9-1: Using GROUP BY and HAVING Clauses

Vocabulary

HAVING	Used to specify which groups are to be displayed; restricts groups that do not meet group criteria
GROUP BY	Divides the rows in a table into groups

1. In the SQL query shown below, which of the following is true about this query?

_____ a. Kimberly Grant would not appear in the results set.

____x___ b. The GROUP BY clause has an error because the manager_id is not listed in the

SELECT clause.

_____ c. Only salaries greater than 16001 will be in the result set.

____x___ d. Names beginning with Ki will appear after names beginning with Ko.

_____ e. Last names such as King and Kochhar will be returned even if they don't have

salaries > 16000.

```
SELECT last_name, MAX(salary)
FROM employees
WHERE last_name LIKE 'K%'
GROUP BY manager_id, last_name
HAVING MAX(salary) >16000
ORDER BY last_name DESC ;
```

2. Each of the following SQL queries has an error. Find the error and correct it. Use Oracle Application Express to verify that your corrections produce the desired results.

a.

```
SELECT manager_id
```

FROM employees

WHERE AVG(salary) <16000

GROUP BY manager_id;

```
SELECT manager_id
FROM employees
GROUP BY manager_id
HAVING AVG(salary) < 16000;
```

b.

SELECT cd_number, COUNT(title)

FROM d_cds

WHERE cd_number < 93;

```
SELECT cd_number, COUNT(title)
FROM d_cds
GROUP BY cd_number
HAVING cd_number < 93;
```

c. SELECT ID, MAX(ID), artist AS Artist

FROM d_songs

WHERE duration IN('3 min', '6 min', '10 min')

HAVING ID < 50

GROUP by ID;

```
SELECT artist AS Artist, MAX(ID)
FROM d_songs
WHERE duration IN('3 min', '6 min', '10 min')
GROUP BY artist
HAVING MAX(ID) < 50;
```

d.

```
SELECT loc_type, rental_fee AS Fee

FROM d_venues

WHERE id <100

GROUP BY "Fee"

ORDER BY 2;
```

```
SELECT loc_type, rental_fee
FROM d_venues
WHERE id < 100
GROUP BY loc_type, rental_fee
ORDER BY 2;
```

3. Rewrite the following query to accomplish the same result:

```
SELECT DISTINCT MAX(song_id)

FROM d_track_listings

WHERE track IN ( 1, 2, 3);
```

```
SELECT MAX(song_id)
FROM d_track_listings
WHERE track IN (1, 2, 3)
GROUP BY track;
```

4. Indicate True or False

___T__ a. If you include a group function and any other individual columns in a SELECT clause, then each individual column must also appear in the GROUP BY clause.

___F__ b. You can use a column alias in the GROUP BY clause.

___F__ c. The GROUP BY clause always includes a group function.

5. Write a query that will return both the maximum and minimum average salary grouped by department from the employees table.

```
SELECT MAX(AVG(salary)) AS max_avg_salary,
       MIN(AVG(salary)) AS min_avg_salary
FROM employees
GROUP BY department_id
```

6. Write a query that will return the average of the maximum salaries in each department for the employees table.

```
SELECT AVG(MAX(salary)) AS avg_max_salary
FROM employees
GROUP BY department_id
```

