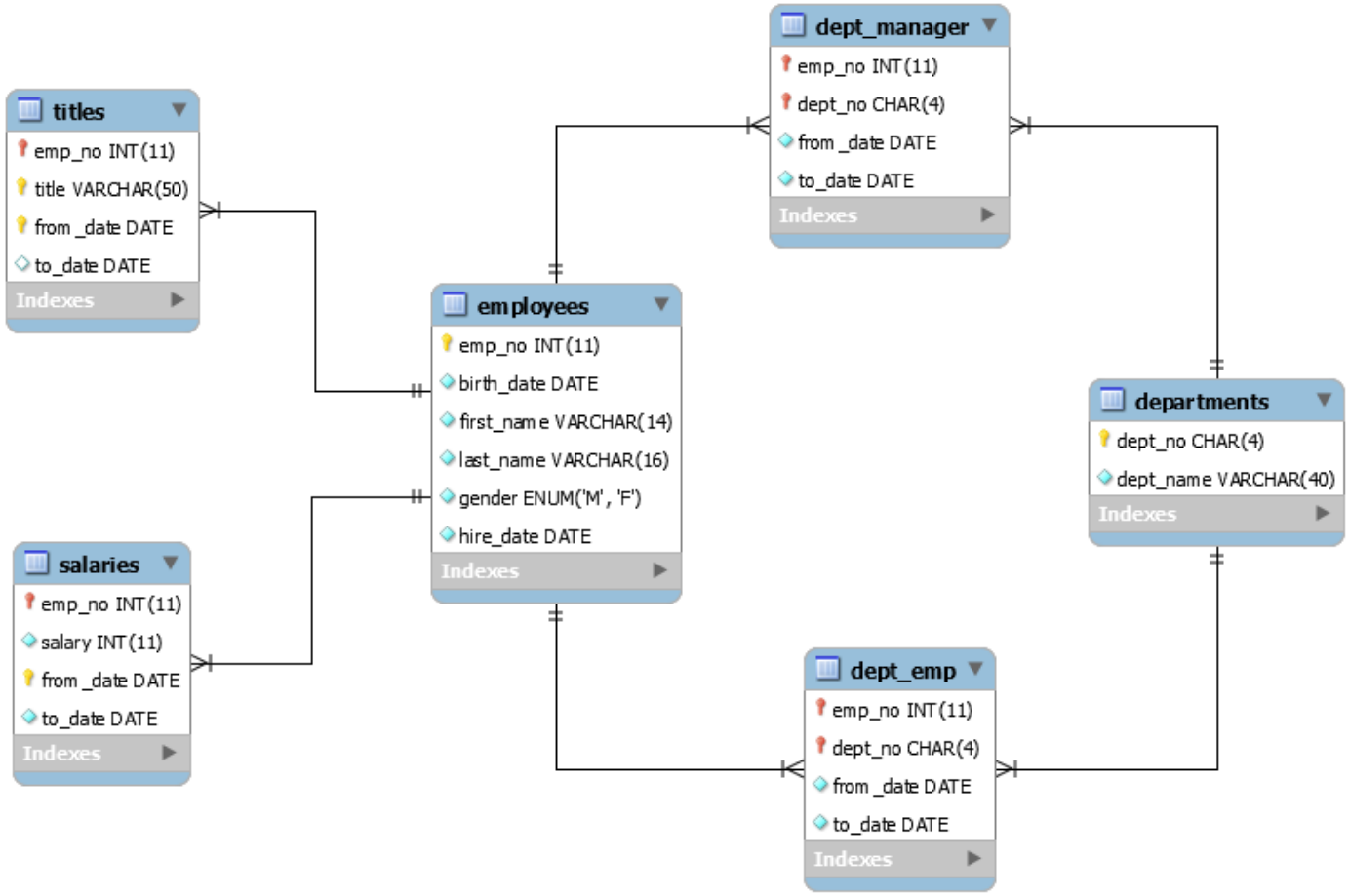
Data Analysis and Integration

A review of SQL

Introduction

- The employees database



Introduction

- The employees table

select * **from** employees **limit** 10;

```
+--------+------------+------------+-------------+--------+------------+
| emp_no | birth_date | first_name | last_name   | gender | hire_date  |
+--------+------------+------------+-------------+--------+------------+
|  10721 | 1964-07-12 | Bernd      | Redmiles    | F      | 1995-03-17 |
|  11260 | 1963-06-11 | Ingemar    | Schade      | M      | 1993-09-29 |
|  11371 | 1956-05-17 | Tadahiko   | Masamoto    | M      | 1988-12-25 |
|  11693 | 1952-02-15 | Hideo      | Coorg       | M      | 1989-03-13 |
|  13816 | 1964-03-09 | Miquel     | Maksimenko  | F      | 1992-09-17 |
|  14007 | 1961-12-02 | Shiv       | Jervis      | M      | 1987-02-03 |
|  14083 | 1959-05-27 | Sashi      | Figueira    | M      | 1986-04-13 |
|  14131 | 1960-02-17 | Kirk       | Thorensen   | M      | 1993-02-21 |
|  14791 | 1952-12-12 | Magy       | Garrabrants | F      | 1992-02-17 |
|  17698 | 1959-12-03 | Kazuhito   | Larfeldt    | M      | 1988-08-07 |
+--------+------------+------------+-------------+--------+------------+
10 rows in set (0.00 sec)
```

Introduction

- The departments table

select * **from** departments;

```
+---------+--------------------+
| dept_no | dept_name          |
+---------+--------------------+
| d009    | Customer Service   |
| d005    | Development        |
| d002    | Finance            |
| d003    | Human Resources    |
| d001    | Marketing          |
| d004    | Production         |
| d006    | Quality Management |
| d008    | Research           |
| d007    | Sales              |
+---------+--------------------+
9 rows in set (0.00 sec)
```

