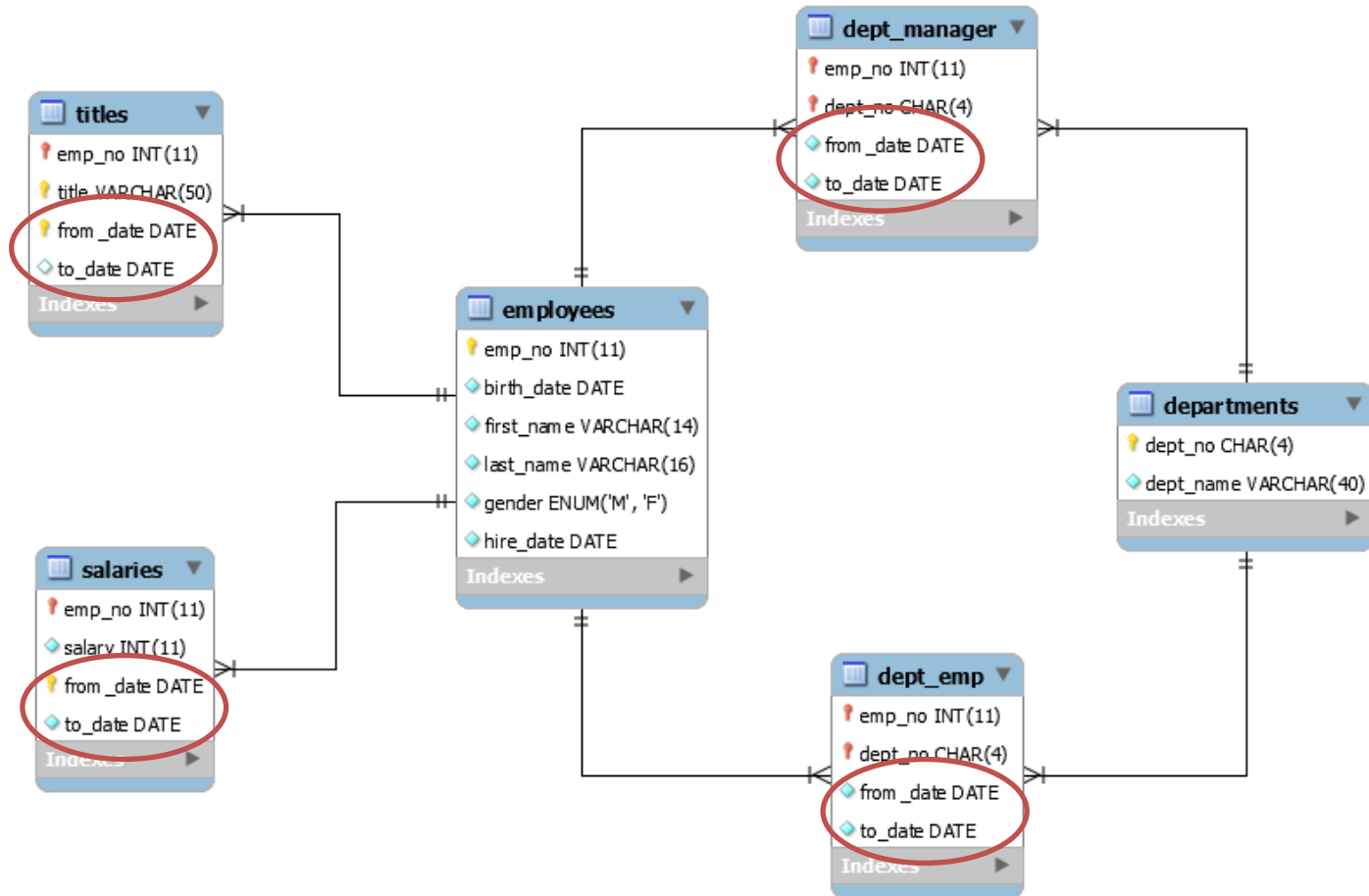


Data Analysis and Integration

SQL Views

Introduction

- The employees database



Views

- `curr_salaries(emp_no, salary)`
 - a **view** that returns the current salary of each employee
- `curr_dept_emp(emp_no, dept_no)`
 - a **view** that returns the current department of each employee
- `curr_dept_manager(emp_no, dept_no)`
 - a **view** that returns the current manager of each department
- `curr_titles(emp_no, title)`
 - a **view** that returns the current title of each employee

