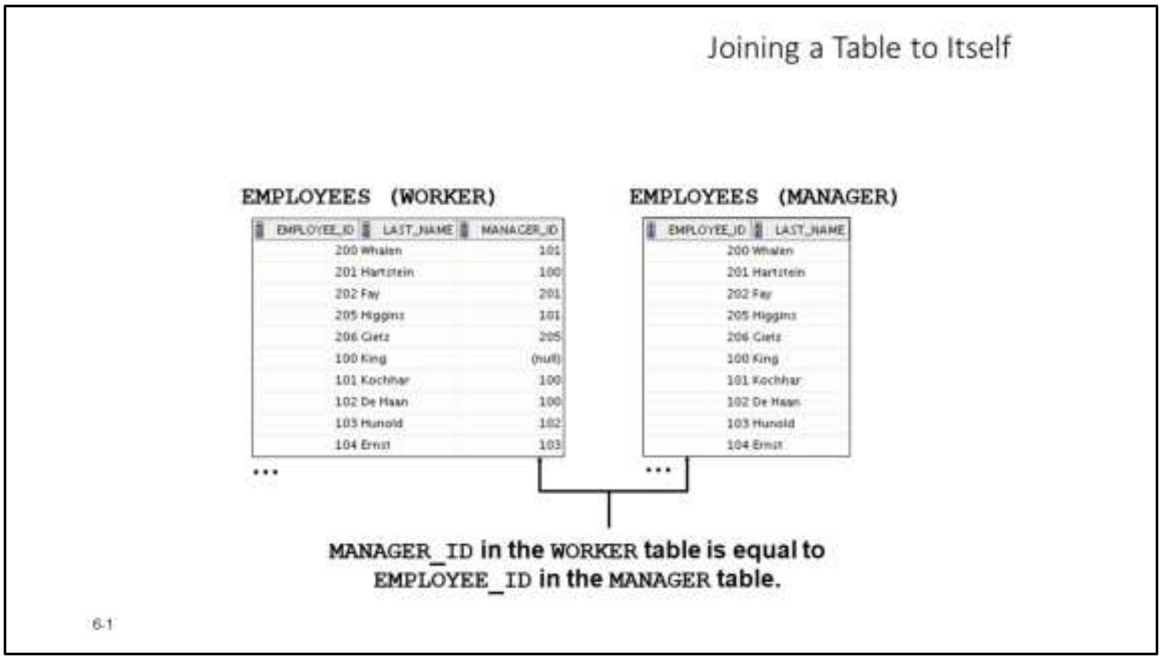


Joining a Table to Itself

EMPLOYEES (WORKER)

EMPLOYEE_ID	LAST_NAME	MANAGER_ID
200	Whalen	101
201	Hartstein	100
202	Fay	201
205	Higgins	101
206	Gietz	205
100	King	(null)
101	Kochhar	100
102	De Haan	100
103	Hunold	102
104	Ernst	103

...

EMPLOYEES (MANAGER)

EMPLOYEE_ID	LAST_NAME
200	Whalen
201	Hartstein
202	Fay
205	Higgins
206	Gietz
100	King
101	Kochhar
102	De Haan
103	Hunold
104	Ernst

...

MANAGER_ID in the WORKER table is equal to EMPLOYEE_ID in the MANAGER table.