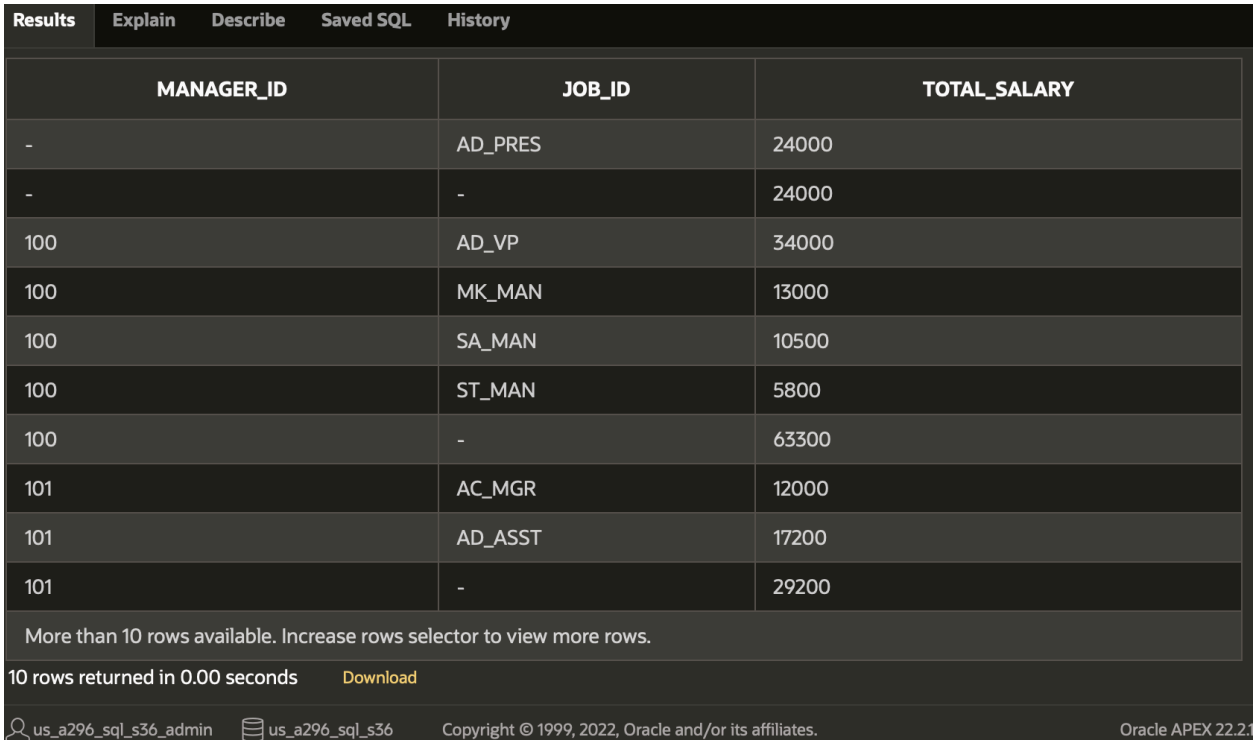
9-2: Using ROLLUP and CUBE Operations and GROUPING SETS

Vocabulary

ROLLUP	Used to create subtotals that roll up from the most detailed level to a grand total, following a grouping list specified in the clause
CUBE	An extension to the GROUP BY clause like ROLLUP that produces cross-tabulation reports
GROUPING SETS	Used to specify multiple groupings of data

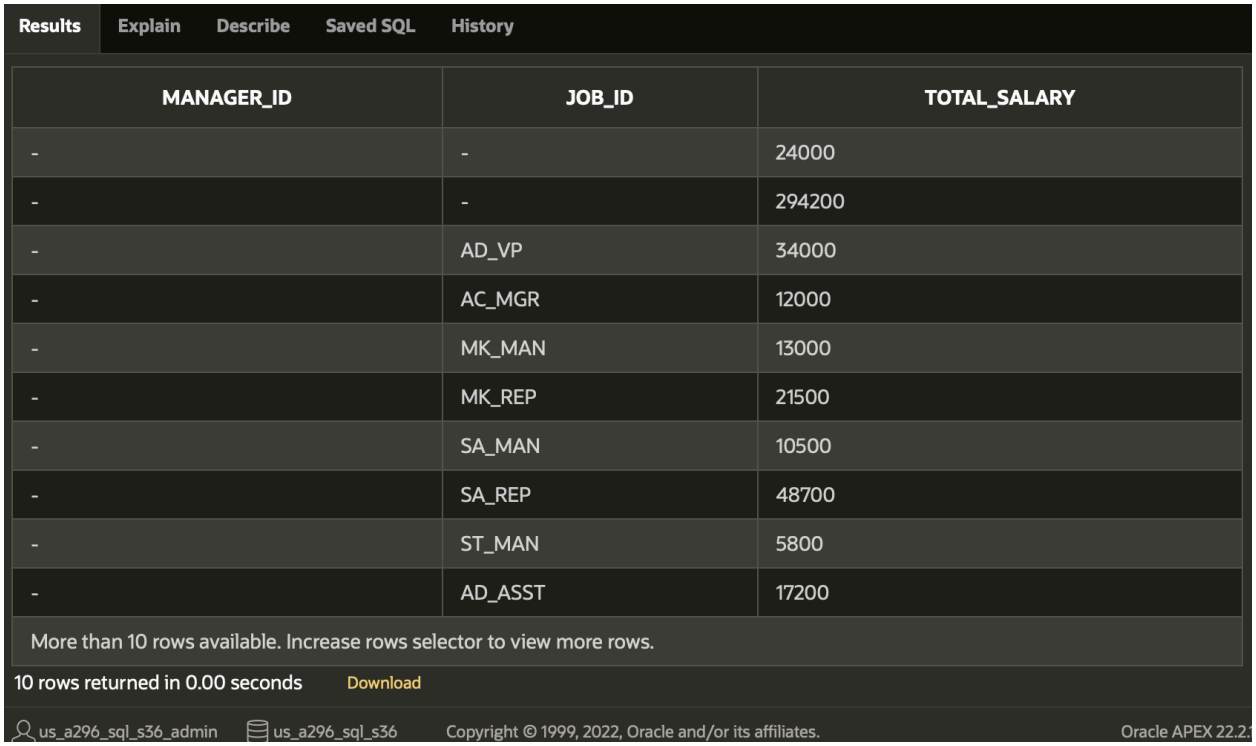
1. Within the Employees table, each manager_id is the manager of one or more employees who each have a job_id and earn a salary. For each manager, what is the total salary earned by all of the employees within each job_id? Write a query to display the Manager_id, job_id, and total salary. Include in the result the subtotal salary for each manager and a grand total of all salaries.

```
SELECT manager_id,
    job_id,
    SUM(salary) AS total_salary
FROM employees
GROUP BY ROLLUP(manager_id, job_id);
```



