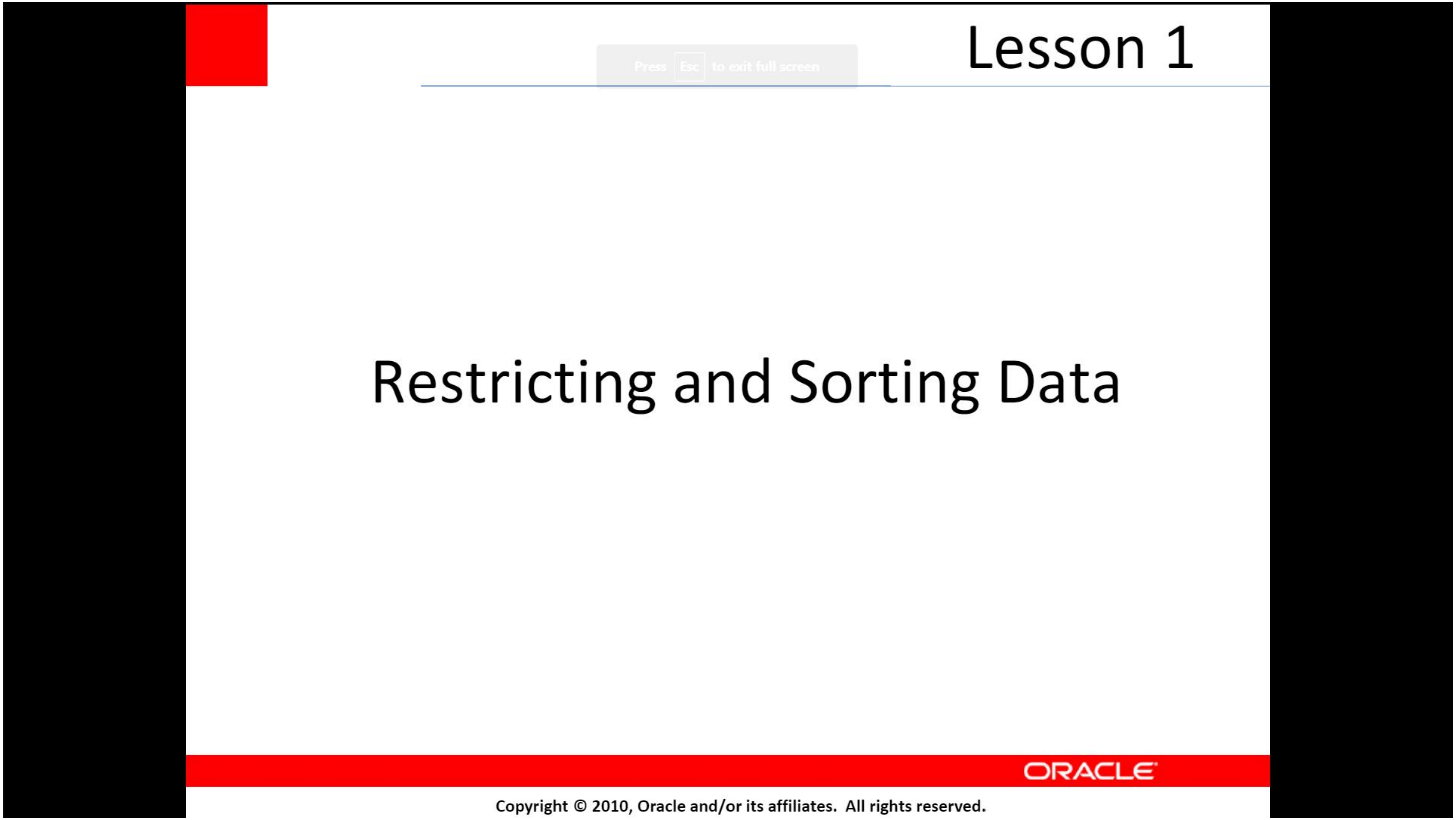
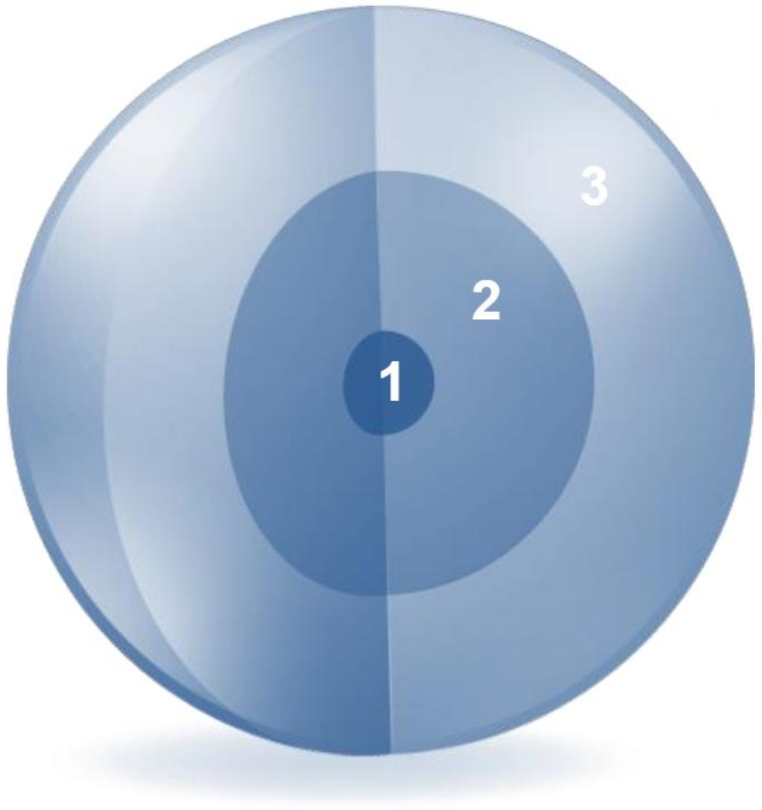