SQL Views

- `curr_salaries(emp_no, salary)`
 - a **view** that returns the current salary of each employee

```
create or replace view curr_salaries(emp_no, salary) as  
  select emp_no, salary  
  from salaries  
  where from_date <= current_date and to_date >= current_date;
```

```
select * from curr_salaries limit 10;
```

```
+-----+-----+  
| emp_no | salary |  
+-----+-----+  
| 10721 | 44812 |  
| 11260 | 52435 |  
| 11371 | 81461 |  
| 11693 | 101179 |  
| 13816 | 76104 |  
| 14007 | 105453 |  
| 14083 | 71350 |  
| 14791 | 49249 |  
| 17698 | 91443 |  
| 17739 | 91836 |  
+-----+-----+  
10 rows in set (0.00 sec)
```

SQL Views

- `curr_dept_emp(emp_no, dept_no)`
 - a **view** that returns the current department of each employee

```
create or replace view curr_dept_emp(emp_no, dept_no) as  
  select emp_no, dept_no  
  from dept_emp  
  where from_date <= current_date and to_date >= current_date;
```

```
select * from curr_dept_emp limit 10;
```

emp_no	dept_no
10721	d009
11260	d009
11371	d005
11693	d005
13816	d005
14007	d002
14083	d004
14791	d005
17698	d005
17739	d005

10 rows in set (0.00 sec)

SQL Views

- `curr_dept_manager(emp_no, dept_no)`
 - a **view** that returns the current manager of each department

```
create or replace view curr_dept_manager(emp_no, dept_no) as  
  select emp_no, dept_no  
  from dept_manager  
  where from_date <= current_date and to_date >= current_date;
```

```
select * from curr_dept_manager;
```

emp_no	dept_no
110039	d001
110114	d002
110228	d003
110420	d004
110567	d005
110854	d006
111133	d007
111534	d008
111939	d009

9 rows in set (0.00 sec)

SQL Views

- `curr_titles(emp_no, title)`
 - a **view** that returns the current title of each employee

```
create or replace view curr_titles(emp_no, title) as  
  select emp_no, title  
  from titles  
  where from_date <= current_date and to_date >= current_date;
```

```
select * from curr_titles limit 10;
```

```
+-----+-----+  
| emp_no | title                |  
+-----+-----+  
| 10721 | Staff                |  
| 11260 | Staff                |  
| 11371 | Senior Engineer      |  
| 11693 | Senior Engineer      |  
| 13816 | Senior Engineer      |  
| 14007 | Senior Staff         |  
| 14083 | Senior Engineer      |  
| 14791 | Assistant Engineer   |  
| 17698 | Senior Engineer      |  
| 17739 | Technique Leader     |  
+-----+-----+  
10 rows in set (0.00 sec)
```

New schema (with views)

- old schema

employees(emp_no, birth_date, first_name, last_name, gender, hire_date)
departments(dept_no, dept_name)
dept_emp(emp_no, dept_no, from_date, to_date)
dept_manager(emp_no, dept_no, from_date, to_date)
salaries(emp_no, salary, from_date, to_date)
titles(emp_no, title, from_date, to_date)

- new schema

employees(emp_no, birth_date, first_name, last_name, gender, hire_date)
departments(dept_no, dept_name)
curr_dept_emp(emp_no, dept_no)
curr_dept_manager(emp_no, dept_no)
curr_salaries(emp_no, salary)
curr_titles(emp_no, title)

Queries over views

- simple query

```
select emp_no, salary
from curr_salaries
where salary > 80000
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)
```

Queries over views

- salaries and employees

```
select a.emp_no, a.salary, b.first_name, b.last_name
from curr_salaries as a, employees as b
where a.emp_no = b.emp_no
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)

Queries over views

- employees and departments

```
select a.first_name, a.last_name, c.dept_name
from employees as a, curr_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	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)