2. Amend the previous query to also include a subtotal salary for each job_id regardless of the manager_id.

```
SELECT manager_id,
      job_id,
      SUM(salary) AS total_salary
FROM employees
GROUP BY CUBE(manager_id, job_id);
```



Results | Explain | Describe | Saved SQL | History

MANAGER_ID	JOB_ID	TOTAL_SALARY
-	-	24000
-	-	294200
-	AD_VP	34000
-	AC_MGR	12000
-	MK_MAN	13000
-	MK_REP	21500
-	SA_MAN	10500
-	SA_REP	48700
-	ST_MAN	5800
-	AD_ASST	17200

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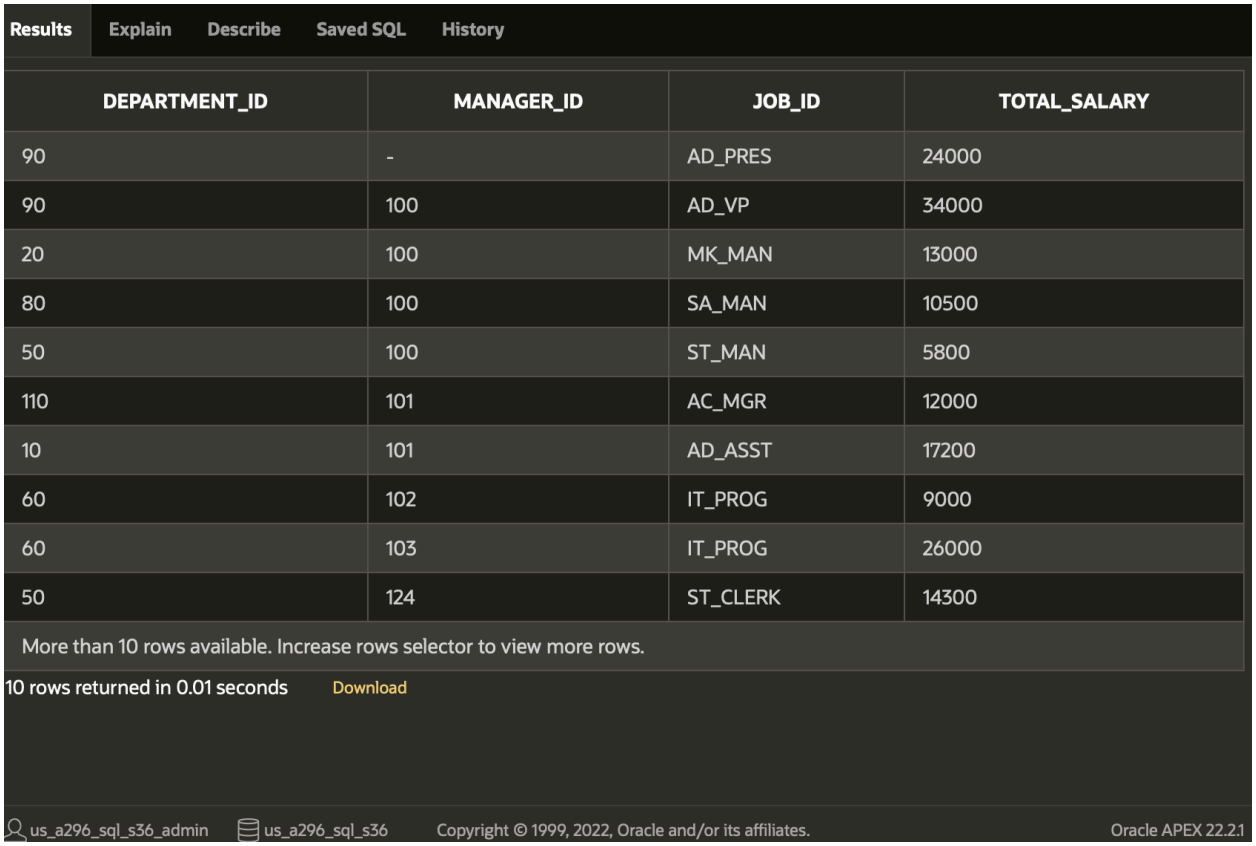
3. Using GROUPING SETS, write a query to show the following groupings:

