy	Davolio	57690
Janet	Leverling	42838
Robert	King	39772
Laura	Callahan	39309
Andrew	Fuller	32503
Steven	Buchanan	27480
Michael	Suyama	25399
Anne	Dodsworth	15734

max_salary	deptno	dname
3000	20	RESEARCH
2850	30	SALES
5000	10	ACCOUNTING

customername	price_total
Ernst Handel	35631
Mère Paillarde	23362
Save-a-lot Markets	22500
Rattlesnake Canyon Grocery	18421
QUICK-Stop	18178



productid	productname	CategoryName	sum(od.quantity)
31	Gorgonzola Telino	Dairy Products	458
60	Camembert Pierrot	Dairy Products	430
35	Steeleye Stout	Beverages	369
59	Raclette Courdavault	Dairy Products	346
2	Chang	Beverages	341