Queries over views

- number of employees in each department

```
select a.dept_no, b.dept_name, count(a.emp_no) as count_emp_no
from curr_dept_emp as a, departments as b
where a.dept_no = b.dept_no
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
d006	Quality Management	18
d002	Finance	18
d001	Marketing	15
d008	Research	14
d003	Human Resources	10

9 rows in set (0.00 sec)

Queries over views

- sum of salaries by department

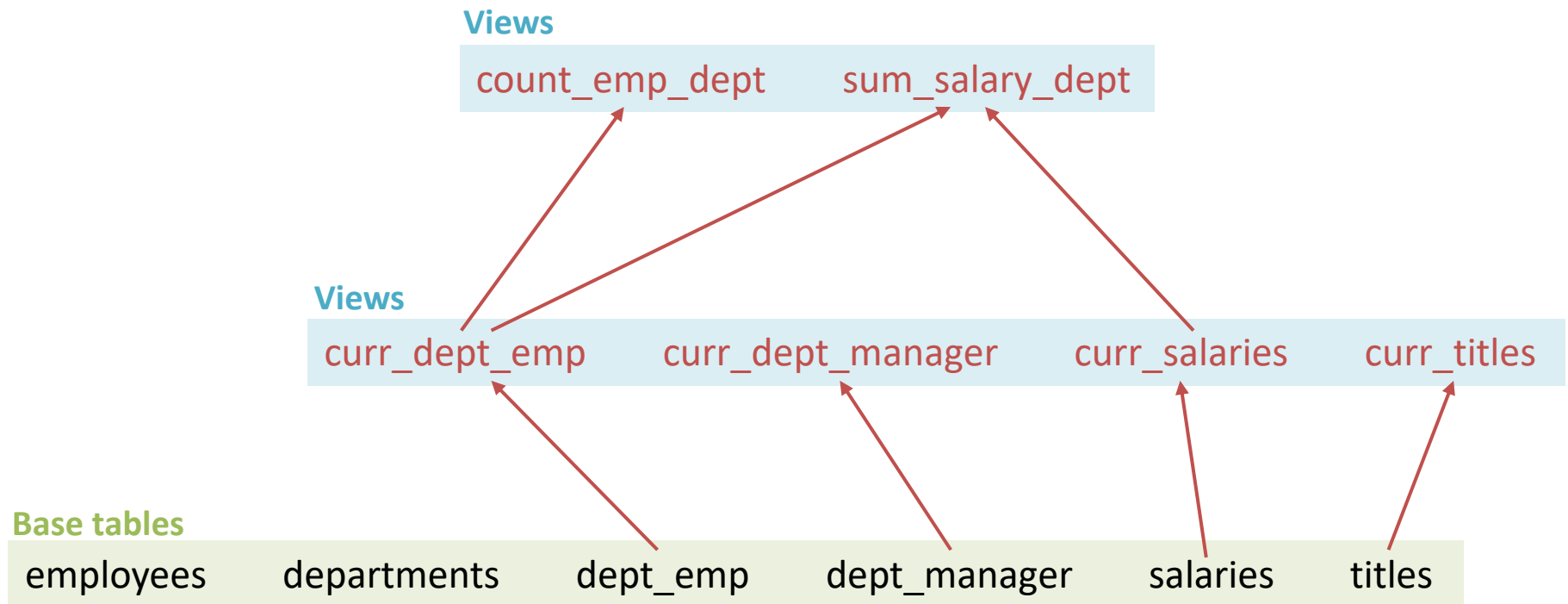
```
select b.dept_no, c.dept_name, sum(a.salary) as sum_salary
from curr_salaries as a, curr_dept_emp as b, departments as c
where a.emp_no = b.emp_no and b.dept_no = c.dept_no
group by b.dept_no, c.dept_name
order by sum_salary desc;
```

dept_no	dept_name	sum_salary
d005	Development	4434974
d007	Sales	3715959
d004	Production	2928341
d009	Customer Service	1914195
d002	Finance	1492870
d001	Marketing	1249477
d006	Quality Management	1212103
d008	Research	1064935
d003	Human Resources	643182

9 rows in set (0.01 sec)

Views over views

- Higher schemas



Views over views

- `count_emp_dept(dept_no, count_emp)`
 - a **view** to show the number of employees in each department
- `sum_salary_dept(dept_no, sum_salary)`
 - a **view** to show the sum of salaries by department

Views over views

- `count_emp_dept(dept_no, count_emp)`
 - a **view** to show the number of employees in each department