- department_id, manager_id, job_id
- manager_id, job_id
- department_id, manager_id

```
SELECT department_id,
      manager_id,
      job_id,
      SUM(salary) AS total_salary
FROM employees
GROUP BY GROUPING SETS (
   (department_id,manager_id, job_id),
   (manager_id, job_id),
   (department_id, manager_id));
```



Results | Explain | Describe | Saved SQL | History

DEPARTMENT_ID	MANAGER_ID	JOB_ID	TOTAL_SALARY
90	-	AD_PRES	24000
90	100	AD_VP	34000
20	100	MK_MAN	13000
80	100	SA_MAN	10500
50	100	ST_MAN	5800
110	101	AC_MGR	12000
10	101	AD_ASST	17200
60	102	IT_PROG	9000
60	103	IT_PROG	26000
50	124	ST_CLERK	14300

More than 10 rows available. Increase rows selector to view more rows.

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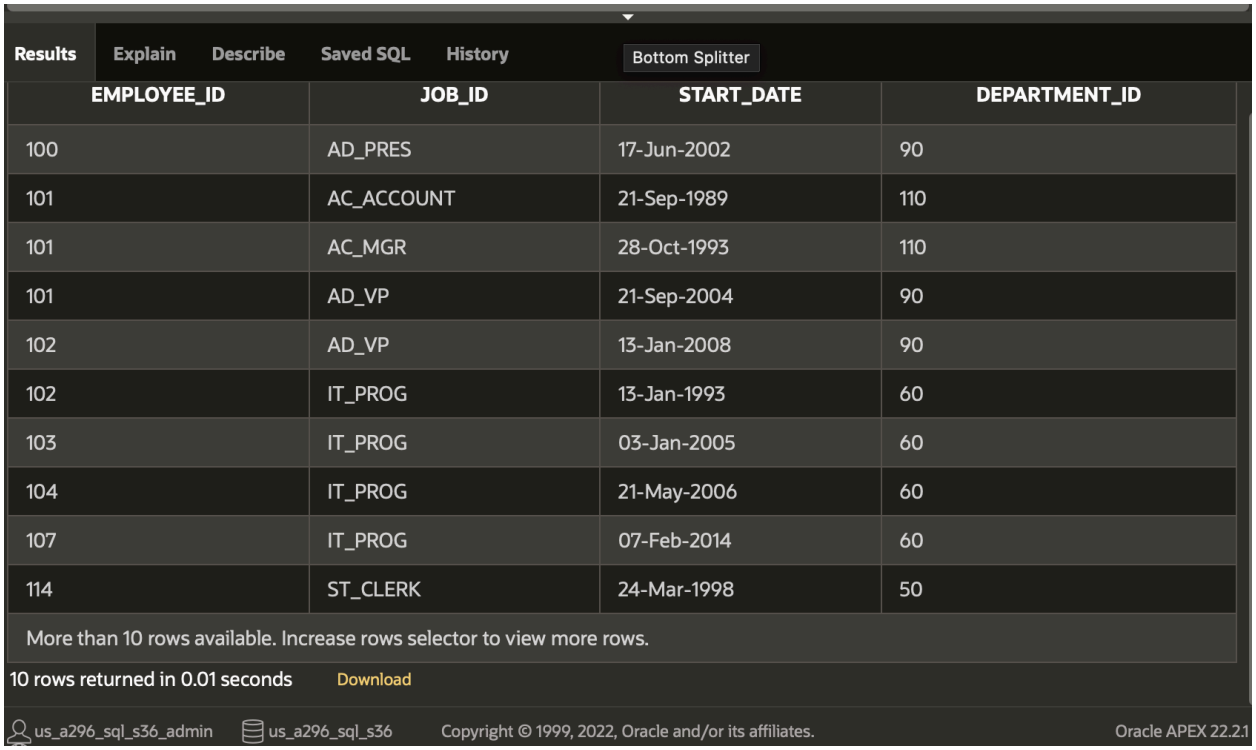
9-3: Set Operators