Introduction

- The dept_emp table

select * **from** dept_emp **limit** 10;

```
+--------+---------+------------+------------+
| emp_no | dept_no | from_date  | to_date    |
+--------+---------+------------+------------+
|  10721 | d009    | 1999-07-15 | 9999-01-01 |
|  11260 | d009    | 1996-05-16 | 9999-01-01 |
|  11371 | d005    | 1988-12-25 | 9999-01-01 |
|  11693 | d005    | 1991-08-24 | 9999-01-01 |
|  13816 | d005    | 1992-09-17 | 9999-01-01 |
|  14007 | d002    | 1988-10-17 | 9999-01-01 |
|  14083 | d004    | 1986-04-13 | 9999-01-01 |
|  14131 | d004    | 1993-05-11 | 1996-05-28 |
|  14791 | d005    | 1997-11-16 | 9999-01-01 |
|  17698 | d005    | 1988-08-07 | 9999-01-01 |
+--------+---------+------------+------------+
10 rows in set (0.00 sec)
```

Introduction

- The dept_manager table

select * **from** dept_manager **limit** 10;

```
+--------+---------+------------+------------+
| emp_no | dept_no | from_date  | to_date    |
+--------+---------+------------+------------+
| 110022 | d001    | 1985-01-01 | 1991-10-01 |
| 110039 | d001    | 1991-10-01 | 9999-01-01 |
| 110085 | d002    | 1985-01-01 | 1989-12-17 |
| 110114 | d002    | 1989-12-17 | 9999-01-01 |
| 110183 | d003    | 1985-01-01 | 1992-03-21 |
| 110228 | d003    | 1992-03-21 | 9999-01-01 |
| 110303 | d004    | 1985-01-01 | 1988-09-09 |
| 110344 | d004    | 1988-09-09 | 1992-08-02 |
| 110386 | d004    | 1992-08-02 | 1996-08-30 |
| 110420 | d004    | 1996-08-30 | 9999-01-01 |
+--------+---------+------------+------------+
10 rows in set (0.00 sec)
```

Introduction

- The titles table

select * **from** titles **limit** 10;

```
+--------+--------------------+------------+------------+
| emp_no | title              | from_date  | to_date    |
+--------+--------------------+------------+------------+
|  10721 | Staff              | 1999-07-15 | 9999-01-01 |
|  11260 | Staff              | 1996-05-16 | 9999-01-01 |
|  11371 | Assistant Engineer | 1988-12-25 | 1993-12-25 |
|  11371 | Engineer           | 1993-12-25 | 1998-12-25 |
|  11371 | Senior Engineer    | 1998-12-25 | 9999-01-01 |
|  11693 | Senior Engineer    | 1991-08-24 | 9999-01-01 |
|  13816 | Engineer           | 1992-09-17 | 1999-09-18 |
|  13816 | Senior Engineer    | 1999-09-18 | 9999-01-01 |
|  14007 | Senior Staff       | 1995-10-18 | 9999-01-01 |
|  14007 | Staff              | 1988-10-17 | 1995-10-18 |
+--------+--------------------+------------+------------+
10 rows in set (0.00 sec)
```

Introduction

- The salaries table

select * **from** salaries **limit** 10;

```
+--------+--------+------------+------------+
| emp_no | salary | from_date  | to_date    |
+--------+--------+------------+------------+
|  10721 |  40000 | 1999-07-15 | 2000-07-14 |
|  10721 |  40477 | 2000-07-14 | 2001-07-14 |
|  10721 |  41015 | 2001-07-14 | 2002-07-14 |
|  10721 |  44812 | 2002-07-14 | 9999-01-01 |
|  11260 |  40000 | 1996-05-16 | 1997-05-16 |
|  11260 |  41740 | 1997-05-16 | 1998-05-16 |
|  11260 |  45525 | 1998-05-16 | 1999-05-16 |
|  11260 |  45850 | 1999-05-16 | 2000-05-15 |
|  11260 |  47692 | 2000-05-15 | 2001-05-15 |
|  11260 |  48889 | 2001-05-15 | 2002-05-15 |
+--------+--------+------------+------------+
10 rows in set (0.00 sec)
```

Simple queries

- Queries with selection (conditions)

```
select *
from salaries
where salary > 80000
limit 10;
```

```
+--------+--------+------------+------------+
| emp_no | salary | from_date  | to_date    |
+--------+--------+------------+------------+
|  11371 |  81461 | 2001-12-22 | 9999-01-01 |
|  11693 |  80506 | 1994-08-23 | 1995-08-23 |
|  11693 |  83059 | 1995-08-23 | 1996-08-22 |
|  11693 |  86434 | 1996-08-22 | 1997-08-22 |
|  11693 |  86865 | 1997-08-22 | 1998-08-22 |
|  11693 |  91258 | 1998-08-22 | 1999-08-22 |
|  11693 |  94735 | 1999-08-22 | 2000-08-21 |
|  11693 |  97681 | 2000-08-21 | 2001-08-21 |
|  11693 | 101179 | 2001-08-21 | 9999-01-01 |
|  14007 |  82180 | 1990-10-17 | 1991-10-17 |
+--------+--------+------------+------------+
10 rows in set (0.00 sec)
```

Simple queries

- Queries with selection (conditions)

```
select *
from salaries
where salary > 80000
    and from_date <= '2000-01-01'
    and to_date >= '2000-01-01'
limit 10;
```

```
+--------+--------+------------+------------+
| emp_no | salary | from_date  | to_date    |
+--------+--------+------------+------------+
|  11693 |  94735 | 1999-08-22 | 2000-08-21 |
|  14007 | 101994 | 1999-10-15 | 2000-10-14 |
|  17698 |  85025 | 1999-08-05 | 2000-08-04 |
|  17739 |  88642 | 1999-08-29 | 2000-08-28 |
|  25730 |  82181 | 1999-07-13 | 2000-07-12 |
|  26002 |  89070 | 1999-03-09 | 2000-03-08 |
|  30851 | 101062 | 1999-05-09 | 2000-05-08 |
|  40676 |  89058 | 1999-05-17 | 2000-05-16 |
|  43941 | 107578 | 1999-06-13 | 2000-06-12 |
|  47000 |  83831 | 1999-12-28 | 2000-12-27 |
+--------+--------+------------+------------+
10 rows in set (0.00 sec)
```