6-1

Joining a Table to Itself

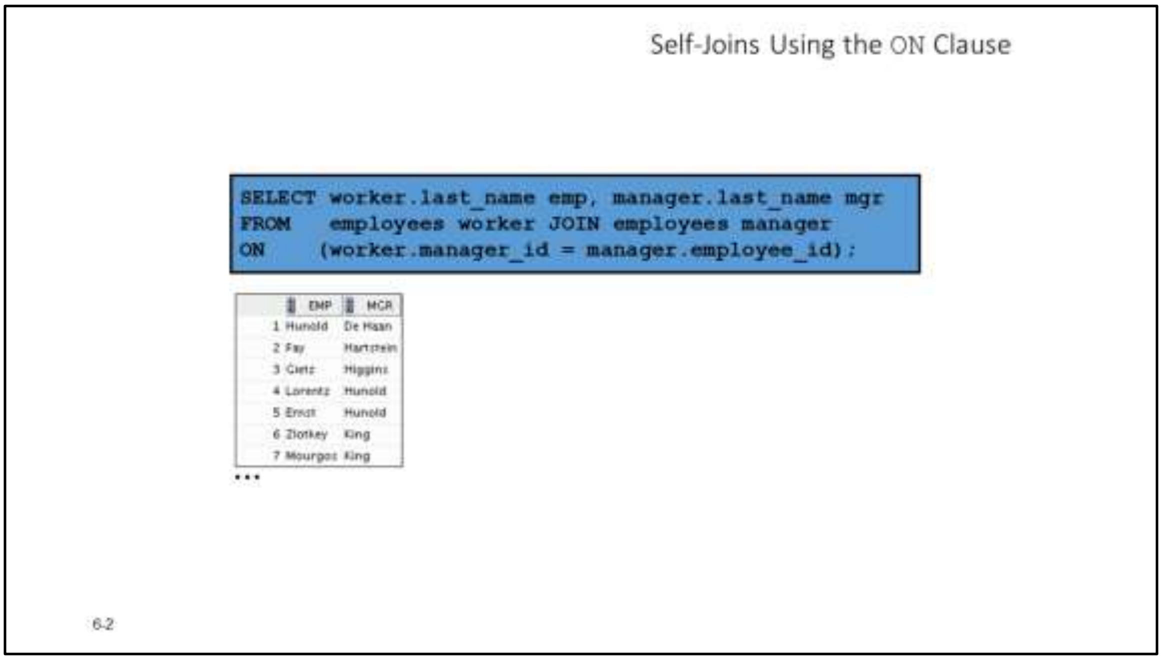
Sometimes you need to join a table to itself. To find the name of each employee's manager, you need to join the EMPLOYEES table to itself, or perform a self-join. For example, to find the name of Lorentz's manager, you need to:

Find Lorentz in the EMPLOYEES table by looking at the LAST_NAME column

Find the manager number for Lorentz by looking at the MANAGER_ID column. Lorentz's manager number is 103.

Find the name of the manager with EMPLOYEE_ID 103 by looking at the LAST_NAME column. Hunold's employee number is 103, so Hunold is Lorentz's manager.

In this process, you look in the table twice. The first time you look in the table to find Lorentz in the LAST_NAME column and the MANAGER_ID value of 103. The second time you look in the EMPLOYEE_ID column to find 103 and the LAST_NAME column to find Hunold.



Self-Joins Using the ON Clause

```
SELECT worker.last_name emp, manager.last_name mgr
FROM   employees worker JOIN employees manager
ON    (worker.manager_id = manager.employee_id);
```

	EMP	MGR
1	Hunold	De Haan
2	Fay	Hartstein
3	Gietz	Higgins
4	Lorentz	Hunold
5	Ernst	Hunold
6	Zlotkey	King
7	Mourgos	King

...