1. Name the different Set operators?
    - **UNION**
    - **UNION ALL**
    - **INTERSECT**
    - **MINUS**

2. Write one query to return the employee_id, job_id, hire_date, and department_id of all employees and a second query listing employee_id, job_id, start_date, and department_id from the job_history table and combine the results as one single output. Make sure you suppress duplicates in the output.

```
SELECT employee_id,
    job_id,
    hire_date AS start_date, department_id
FROM employees
UNION
SELECT employee_id, job_id, start_date, department_id
FROM job_history;
```



3. Amend the previous statement to not suppress duplicates and examine the output. How many extra rows did you get returned and which were they? Sort the output by employee_id to make it easier to spot.

```
SELECT employee_id,
    job_id,
    hire_date AS start_date, department_id
FROM employees
UNION ALL
SELECT employee_id, job_id, start_date, department_id
FROM job_history
ORDER BY employee_id;
```

Results | Explain | Describe | Saved SQL | History

EMPLOYEE_ID	JOB_ID	START_DATE	DEPARTMENT_ID
100	AD_PRES	17-Jun-2002	90
101	AC_MGR	28-Oct-1993	110
101	AD_VP	21-Sep-2004	90
101	AC_ACCOUNT	21-Sep-1989	110
102	AD_VP	13-Jan-2008	90
102	IT_PROG	13-Jan-1993	60
103	IT_PROG	03-Jan-2005	60
104	IT_PROG	21-May-2006	60
107	IT_PROG	07-Feb-2014	60
114	ST_CLERK	24-Mar-1998	50

More than 10 rows available. Increase rows selector to view more rows.

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4. List all employees who have not changed jobs even once. (Such employees are not found in the job_history table)

```
SELECT e.employee_id,
      e.job_id,
      e.hire_date,
      e.department_id
FROM employees e
WHERE NOT EXISTS (
   SELECT 1
   FROM job_history jh
   WHERE e.employee_id = jh.employee_id);
```

Results | Explain | Describe | Saved SQL | History

EMPLOYEE_ID	JOB_ID	HIRE_DATE	DEPARTMENT_ID
100	AD_PRES	17-Jun-2002	90
103	IT_PROG	03-Jan-2005	60
104	IT_PROG	21-May-2006	60
107	IT_PROG	07-Feb-2014	60
124	ST_MAN	16-Nov-2014	50
141	ST_CLERK	17-Oct-2010	50
142	ST_CLERK	29-Jan-2012	50
143	ST_CLERK	15-Mar-2013	50
144	ST_CLERK	09-Jul-2013	50
149	SA_MAN	29-Jan-2015	80

More than 10 rows available. Increase rows selector to view more rows.