Simple queries

- Queries with selection (conditions)

```
select *
from salaries
where salary > 80000
    and from_date <= current_date
    and to_date >= current_date
limit 10;
```

```
+--------+--------+------------+------------+
| emp_no | salary | from_date  | to_date    |
+--------+--------+------------+------------+
|  11371 |  81461 | 2001-12-22 | 9999-01-01 |
|  11693 | 101179 | 2001-08-21 | 9999-01-01 |
|  14007 | 105453 | 2001-10-14 | 9999-01-01 |
|  17698 |  91443 | 2001-08-04 | 9999-01-01 |
|  17739 |  91836 | 2001-08-28 | 9999-01-01 |
|  17890 |  80046 | 2002-07-18 | 9999-01-01 |
|  25730 |  82887 | 2002-07-12 | 9999-01-01 |
|  25949 |  80946 | 2001-10-21 | 9999-01-01 |
|  26002 |  94825 | 2002-03-08 | 9999-01-01 |
|  30851 | 104788 | 2002-05-08 | 9999-01-01 |
+--------+--------+------------+------------+
10 rows in set (0.00 sec)
```

Simple queries

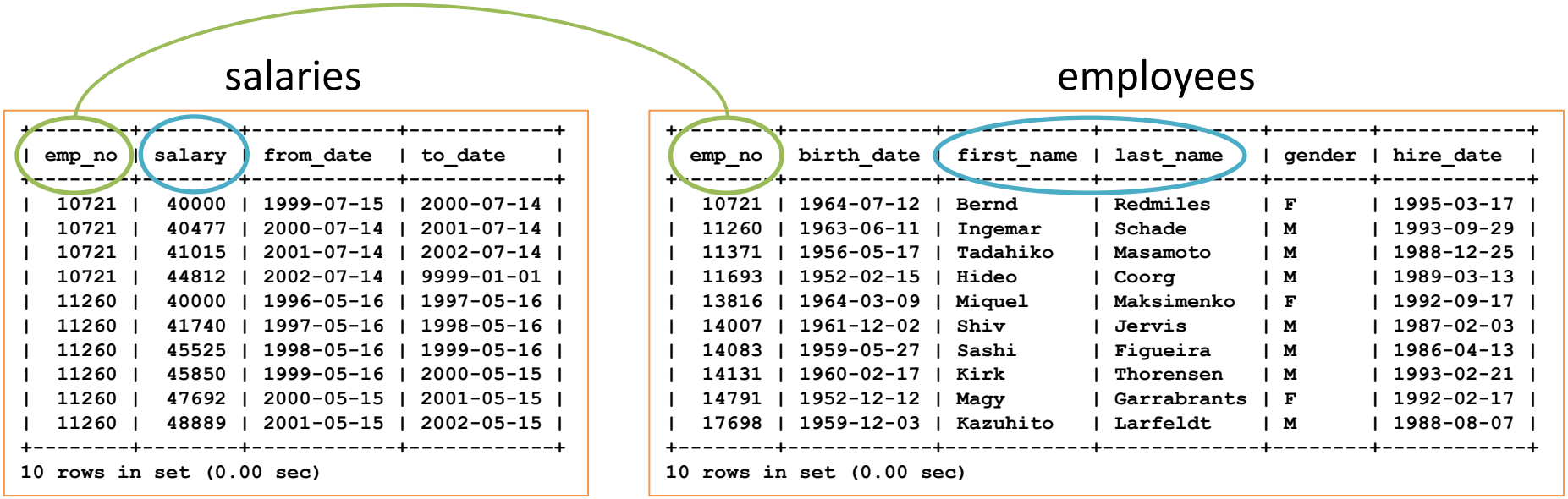
- Queries with projection

```
select emp_no, salary
from salaries
where salary > 80000
    and from_date <= current_date
    and to_date >= current_date
limit 10;
```

```
+--------+--------+
| emp_no | salary |
+--------+--------+
|  11371 |  81461 |
|  11693 | 101179 |
|  14007 | 105453 |
|  17698 |  91443 |
|  17739 |  91836 |
|  17890 |  80046 |
|  25730 |  82887 |
|  25949 |  80946 |
|  26002 |  94825 |
|  30851 | 104788 |
+--------+--------+
10 rows in set (0.00 sec)
```

Simple queries

- Joining tables: salaries and employees



salaries

emp_no	salary	from_date	to_date
10721	40000	1999-07-15	2000-07-14
10721	40477	2000-07-14	2001-07-14
10721	41015	2001-07-14	2002-07-14
10721	44812	2002-07-14	9999-01-01
11260	40000	1996-05-16	1997-05-16
11260	41740	1997-05-16	1998-05-16
11260	45525	1998-05-16	1999-05-16
11260	45850	1999-05-16	2000-05-15
11260	47692	2000-05-15	2001-05-15
11260	48889	2001-05-15	2002-05-15

10 rows in set (0.00 sec)

employees

emp_no	birth_date	first_name	last_name	gender	hire_date
10721	1964-07-12	Bernd	Redmiles	F	1995-03-17
11260	1963-06-11	Ingemar	Schade	M	1993-09-29
11371	1956-05-17	Tadahiko	Masamoto	M	1988-12-25
11693	1952-02-15	Hideo	Coorg	M	1989-03-13
13816	1964-03-09	Miquel	Maksimenko	F	1992-09-17
14007	1961-12-02	Shiv	Jervis	M	1987-02-03
14083	1959-05-27	Sashi	Figueira	M	1986-04-13
14131	1960-02-17	Kirk	Thorensen	M	1993-02-21
14791	1952-12-12	Magy	Garrabrants	F	1992-02-17
17698	1959-12-03	Kazuhito	Larfeldt	M	1988-08-07