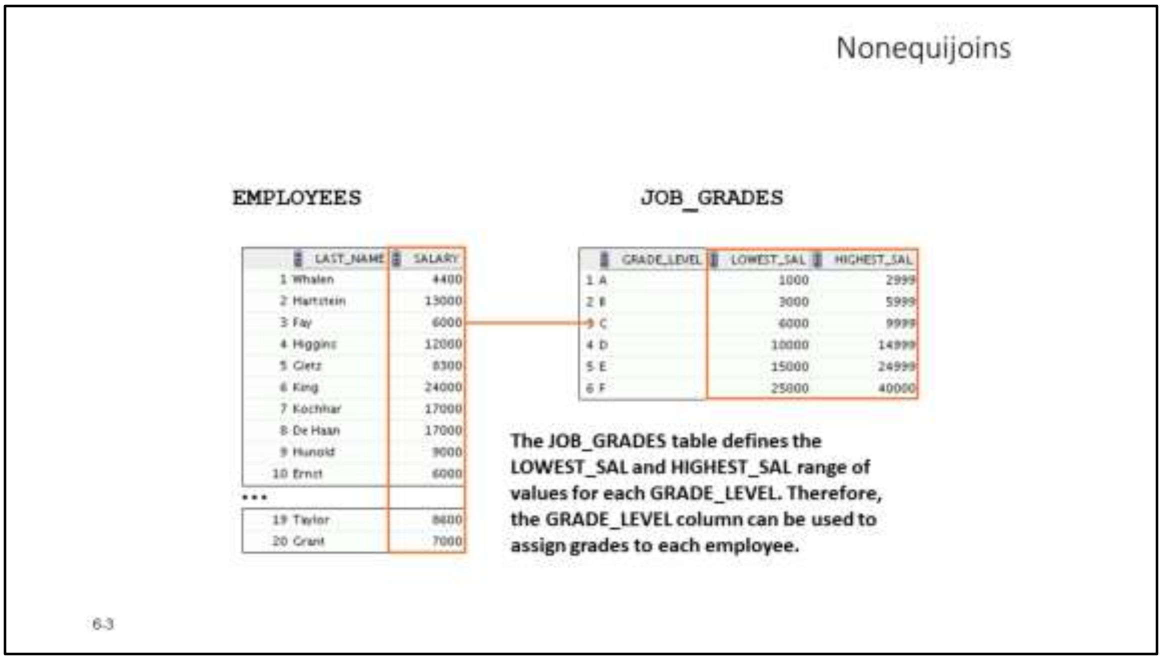
6-2

Self-Joins Using the `ON` Clause

The `ON` clause can also be used to join columns that have different names, within the same table or in a different table.

The example shown is a self-join of the `EMPLOYEES` table, based on the `EMPLOYEE_ID` and `MANAGER_ID` columns.

Note: The parenthesis around the joined columns as in the example in the slide, `(e.manager_id = m.employee_id)` is **optional**. So, even `ON e.manager_id = m.employee_id` will work.



Nonequijoins

EMPLOYEES

	LAST_NAME	SALARY
1	Whalen	4400
2	Hartstein	13000
3	Fay	6000
4	Higgins	12000
5	Gietz	8300
6	King	24000
7	Kochhar	17000
8	De Haan	17000
9	Hunold	9000
10	Ernst	6000
•••		
19	Taylor	8600
20	Grant	7000

JOB_GRADES

	GRADE_LEVEL	LOWEST_SAL	HIGHEST_SAL
1	A	1000	2999
2	B	3000	5999
3	C	6000	9999
4	D	10000	14999
5	E	15000	24999
6	F	25000	40000