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5. List the employees that HAVE changed their jobs at least once.

```
SELECT e.employee_id,
       e.job_id,
       e.hire_date,
       e.department_id
FROM employees e
WHERE EXISTS (
   SELECT 1
   FROM job_history jh
   WHERE e.employee_id = jh.employee_id);
```

Results | Explain | Describe | Saved SQL | History

EMPLOYEE_ID	JOB_ID	HIRE_DATE	DEPARTMENT_ID
101	AD_VP	21-Sep-2004	90
102	AD_VP	13-Jan-2008	90
176	SA_REP	24-Mar-2013	80
200	AD_ASST	17-Sep-2002	10
201	MK_MAN	17-Feb-2011	20

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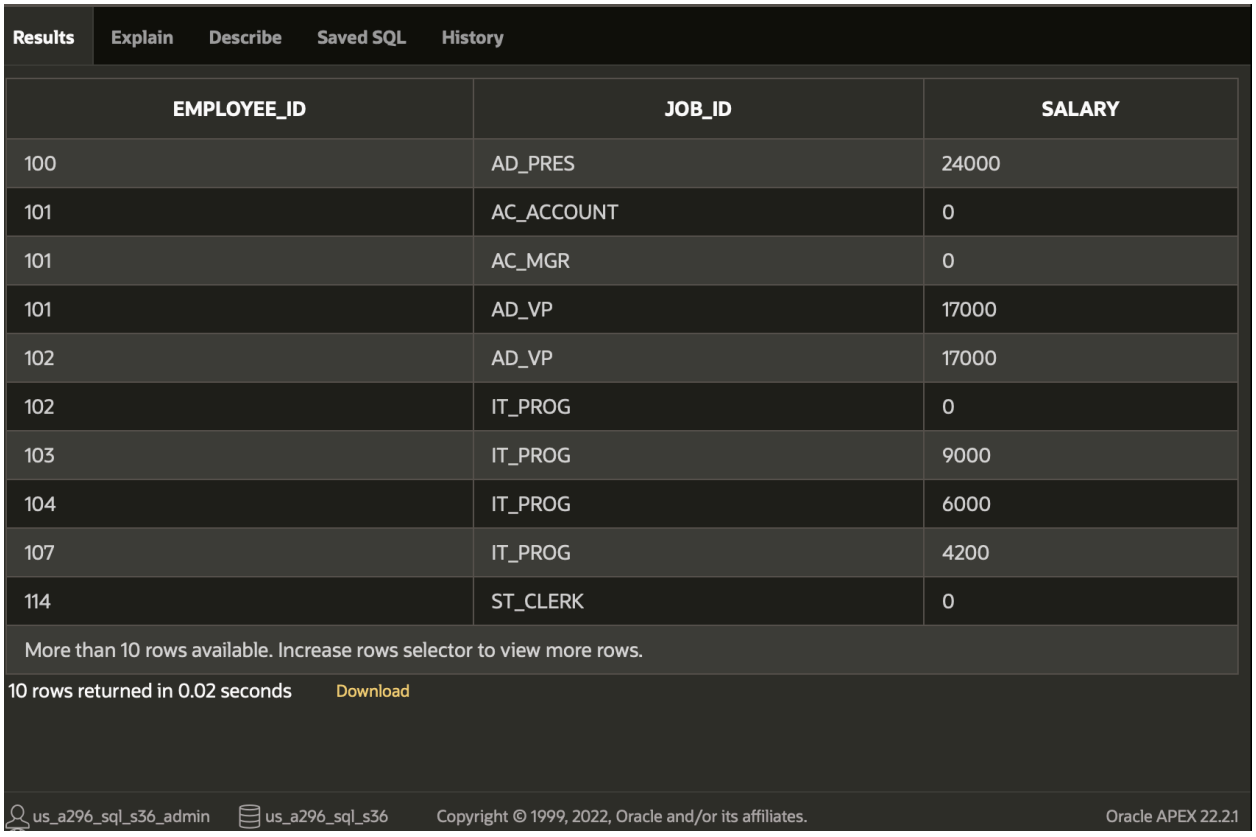
6. Using the UNION operator, write a query that displays the employee_id, job_id, and salary of ALL present and past employees. If a salary is not found, then just display a 0 (zero) in its place.

```
SELECT employee_id,
       job_id,
       NVL (salary, 0) AS salary
FROM employees
UNION
   SELECT employee_id,
          job_id,
          0 AS salary
   FROM job_history
```



Results | Explain | Describe | Saved SQL | History

EMPLOYEE_ID	JOB_ID	SALARY
100	AD_PRES	24000
101	AC_ACCOUNT	0
101	AC_MGR	0
101	AD_VP	17000
102	AD_VP	17000
102	IT_PROG	0
103	IT_PROG	9000
104	IT_PROG	6000
107	IT_PROG	4200
114	ST_CLERK	0

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