10 rows in set (0.00 sec)

Simple queries

- Joining tables: salaries and employees

```
select *
from salaries as a, employees as b
where a.emp_no = b.emp_no
limit 10;
```

```
+--------+--------+------------+------------+--------+------------+------------+-----------+--------+------------+
| emp_no | salary | from_date  | to_date    | emp_no | birth_date | first_name | last_name | gender | hire_date  |
+--------+--------+------------+------------+--------+------------+------------+-----------+--------+------------+
|  10721 |  40000 | 1999-07-15 | 2000-07-14 |  10721 | 1964-07-12 | Bernd      | Redmiles  | F      | 1995-03-17 |
|  10721 |  40477 | 2000-07-14 | 2001-07-14 |  10721 | 1964-07-12 | Bernd      | Redmiles  | F      | 1995-03-17 |
|  10721 |  41015 | 2001-07-14 | 2002-07-14 |  10721 | 1964-07-12 | Bernd      | Redmiles  | F      | 1995-03-17 |
|  10721 |  44812 | 2002-07-14 | 9999-01-01 |  10721 | 1964-07-12 | Bernd      | Redmiles  | F      | 1995-03-17 |
|  11260 |  40000 | 1996-05-16 | 1997-05-16 |  11260 | 1963-06-11 | Ingemar    | Schade    | M      | 1993-09-29 |
|  11260 |  41740 | 1997-05-16 | 1998-05-16 |  11260 | 1963-06-11 | Ingemar    | Schade    | M      | 1993-09-29 |
|  11260 |  45525 | 1998-05-16 | 1999-05-16 |  11260 | 1963-06-11 | Ingemar    | Schade    | M      | 1993-09-29 |
|  11260 |  45850 | 1999-05-16 | 2000-05-15 |  11260 | 1963-06-11 | Ingemar    | Schade    | M      | 1993-09-29 |
|  11260 |  47692 | 2000-05-15 | 2001-05-15 |  11260 | 1963-06-11 | Ingemar    | Schade    | M      | 1993-09-29 |
|  11260 |  48889 | 2001-05-15 | 2002-05-15 |  11260 | 1963-06-11 | Ingemar    | Schade    | M      | 1993-09-29 |
+--------+--------+------------+------------+--------+------------+------------+-----------+--------+------------+
10 rows in set (0.00 sec)
```

Simple queries

- Joining tables: salaries and employees

```
select *
from salaries as a, employees as b
where a.emp_no = b.emp_no
    and a.from_date <= current_date
    and a.to_date >= current_date
limit 10;
```

emp_no	salary	from_date	to_date	emp_no	birth_date	first_name	last_name	gender	hire_date
10721	44812	2002-07-14	9999-01-01	10721	1964-07-12	Bernd	Redmiles	F	1995-03-17
11260	52435	2002-05-15	9999-01-01	11260	1963-06-11	Ingemar	Schade	M	1993-09-29
11371	81461	2001-12-22	9999-01-01	11371	1956-05-17	Tadahiko	Masamoto	M	1988-12-25
11693	101179	2001-08-21	9999-01-01	11693	1952-02-15	Hideo	Coorg	M	1989-03-13
13816	76104	2001-09-15	9999-01-01	13816	1964-03-09	Miquel	Maksimenko	F	1992-09-17
14007	105453	2001-10-14	9999-01-01	14007	1961-12-02	Shiv	Jervis	M	1987-02-03
14083	71350	2002-04-09	9999-01-01	14083	1959-05-27	Sashi	Figueira	M	1986-04-13
14791	49249	2001-11-15	9999-01-01	14791	1952-12-12	Magy	Garrabrants	F	1992-02-17
17698	91443	2001-08-04	9999-01-01	17698	1959-12-03	Kazuhito	Larfeldt	M	1988-08-07
17739	91836	2001-08-28	9999-01-01	17739	1961-09-01	Satoru	Chaudhury	F	1987-09-01

10 rows in set (0.00 sec)

Simple queries

- Joining tables: salaries and employees

```
select a.emp_no, a.salary, b.first_name, b.last_name
from salaries as a, employees as b
where a.emp_no = b.emp_no
    and a.from_date <= current_date
    and a.to_date >= current_date
limit 10;
```

```
+--------+--------+------------+-------------+
| emp_no | salary | first_name | last_name   |
+--------+--------+------------+-------------+
|  10721 |  44812 | Bernd      | Redmiles    |
|  11260 |  52435 | Ingemar    | Schade      |
|  11371 |  81461 | Tadahiko   | Masamoto    |
|  11693 | 101179 | Hideo      | Coorg       |
|  13816 |  76104 | Miquel     | Maksimenko  |
|  14007 | 105453 | Shiv       | Jervis      |
|  14083 |  71350 | Sashi      | Figueira    |
|  14791 |  49249 | Magy       | Garrabrants |
|  17698 |  91443 | Kazuhito   | Larfeldt    |
|  17739 |  91836 | Satoru     | Chaudhury   |
+--------+--------+------------+-------------+
10 rows in set (0.00 sec)
```

Simple queries

- Joining tables: employees and departments

dept_emp

```
+--------+---------+------------+------------+
| emp_no | dept_no | from_date  | to_date    |
+--------+---------+------------+------------+
|  10721 | d009    | 1999-07-15 | 9999-01-01 |
|  11260 | d009    | 1996-05-16 | 9999-01-01 |
|  11371 | d005    | 1988-12-25 | 9999-01-01 |
|  11693 | d005    | 1991-08-24 | 9999-01-01 |
|  13816 | d005    | 1992-09-17 | 9999-01-01 |
|  14007 | d002    | 1988-10-17 | 9999-01-01 |
|  14083 | d004    | 1986-04-13 | 9999-01-01 |
|  14131 | d004    | 1993-05-11 | 1996-05-28 |
|  14791 | d005    | 1997-11-16 | 9999-01-01 |
|  17698 | d005    | 1988-08-07 | 9999-01-01 |
+--------+---------+------------+------------+
10 rows in set (0.00 sec)
```

