Restricting and Sorting Data

Objectives

After completing this lesson, you should be able to do the following:

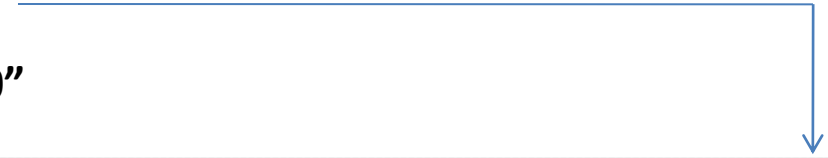
- **Limit the rows that are retrieved by a query**
- **Sort the rows that are retrieved by a query**
- **Use ampersand substitution in *SQL*Plus to* restrict and sort output at run time**

Limiting Rows Using a Selection

EMPLOYEES

EMPLOYEE_ID	LAST_NAME	JOB_ID	DEPARTMENT_ID
100	King	AD_PRES	90
101	Kochhar	AD_VP	90
102	De Haan	AD_VP	90
103	Hunold	IT_PROG	60
104	Ernst	IT_PROG	60
107	Lorentz	IT_PROG	60
124	Mourgos	ST_MAN	50

"retrieve all employees in department 90"



EMPLOYEE_ID	LAST_NAME	JOB_ID	DEPARTMENT_ID
100	King	AD_PRES	90
101	Kochhar	AD_VP	90
102	De Haan	AD_VP	90

Limiting the Rows That Are Selected

Restrict the rows that are returned by using the WHERE clause:

SELECT *|{[DISTINCT] *column|expression [alias],...}*
FROM *table*
[WHERE *condition(s)];*

- **The WHERE clause follows the FROM clause.**

Using the WHERE Clause

```
SELECT employee_id, last_name, job_id, department_id
FROM employees
WHERE department_id = 90 ;
```

EMPLOYEE_ID	LAST_NAME	JOB_ID	DEPARTMENT_ID
100	King	AD_PRES	90
101	Kochhar	AD_VP	90
102	De Haan	AD_VP	90

Character Strings and Dates

- Character strings and date values are enclosed by single quotation marks.
- Character values are case-sensitive, and date values are format-sensitive.
- The default date format is DD-MON-RR.

```
SELECT last_name, job_id, department_id
FROM employees
WHERE last_name = 'Whalen' ;
```

Comparison Conditions

Operator	Meaning
=	Equal to
>	Greater than
>=	Greater than or equal to
<	Less than
<=	Less than or equal to
<>	Not equal to
BETWEEN ...AND...	Between two values (inclusive)
IN(set)	Match any of a list of values
LIKE	Match a character pattern
IS NULL	Is a null value

Using Comparison Conditions

```
SELECT last_name, salary
FROM employees
WHERE salary <= 3000 ;
```

LAST_NAME	SALARY
Matos	2600
Vargas	2500

Using the BETWEEN Condition

Use the BETWEEN condition to display rows based on a range of values:

```
SELECT last_name, salary
FROM employees
WHERE salary BETWEEN 2500 AND 3500 ;
```

Lower limit **Upper limit**

LAST_NAME	SALARY
Rajs	3500
Davies	3100
Matos	2600
Vargas	2500

Using the IN Condition

Use the IN membership condition to test for values in a list:

```
SELECT employee_id, last_name, salary, manager_id
FROM employees
WHERE manager_id IN (100, 101, 201) ;
```

EMPLOYEE_ID	LAST_NAME	SALARY	MANAGER_ID
202	Fay	6000	201
200	Whalen	4400	101
205	Higgins	12000	101
101	Kochhar	17000	100
102	De Haan	17000	100
124	Mourgos	5800	100
149	Zlotkey	10500	100
201	Hartstein	13000	100

Using the LIKE Condition

- Use the LIKE condition to perform wildcard searches of valid search string values.
- Search conditions can contain either literal characters or numbers:
  - % denotes zero or many characters.
  - _ denotes one character.

```
SELECT first_name
FROM employees
WHERE first_name LIKE 'S%' ;
```

Using the LIKE Condition

- You can combine pattern-matching characters:

```
SELECT last_name
FROM employees
WHERE last_name LIKE '_o%' ;
```

LAST_NAME
Kochhar
Lorentz
Mourgos

- You can use the ESCAPE identifier to search for the actual % and _ symbols.