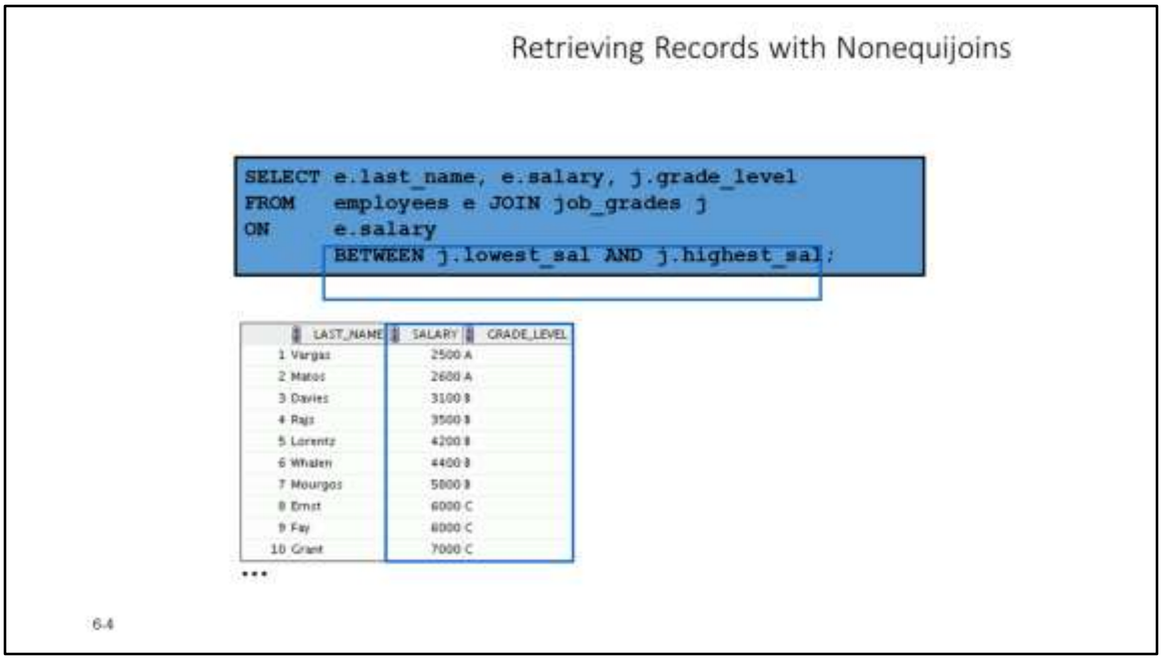
The JOB_GRADES table defines the LOWEST_SAL and HIGHEST_SAL range of values for each GRADE_LEVEL. Therefore, the GRADE_LEVEL column can be used to assign grades to each employee.

6-3

Nonequijoins

A nonequijoin is a join condition containing something other than an equality operator.

The relationship between the `EMPLOYEES` table and the `JOB_GRADES` table is an example of a nonequijoin. The `SALARY` column in the `EMPLOYEES` table ranges between the values in the `LOWEST_SAL` and `HIGHEST_SAL` columns of the `JOB_GRADES` table. Therefore, each employee can be graded based on their salary. The relationship is obtained using an operator other than the equality (=) operator.



Retrieving Records with Nonequijoins

```
SELECT e.last_name, e.salary, j.grade_level
FROM   employees e JOIN job_grades j
ON     e.salary
       BETWEEN j.lowest_sal AND j.highest_sal;
```

	LAST_NAME	SALARY	GRADE_LEVEL
1	Vargas	2500	A
2	Matos	2600	A
3	Davies	3100	B
4	Rajs	3500	B
5	Lorentz	4200	B
6	Whalen	4400	B
7	Mourgos	5800	B
8	Ernst	6000	C
9	Fay	6000	C
10	Grant	7000	C

...

6-4

Retrieving Records with Nonequijoins

The example in the slide creates a nonequijoin to evaluate an employee's salary grade. The salary must be *between* any pair of the low and high salary ranges.