employees

```
+--------+------------+------------+-------------+--------+------------+
| emp_no | birth_date | first_name | last_name   | gender | hire_date  |
+--------+------------+------------+-------------+--------+------------+
|  10721 | 1964-07-12 | Bernd      | Redmiles    | F      | 1995-03-17 |
|  11260 | 1963-06-11 | Ingemar    | Schade      | M      | 1993-09-29 |
|  11371 | 1956-05-17 | Tadahiko   | Masamoto    | M      | 1988-12-25 |
|  11693 | 1952-02-15 | Hideo      | Coorg       | M      | 1989-03-13 |
|  13816 | 1964-03-09 | Miquel     | Maksimenko  | F      | 1992-09-17 |
|  14007 | 1961-12-02 | Shiv       | Jervis      | M      | 1987-02-03 |
|  14083 | 1959-05-27 | Sashi      | Figueira    | M      | 1986-04-13 |
|  14131 | 1960-02-17 | Kirk       | Thorensen   | M      | 1993-02-21 |
|  14791 | 1952-12-12 | Magy       | Garrabrants | F      | 1992-02-17 |
|  17698 | 1959-12-03 | Kazuhito   | Larfeldt    | M      | 1988-08-07 |
+--------+------------+------------+-------------+--------+------------+
10 rows in set (0.00 sec)
```

departments

```
+---------+--------------------+
| dept_no | dept_name          |
+---------+--------------------+
| d009    | Customer Service   |
| d005    | Development        |
| d002    | Finance            |
| d003    | Human Resources    |
| d001    | Marketing          |
| d004    | Production         |
| d006    | Quality Management |
| d008    | Research           |
| d007    | Sales              |
+---------+--------------------+
9 rows in set (0.00 sec)
```

Simple queries

- Joining tables: employees and departments

```
select a.first_name, a.last_name, b.from_date, b.to_date, c.dept_name
from employees as a, dept_emp as b, departments as c
where a.emp_no = b.emp_no and b.dept_no = c.dept_no
limit 10;
```

```
+------------+-------------+-----------+-----------+------------------+
| first_name | last_name   | from_date | to_date   | dept_name        |
+------------+-------------+-----------+-----------+------------------+
| Bernd      | Redmiles    | 1999-07-15 | 9999-01-01 | Customer Service |
| Ingemar    | Schade      | 1996-05-16 | 9999-01-01 | Customer Service |
| Sandeepan  | McClurg     | 1986-04-17 | 9999-01-01 | Customer Service |
| Jiang      | Birjandi    | 1990-05-27 | 1996-09-21 | Customer Service |
| Mohit      | Simkin      | 1997-07-04 | 9999-01-01 | Customer Service |
| Patricia   | Kropatsch   | 1994-11-22 | 9999-01-01 | Customer Service |
| Monique    | Werthner    | 2001-01-13 | 9999-01-01 | Customer Service |
| Abdelghani | Keustermans | 1997-05-08 | 9999-01-01 | Customer Service |
| Tremaine   | Attimonelli | 1997-10-02 | 9999-01-01 | Customer Service |
| Gritta     | Gischer     | 1994-03-08 | 9999-01-01 | Customer Service |
+------------+-------------+-----------+-----------+------------------+
10 rows in set (0.00 sec)
```

Simple queries

- Joining tables: employees and departments

```
select a.first_name, a.last_name, b.from_date, b.to_date, c.dept_name
from employees as a, dept_emp as b, departments as c
where a.emp_no = b.emp_no and b.dept_no = c.dept_no
    and b.from_date <= current_date and b.to_date >= current_date
limit 10;
```

```
+------------+-------------+------------+------------+------------------+
| first_name | last_name   | from_date  | to_date    | dept_name        |
+------------+-------------+------------+------------+------------------+
| Bernd      | Redmiles    | 1999-07-15 | 9999-01-01 | Customer Service |
| Ingemar    | Schade      | 1996-05-16 | 9999-01-01 | Customer Service |
| Sandeepan  | McClurg     | 1986-04-17 | 9999-01-01 | Customer Service |
| Mohit      | Simkin      | 1997-07-04 | 9999-01-01 | Customer Service |
| Patricia   | Kropatsch   | 1994-11-22 | 9999-01-01 | Customer Service |
| Monique    | Werthner    | 2001-01-13 | 9999-01-01 | Customer Service |
| Abdelghani | Keustermans | 1997-05-08 | 9999-01-01 | Customer Service |
| Tremaine   | Attimonelli | 1997-10-02 | 9999-01-01 | Customer Service |
| Gritta     | Gischer     | 1994-03-08 | 9999-01-01 | Customer Service |
| Harngdar   | Herber      | 1990-03-09 | 9999-01-01 | Customer Service |
+------------+-------------+------------+------------+------------------+
10 rows in set (0.00 sec)
```

Simple queries

- Joining tables: employees and departments

```
select a.first_name, a.last_name, c.dept_name
from employees as a, dept_emp as b, departments as c
where a.emp_no = b.emp_no and b.dept_no = c.dept_no
    and b.from_date <= current_date and b.to_date >= current_date
limit 10;
```

```
+------------+-------------+------------------+
| first_name | last_name   | dept_name        |
+------------+-------------+------------------+
| Bernd      | Redmiles    | Customer Service |
| Ingemar    | Schade      | Customer Service |
| Sandeepan  | McClurg     | Customer Service |
| Mohit      | Simkin      | Customer Service |
| Patricia   | Kropatsch   | Customer Service |
| Monique    | Werthner    | Customer Service |
| Abdelghani | Keustermans | Customer Service |
| Tremaine   | Attimonelli | Customer Service |
| Gritta     | Gischer     | Customer Service |
| Harngdar   | Herber      | Customer Service |
+------------+-------------+------------------+
10 rows in set (0.00 sec)
```