Using the NULL Conditions

Test for nulls with the IS NULL operator.

```
SELECT last_name, manager_id
FROM employees
WHERE manager_id IS NULL ;
```

LAST_NAME	MANAGER_ID
King	

Logical Conditions

Operator	Meaning
AND	**Returns TRUE if *both component* conditions are true**
OR	**Returns TRUE if *either component* condition is true**
NOT	**Returns TRUE if the following condition is false**

Using the AND Operator

AND requires both conditions to be true:

```
SELECT employee_id, last_name, job_id, salary
FROM employees
WHERE salary >=10000
AND job_id LIKE '%MAN%' ;
```

EMPLOYEE_ID	LAST_NAME	JOB_ID	SALARY
149	Zlotkey	SA_MAN	10500
201	Hartstein	MK_MAN	13000

Using the OR Operator

OR requires either condition to be true:

```
SELECT employee_id, last_name, job_id, salary
FROM employees
WHERE salary >= 10000
OR job_id LIKE '%MAN%' ;
```

EMPLOYEE_ID	LAST_NAME	JOB_ID	SALARY
100	King	AD_PRES	24000
101	Kochhar	AD_VP	17000
102	De Haan	AD_VP	17000
124	Mourgos	ST_MAN	5800
149	Zlotkey	SA_MAN	10500
174	Abel	SA_REP	11000
201	Hartstein	MK_MAN	13000
205	Higgins	AC_MGR	12000

Using the NOT Operator

```
SELECT last_name, job_id
FROM employees
WHERE job_id
NOT IN ('IT_PROG', 'ST_CLERK', 'SA_REP') ;
```

LAST_NAME	JOB_ID
King	AD_PRES
Kochhar	AD_VP
De Haan	AD_VP
Mourgos	ST_MAN
Zlotkey	SA_MAN
Whalen	AD_ASST
Hartstein	MK_MAN
Fay	MK_REP
Higgins	AC_MGR
Gietz	AC_ACCOUNT

Rules of Precedence

Operator	Meaning
1.	**Arithmetic operators**
2.	**Concatenation operator**
3.	**Comparison conditions**
4.	**IS [NOT] NULL, LIKE, [NOT] IN**
5.	**[NOT] BETWEEN**
6.	**Not equal to**
7.	**NOT logical condition**
8.	**AND logical condition**
9.	**OR logical condition**

You can use parentheses to override rules of precedence.

Rules of Precedence

```
SELECT last_name, job_id, salary
FROM employees
WHERE job_id = 'SA_REP'
OR job_id = 'AD_PRES'
AND salary > 15000;
```

LAST_NAME	JOB_ID	SALARY
King	AD_PRES	24000
Abel	SA_REP	11000
Taylor	SA_REP	8600
Grant	SA_REP	7000

```
SELECT last_name, job_id, salary
FROM employees
WHERE (job_id = 'SA_REP'
OR job_id = 'AD_PRES')
AND salary > 15000;
```

LAST_NAME	JOB_ID	SALARY
King	AD_PRES	24000

Using the ORDER BY Clause

- Sort retrieved rows with the ORDER BY clause:
  - ASC: ascending order, default
  - DESC: descending order
- The ORDER BY clause comes last in the SELECT statement:

```
SELECT last_name, job_id, department_id, hire_date
FROM employees
ORDER BY hire_date ;
```

LAST_NAME	JOB_ID	DEPARTMENT_ID	HIRE_DATE
King	AD_PRES	90	17-JUN-87
Whalen	AD_ASST	10	17-SEP-87
Kochhar	AD_VP	90	21-SEP-89
Hunold	IT_PROG	60	03-JAN-90
Ernst	IT_PROG	60	21-MAY-91

Sorting

- **Sorting in descending order:**

```
SELECT last_name, job_id, department_id, hire_date
FROM employees
ORDER BY hire_date DESC ;
```

- **Sorting by column alias:**

```
SELECT employee_id, last_name, salary*12 annsal
FROM employees
ORDER BY annsal ;
```

- **Sorting by multiple columns:**

```
SELECT last_name, department_id, salary
FROM employees
ORDER BY department_id, salary DESC;
```

Substitution Variables

... salary = ? …
… department_id = ? …
... last_name = ? ...