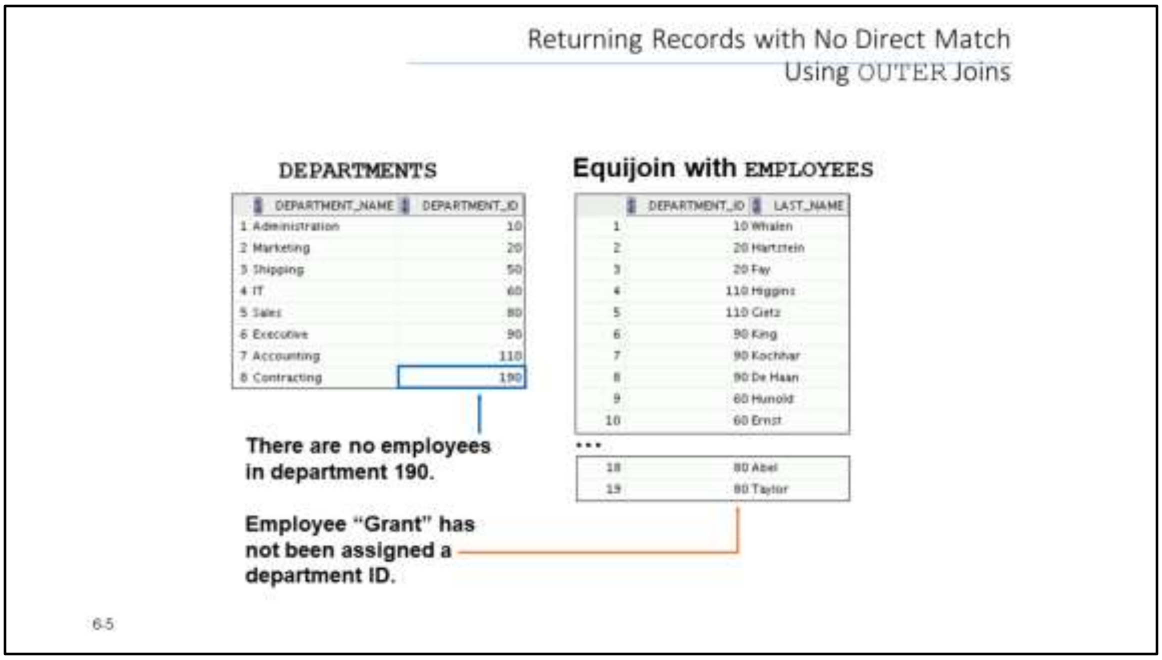
It is important to note that all employees appear exactly once when this query is executed. No employee is repeated in the list. There are two reasons for this:

None of the rows in the `JOB_GRADES` table contain grades that overlap. That is, the salary value for an employee can lie only between the low salary and high salary values of one of the rows in the salary grade table.

All of the employees' salaries lie within the limits provided by the job grade table. That is, no employee earns less than the lowest value contained in the `LOWEST_SAL` column or more than the highest value contained in the `HIGHEST_SAL` column.

Note: Other conditions (such as <= and >=) can be used, but `BETWEEN` is the simplest. Remember to specify the low value first and the high value last when using the `BETWEEN` condition. The Oracle server translates the `BETWEEN` condition to a pair of `AND` conditions. Therefore, using `BETWEEN` has no performance benefits, but should be used only for logical simplicity.

Table aliases have been specified in the slide example for performance reasons, not because of possible ambiguity.



Returning Records with No Direct Match Using OUTER Joins

DEPARTMENTS

	DEPARTMENT_NAME	DEPARTMENT_ID
1	Administration	10
2	Marketing	20
3	Shipping	50
4	IT	60
5	Sales	80
6	Executive	90
7	Accounting	110
8	Contracting	190

There are no employees in department 190.

Equijoin with EMPLOYEES

	DEPARTMENT_ID	LAST_NAME
1	10	Whalen
2	20	Hartstein
3	20	Fay
4	110	Higgins
5	110	Gietz
6	90	King
7	90	Kochhar
8	90	De Haan
9	60	Hunold
10	60	Ernst

...

18	80	Abel
19	80	Taylor

Employee "Grant" has not been assigned a department ID.

6-5

Returning Records with No Direct Match Using OUTER Joins

If a row does not satisfy a join condition, the row does not appear in the query result.

In the slide example, a simple equijoin condition is used on the EMPLOYEES and DEPARTMENTS tables to return the result on the right. The result set does not contain the following:

Department ID 190, because there are no employees with that department ID recorded in the EMPLOYEES table

The employee with the last name of Grant, because this employee has not been assigned a department ID

To return the department record that does not have any employees, or employees that do not have an assigned department, you can use an OUTER join.