Sorting

- Number of employees in each department

```
select *
from dept_emp
where from_date <= current_date
    and to_date >= current_date
limit 10;
```

```
+--------+---------+------------+------------+
| emp_no | dept_no | from_date  | to_date    |
+--------+---------+------------+------------+
|  10721 | d009    | 1999-07-15 | 9999-01-01 |
|  11260 | d009    | 1996-05-16 | 9999-01-01 |
|  11371 | d005    | 1988-12-25 | 9999-01-01 |
|  11693 | d005    | 1991-08-24 | 9999-01-01 |
|  13816 | d005    | 1992-09-17 | 9999-01-01 |
|  14007 | d002    | 1988-10-17 | 9999-01-01 |
|  14083 | d004    | 1986-04-13 | 9999-01-01 |
|  14791 | d005    | 1997-11-16 | 9999-01-01 |
|  17698 | d005    | 1988-08-07 | 9999-01-01 |
|  17739 | d005    | 1987-09-01 | 9999-01-01 |
+--------+---------+------------+------------+
10 rows in set (0.00 sec)
```

Sorting

- Number of employees in each department

```
select *
from dept_emp
where from_date <= current_date
    and to_date >= current_date
order by dept_no
limit 10;
```

```
+--------+---------+------------+------------+
| emp_no | dept_no | from_date  | to_date    |
+--------+---------+------------+------------+
|  21637 | d001    | 2000-01-14 | 9999-01-01 |
|  25949 | d001    | 1995-10-23 | 9999-01-01 |
|  44474 | d001    | 1996-09-11 | 9999-01-01 |
|  84372 | d001    | 1997-08-08 | 9999-01-01 |
| 102629 | d001    | 1989-07-21 | 9999-01-01 |
| 104349 | d001    | 1994-07-05 | 9999-01-01 |
| 110022 | d001    | 1985-01-01 | 9999-01-01 |
| 110039 | d001    | 1986-04-12 | 9999-01-01 |
| 205675 | d001    | 1990-11-16 | 9999-01-01 |
| 242872 | d001    | 1990-09-26 | 9999-01-01 |
+--------+---------+------------+------------+
10 rows in set (0.00 sec)
```

Grouping and aggregation

- Number of employees in each department

```
select dept_no, count(emp_no)
from dept_emp
where from_date <= current_date
    and to_date >= current_date
group by dept_no;
```

```
+---------+---------------+
| dept_no | count(emp_no) |
+---------+---------------+
| d001    |            15 |
| d002    |            18 |
| d003    |            10 |
| d004    |            44 |
| d005    |            62 |
| d006    |            18 |
| d007    |            42 |
| d008    |            14 |
| d009    |            29 |
+---------+---------------+
9 rows in set (0.01 sec)
```

Grouping and aggregation

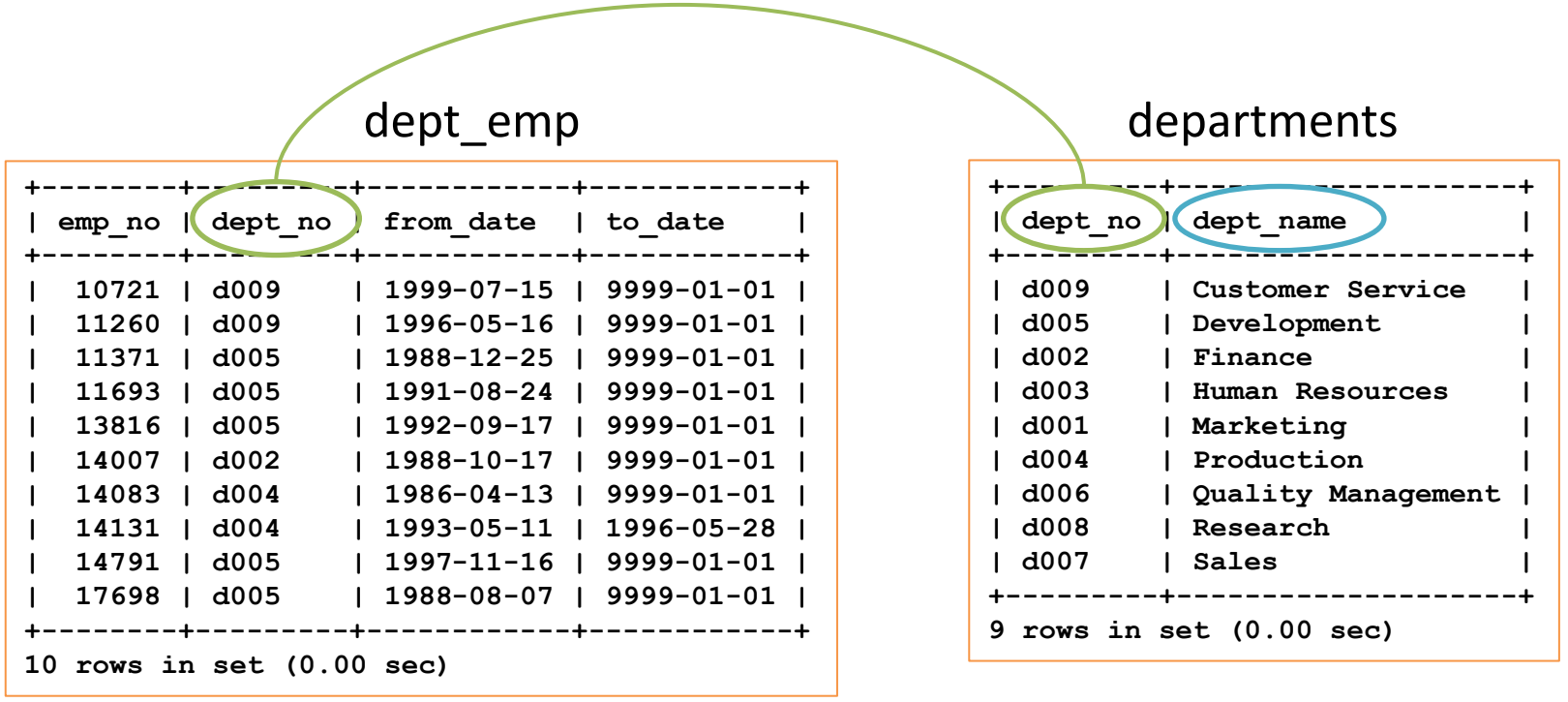
- Number of employees in each department

```
select dept_no, count(emp_no) as count_emp_no
from dept_emp
where from_date <= current_date
    and to_date >= current_date
group by dept_no;
```

```
+---------+--------------+
| dept_no | count_emp_no |
+---------+--------------+
| d001    |           15 |
| d002    |           18 |
| d003    |           10 |
| d004    |           44 |
| d005    |           62 |
| d006    |           18 |
| d007    |           42 |
| d008    |           14 |
| d009    |           29 |
+---------+--------------+
9 rows in set (0.00 sec)
```