```
create or replace view count_emp_dept(dept_no, count_emp) as  
  select dept_no, count(emp_no) as count_emp  
  from curr_dept_emp  
 group by dept_no;
```

```
select * from count_emp_dept;
```

dept_no	count_emp
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)

Views over views

- `sum_salary_dept(dept_no, sum_salary)`
 - a **view** to show the Sum of salaries by department

create or replace view `sum_salary_dept(dept_no, sum_salary)` **as**
`select` `b.dept_no`, `sum(a.salary)` **as** `sum_salary`
from `curr_salaries` **as** `a`, `curr_dept_emp` **as** `b`
where `a.emp_no = b.emp_no`
group by `b.dept_no`;

select * from `sum_salary_dept`;

dept_no	sum_salary
d001	1249477
d002	1492870
d003	643182
d004	2928341
d005	4434974
d006	1212103
d007	3715959
d008	1064935
d009	1914195

9 rows in set (0.00 sec)

Query unfolding (curr_salaries)

```
select emp_no, salary
from curr_salaries
where salary > 80000
limit 10;
```

```
create or replace view curr_salaries(emp_no, salary) as
select emp_no, salary
from salaries
where from_date <= current_date and to_date >= current_date;
```

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


Query unfolding (count_emp_dept)

```
select dept_no  
from count_emp_dept  
where count_emp > 40;
```

```
create or replace view count_emp_dept(dept_no, count_emp) as  
select dept_no, count(emp_no) as count_emp  
from curr_dept_emp  
group by dept_no;
```

```
select dept_no  
from (select dept_no, count(emp_no) as count_emp  
      from curr_dept_emp  
      group by dept_no) as a  
where count_emp > 40;
```

Query unfolding (count_emp_dept)



```
select dept_no
from (select dept_no, count(emp_no) as count_emp
      from curr_dept_emp
      group by dept_no) as a
where count_emp > 40;
```

```
create or replace view curr_dept_emp(emp_no, dept_no) as
select emp_no, dept_no
from dept_emp
where from_date <= current_date and to_date >= current_date;
```

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

Query unfolding (count_emp_dept)

- Note that

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

could be **re-written** more simply as:

```
select dept_no
from dept_emp
where from_date <= current_date and to_date >= current_date
group by dept_no
having count(emp_no) > 40;
```

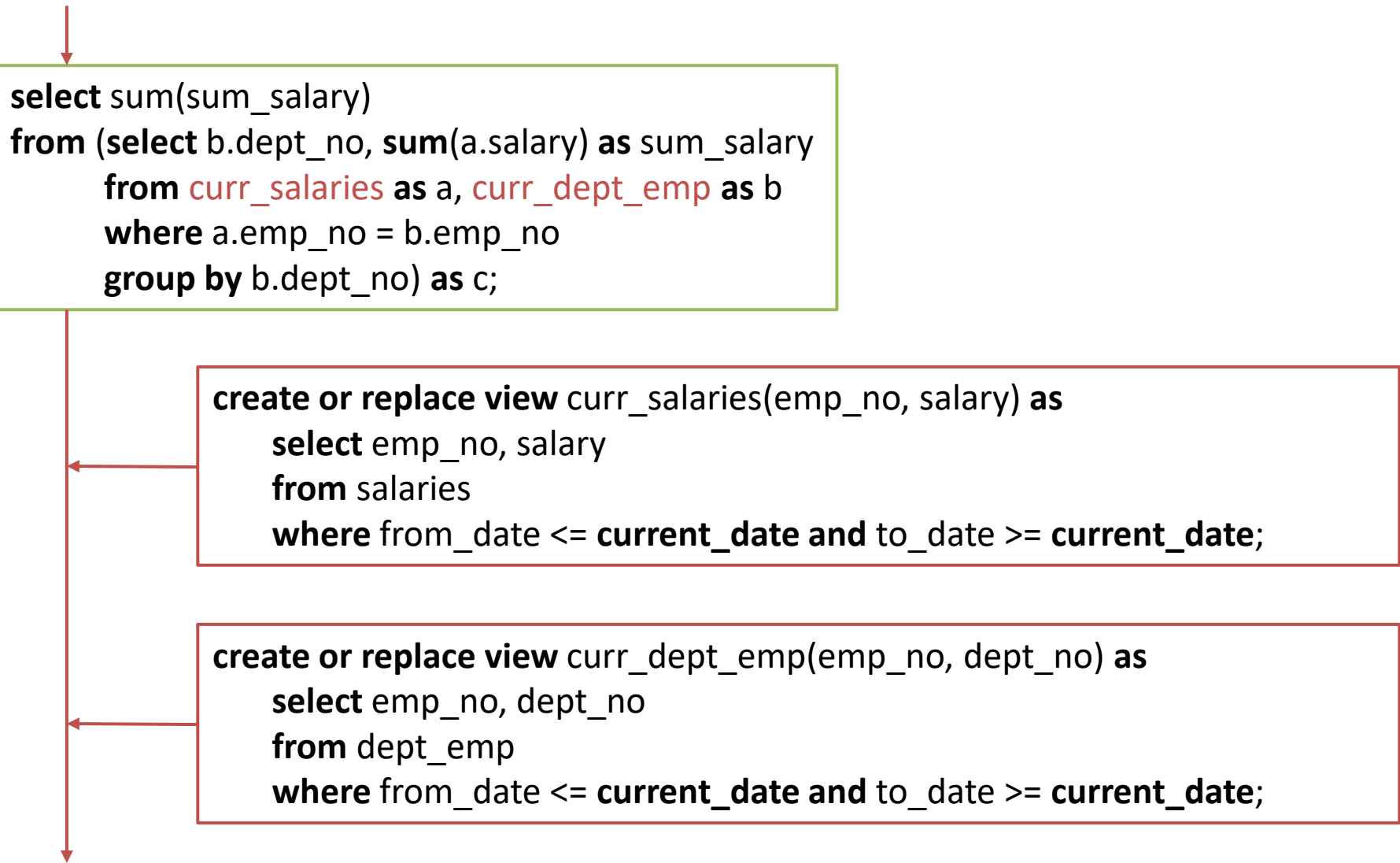
Query unfolding (sum_salary_dept)

```
select sum(sum_salary)
from sum_salary_dept;
```

```
create or replace view sum_salary_dept(dept_no, sum_salary) as
select b.dept_no, sum(a.salary) as sum_salary
from curr_salaries as a, curr_dept_emp as b
where a.emp_no = b.emp_no
group by b.dept_no;
```

```
select sum(sum_salary)
from (select b.dept_no, sum(a.salary) as sum_salary
      from curr_salaries as a, curr_dept_emp as b
      where a.emp_no = b.emp_no
      group by b.dept_no) as c;
```

Query unfolding (sum_salary_dept)




```
select sum(sum_salary)
from (select b.dept_no, sum(a.salary) as sum_salary
      from curr_salaries as a, curr_dept_emp as b
      where a.emp_no = b.emp_no
      group by b.dept_no) as c;
```

```
create or replace view curr_salaries(emp_no, salary) as
select emp_no, salary
from salaries
where from_date <= current_date and to_date >= current_date;
```

```
create or replace view curr_dept_emp(emp_no, dept_no) as
select emp_no, dept_no
from dept_emp
where from_date <= current_date and to_date >= current_date;
```

Query unfolding (sum_salary_dept)



```
select sum(sum_salary)
from (select b.dept_no, sum(a.salary) as sum_salary
      from (select emp_no, salary
            from salaries
            where from_date <= current_date and to_date >= current_date) as a,
      (select emp_no, dept_no
       from dept_emp
       where from_date <= current_date and to_date >= current_date) as b
      where a.emp_no = b.emp_no
      group by b.dept_no) as c;
```

```
+-----+
| sum(sum_salary) |
+-----+
|          18656036 |
+-----+
1 row in set (0.01 sec)
```