I want
to query
different
values.

Substitution Variables

- Use *SQL*Plus substitution variables to:*
  - Temporarily store values with single-ampersand (&)
- Use substitution variables to supplement the following:
  - WHERE conditions
  - ORDER BY clauses
  - Column expressions
  - Table names
  - Entire SELECT statements

Using the & Substitution Variable

Use a variable prefixed with an ampersand (&) to prompt the user for a value:

```
SELECT employee_id, last_name, salary, department_id
FROM employees
WHERE employee_id = &employee_num ;
```

Enter value for employee_num:

Using the & Substitution Variable

```
old 3: WHERE employee_id = &employee_num
new 3: WHERE employee_id = 101
```

EMPLOYEE_ID	LAST_NAME	SALARY	DEPARTMENT_ID
101	Kochhar	17000	90

Character and Date Values with Substitution Variables

Use single quotation marks for date and character values:

```
SELECT last_name, department_id, salary*12
FROM employees
WHERE job_id = '&job_title' ;

Enter value for job_title:      IT_PROG

old   3: WHERE job_id = '&job_title'
new   3: WHERE job_id = 'IT_PROG'

LAST_NAME                 DEPARTMENT_ID  SALARY*12
------------------------- ------------- ----------------------------
Hunold                              60             108000
Ernst                               60              72000
Lorentz                             60              50400
```

Specifying Column Names, Expressions, and Text

```
SELECT employee_id, last_name, job_id,&column_name
FROM employees
WHERE &condition
ORDER BY &order_column ;
```

```
Enter value for column_name: salary
old   1: SELECT employee_id, last_name, job_id,&column_name
new   1: SELECT employee_id, last_name, job_id,salary
Enter value for condition: salary > 15000
old   3: WHERE &condition
new   3: WHERE salary > 15000
Enter value for order_column: last_name
old   4: ORDER BY &order_column
new   4: ORDER BY last_name
```

Using the *SQL*Plus DEFINE Command*

- **Use the *SQL*Plus DEFINE command to create and assign a value to a variable.**
- **Use the *SQL*Plus UNDEFINE command to remove a variable.**

```
DEFINE employee_num = 200
SELECT employee_id, last_name, salary, department_id
FROM employees
WHERE employee_id = &employee_num ;
UNDEFINE employee_num
```

```
old   3: WHERE employee_id = &employee_num
new   3: WHERE employee_id = 200

EMPLOYEE_ID LAST_NAME                 SALARY DEPARTMENT_ID
----------- ------------------------- --------- -------------
        200 Whalen                        4400            10
```

Using the VERIFY Command

Use the VERIFY command to toggle the display of the substitution variable, both before and after *SQL*Plus* replaces substitution variables with values:

```
SET VERIFY ON
SELECT employee_id, last_name, salary, department_id
FROM employees
WHERE employee_id = &employee_num;
```

```
Enter value for employee_num: 200
old   3: WHERE employee_id = &employee_num
new   3: WHERE employee_id = 200

EMPLOYEE_ID LAST_NAME                 SALARY DEPARTMENT_ID
----------- ------------------------- ---------- -------------
        200 Whalen                          4400            10
```

DECODE Function

Facilitates conditional inquiries by doing the work of a CASE expression or an IF-THEN-ELSE statement:

DECODE(*col|expression, search1, result1*
[, *search2, result2,...,]*
[, *default])*

Using the DECODE Function

```
SELECT last_name, job_id, salary,
DECODE(job_id, 'IT_PROG', 1.10*salary,
                       'ST_CLERK', 1.15*salary,
                       'SA_REP', 1.20*salary,
            salary)
            REVISED_SALARY
FROM employees;
```

Using the DECODE Function

Display the applicable tax rate for each employee in department 80:

```
SELECT last_name, salary,
DECODE (TRUNC(salary/2000, 0),
                        0, 0.00,
                        1, 0.09,
                        2, 0.20,
                        3, 0.30,
                        4, 0.40,
                        5, 0.42,
                        6, 0.44,
                        0.45) TAX_RATE
FROM employees
WHERE department_id = 80;
```