Grouping and aggregation

- Number of employees in each department



dept_emp

emp_no	dept_no	from_date	to_date
10721	d009	1999-07-15	9999-01-01
11260	d009	1996-05-16	9999-01-01
11371	d005	1988-12-25	9999-01-01
11693	d005	1991-08-24	9999-01-01
13816	d005	1992-09-17	9999-01-01
14007	d002	1988-10-17	9999-01-01
14083	d004	1986-04-13	9999-01-01
14131	d004	1993-05-11	1996-05-28
14791	d005	1997-11-16	9999-01-01
17698	d005	1988-08-07	9999-01-01

10 rows in set (0.00 sec)

departments

dept_no	dept_name
d009	Customer Service
d005	Development
d002	Finance
d003	Human Resources
d001	Marketing
d004	Production
d006	Quality Management
d008	Research
d007	Sales

9 rows in set (0.00 sec)

Grouping and aggregation

- Number of employees in each department

```
select *
from dept_emp as a, departments as b
where a.dept_no = b.dept_no
limit 10;
```

```
+--------+---------+------------+------------+---------+------------------+
| emp_no | dept_no | from_date  | to_date    | dept_no | dept_name        |
+--------+---------+------------+------------+---------+------------------+
|  10721 | d009    | 1999-07-15 | 9999-01-01 | d009    | Customer Service |
|  11260 | d009    | 1996-05-16 | 9999-01-01 | d009    | Customer Service |
|  22772 | d009    | 1986-04-17 | 9999-01-01 | d009    | Customer Service |
|  30297 | d009    | 1990-05-27 | 1996-09-21 | d009    | Customer Service |
|  40234 | d009    | 1997-07-04 | 9999-01-01 | d009    | Customer Service |
|  61712 | d009    | 1994-11-22 | 9999-01-01 | d009    | Customer Service |
|  64387 | d009    | 2001-01-13 | 9999-01-01 | d009    | Customer Service |
|  68491 | d009    | 1997-05-08 | 9999-01-01 | d009    | Customer Service |
|  73133 | d009    | 1997-10-02 | 9999-01-01 | d009    | Customer Service |
|  91524 | d009    | 1994-03-08 | 9999-01-01 | d009    | Customer Service |
+--------+---------+------------+------------+---------+------------------+
10 rows in set (0.00 sec)
```

Grouping and aggregation

- Number of employees in each department

```
select *
from dept_emp as a, departments as b
where a.dept_no = b.dept_no
    and a.from_date <= current_date
    and a.to_date >= current_date
limit 10;
```

```
+--------+---------+------------+------------+---------+------------------+
| emp_no | dept_no | from_date  | to_date    | dept_no | dept_name        |
+--------+---------+------------+------------+---------+------------------+
|  10721 | d009    | 1999-07-15 | 9999-01-01 | d009    | Customer Service |
|  11260 | d009    | 1996-05-16 | 9999-01-01 | d009    | Customer Service |
|  22772 | d009    | 1986-04-17 | 9999-01-01 | d009    | Customer Service |
|  40234 | d009    | 1997-07-04 | 9999-01-01 | d009    | Customer Service |
|  61712 | d009    | 1994-11-22 | 9999-01-01 | d009    | Customer Service |
|  64387 | d009    | 2001-01-13 | 9999-01-01 | d009    | Customer Service |
|  68491 | d009    | 1997-05-08 | 9999-01-01 | d009    | Customer Service |
|  73133 | d009    | 1997-10-02 | 9999-01-01 | d009    | Customer Service |
|  91524 | d009    | 1994-03-08 | 9999-01-01 | d009    | Customer Service |
| 103361 | d009    | 1990-03-09 | 9999-01-01 | d009    | Customer Service |
+--------+---------+------------+------------+---------+------------------+
10 rows in set (0.00 sec)
```

Grouping and aggregation

- Number of employees in each department

```
select b.dept_name, count(a.emp_no)
from dept_emp as a, departments as b
where a.dept_no = b.dept_no
    and a.from_date <= current_date
    and a.to_date >= current_date
group by b.dept_name;
```

```
+--------------------+-----------------+
| dept_name          | count(a.emp_no) |
+--------------------+-----------------+
| Customer Service   |              29 |
| Development        |              62 |
| Finance            |              18 |
| Human Resources    |              10 |
| Marketing          |              15 |
| Production         |              44 |
| Quality Management |              18 |
| Research           |              14 |
| Sales              |              42 |
+--------------------+-----------------+
9 rows in set (0.00 sec)
```

Grouping and aggregation

- Number of employees in each department (alternative)

```
select a.dept_no, b.dept_name, count(a.emp_no)
from dept_emp as a, departments as b
where a.dept_no = b.dept_no
    and a.from_date <= current_date
    and a.to_date >= current_date
group by a.dept_no, b.dept_name;
```

```
+---------+--------------------+-----------------+
| dept_no | dept_name          | count(a.emp_no) |
+---------+--------------------+-----------------+
| d001    | Marketing          |              15 |
| d002    | Finance            |              18 |
| d003    | Human Resources    |              10 |
| d004    | Production         |              44 |
| d005    | Development        |              62 |
| d006    | Quality Management |              18 |
| d007    | Sales              |              42 |
| d008    | Research           |              14 |
| d009    | Customer Service   |              29 |
+---------+--------------------+-----------------+
9 rows in set (0.00 sec)
```

Grouping and aggregation

- Number of employees in each department

```
select a.dept_no, b.dept_name, count(a.emp_no) as count_emp_no
from dept_emp as a, departments as b
where a.dept_no = b.dept_no
    and a.from_date <= current_date
    and a.to_date >= current_date
group by a.dept_no, b.dept_name;
```

```
+---------+--------------------+--------------+
| dept_no | dept_name          | count_emp_no |
+---------+--------------------+--------------+
| d001    | Marketing          |           15 |
| d002    | Finance            |           18 |
| d003    | Human Resources    |           10 |
| d004    | Production         |           44 |
| d005    | Development        |           62 |
| d006    | Quality Management |           18 |
| d007    | Sales              |           42 |
| d008    | Research           |           14 |
| d009    | Customer Service   |           29 |
+---------+--------------------+--------------+
9 rows in set (0.01 sec)
```

Grouping and sorting

- Number of employees in each department

```
select a.dept_no, b.dept_name, count(a.emp_no) as count_emp_no
from dept_emp as a, departments as b
where a.dept_no = b.dept_no
    and a.from_date <= current_date
    and a.to_date >= current_date
group by a.dept_no, b.dept_name
order by b.dept_name;
```

```
+---------+--------------------+--------------+
| dept_no | dept_name          | count_emp_no |
+---------+--------------------+--------------+
| d009    | Customer Service   |           29 |
| d005    | Development        |           62 |
| d002    | Finance            |           18 |
| d003    | Human Resources    |           10 |
| d001    | Marketing          |           15 |
| d004    | Production         |           44 |
| d006    | Quality Management |           18 |
| d008    | Research           |           14 |
| d007    | Sales              |           42 |
+---------+--------------------+--------------+
9 rows in set (0.00 sec)
```

Grouping, aggregation and sorting

- Number of employees in each department

```
select a.dept_no, b.dept_name, count(a.emp_no) as count_emp_no
from dept_emp as a, departments as b
where a.dept_no = b.dept_no
    and a.from_date <= current_date
    and a.to_date >= current_date
group by a.dept_no, b.dept_name
order by count_emp_no;
```

```
+---------+--------------------+--------------+
| dept_no | dept_name          | count_emp_no |
+---------+--------------------+--------------+
| d003    | Human Resources    |           10 |
| d008    | Research           |           14 |
| d001    | Marketing          |           15 |
| d002    | Finance            |           18 |
| d006    | Quality Management |           18 |
| d009    | Customer Service   |           29 |
| d007    | Sales              |           42 |
| d004    | Production         |           44 |
| d005    | Development        |           62 |
+---------+--------------------+--------------+
9 rows in set (0.00 sec)
```

Grouping, aggregation and sorting

- Number of employees in each department

```
select a.dept_no, b.dept_name, count(a.emp_no) as count_emp_no
from dept_emp as a, departments as b
where a.dept_no = b.dept_no
    and a.from_date <= current_date
    and a.to_date >= current_date
group by a.dept_no, b.dept_name
order by count_emp_no desc;
```

```
+---------+--------------------+--------------+
| dept_no | dept_name          | count_emp_no |
+---------+--------------------+--------------+
| d005    | Development        |           62 |
| d004    | Production         |           44 |
| d007    | Sales              |           42 |
| d009    | Customer Service   |           29 |
| d002    | Finance            |           18 |
| d006    | Quality Management |           18 |
| d001    | Marketing          |           15 |
| d008    | Research           |           14 |
| d003    | Human Resources    |           10 |
+---------+--------------------+--------------+
9 rows in set (0.00 sec)
```

Grouping, aggregation and filtering

- Number of employees in each department

```
select a.dept_no, b.dept_name, count(a.emp_no) as count_emp_no
from dept_emp as a, departments as b
where a.dept_no = b.dept_no
    and a.from_date <= current_date
    and a.to_date >= current_date
group by a.dept_no, b.dept_name
having count_emp_no >= 40;
```

```
+---------+-------------+--------------+
| dept_no | dept_name   | count_emp_no |
+---------+-------------+--------------+
| d004    | Production  |           44 |
| d005    | Development |           62 |
| d007    | Sales       |           42 |
+---------+-------------+--------------+
3 rows in set (0.00 sec)
```

Grouping, aggregation, filtering and sorting

- Number of employees in each department

```
select a.dept_no, b.dept_name, count(a.emp_no) as count_emp_no
from dept_emp as a, departments as b
where a.dept_no = b.dept_no
    and a.from_date <= current_date
    and a.to_date >= current_date
group by a.dept_no, b.dept_name
having count_emp_no >= 40
order by b.dept_name;
```

```
+---------+-------------+--------------+
| dept_no | dept_name   | count_emp_no |
+---------+-------------+--------------+
| d005    | Development |           62 |
| d004    | Production  |           44 |
| d007    | Sales       |           42 |
+---------+-------------+--------------+
3 rows in set (0.00 sec)
```

Grouping, aggregation, filtering and sorting

- Number of employees in each department

```
select a.dept_no, b.dept_name, count(a.emp_no) as count_emp_no
from dept_emp as a, departments as b
where a.dept_no = b.dept_no
    and a.from_date <= current_date
    and a.to_date >= current_date
group by a.dept_no, b.dept_name
having count_emp_no >= 40
order by count_emp_no desc;
```

```
+---------+-------------+--------------+
| dept_no | dept_name   | count_emp_no |
+---------+-------------+--------------+
| d005    | Development |           62 |
| d004    | Production  |           44 |
| d007    | Sales       |           42 |
+---------+-------------+--------------+
3 rows in set (0.00 sec)
```

(result is the same, by coincidence)