Press Esc to exit full screen

Lesson 1

Restricting and Sorting Data

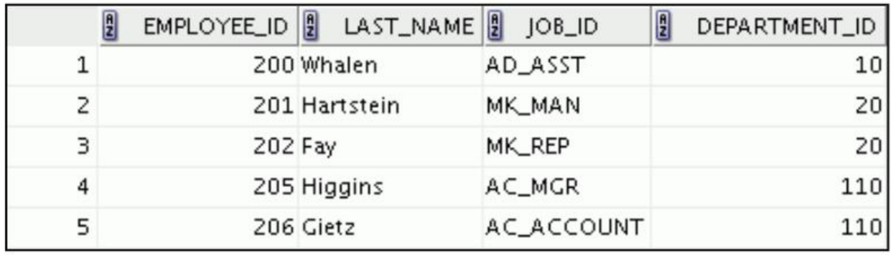
What You will learn at the end of this Session?



1. **Limit the rows that are retrieved by a query**
2. **Sort the rows that are retrieved by a query**
3. **Use ampersand substitution to restrict and sort output at run time**

Limiting Rows Using a Selection

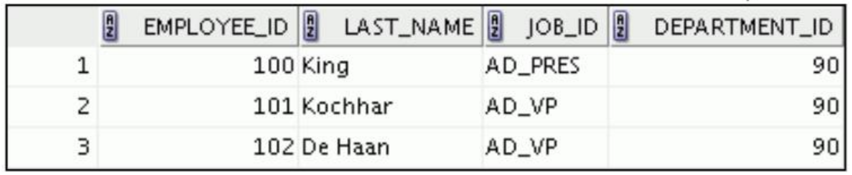
EMPLOYEES



	EMPLOYEE_ID	LAST_NAME	JOB_ID	DEPARTMENT_ID
1	200	Whalen	AD_ASST	10
2	201	Hartstein	MK_MAN	20
3	202	Fay	MK_REP	20
4	205	Higgins	AC_MGR	110
5	206	Gietz	AC_ACCOUNT	110

…

"retrieve all employees in department 90"



	EMPLOYEE_ID	LAST_NAME	JOB_ID	DEPARTMENT_ID
1	100	King	AD_PRES	90
2	101	Kochhar	AD_VP	90
3	102	De Haan	AD_VP	90

Limiting the Rows That Are Selected

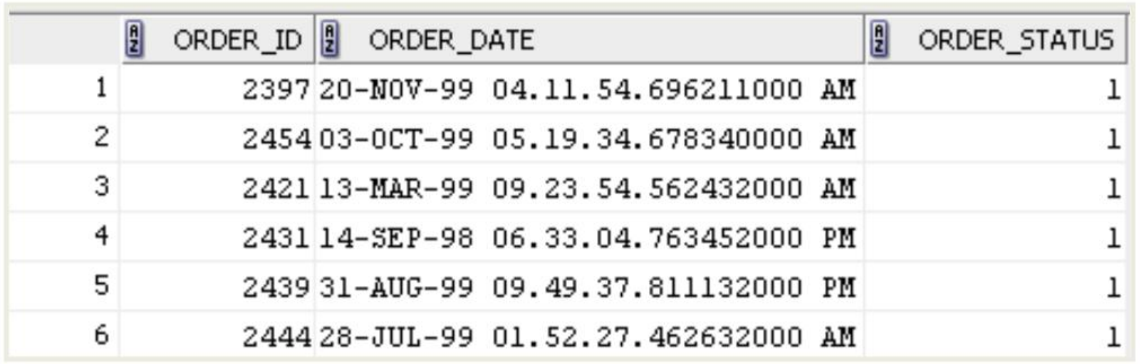
- **Restrict the rows that are returned by using the :**
- **WHERE clause**

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

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

Using the `WHERE` Clause

```
SELECT   order_id,  order_date,  order_status
  FROM   orders
WHERE   order_status = 1 ;
```



	ORDER_ID	ORDER_DATE	ORDER_STATUS
1	2397	20-NOV-99 04.11.54.696211000 AM	1
2	2454	03-OCT-99 05.19.34.678340000 AM	1
3	2421	13-MAR-99 09.23.54.562432000 AM	1
4	2431	14-SEP-98 06.33.04.763452000 PM	1
5	2439	31-AUG-99 09.49.37.811132000 PM	1
6	2444	28-JUL-99 01.52.27.462632000 AM	1

Character Strings and Dates

Character strings and date values are enclosed with single quotation marks.

Character values are case-sensitive and date values are format-sensitive.

The default date display format is DD-MON-RR.

```
SELECT  order_id,  order_date,  order_mode
FROM   orders
WHERE   order_mode = 'direct‘ ;
```

```
SELECT   last_name
FROM   employees
WHERE   hire_date = '17-FEB-96' ;
```

Comparison Operators

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

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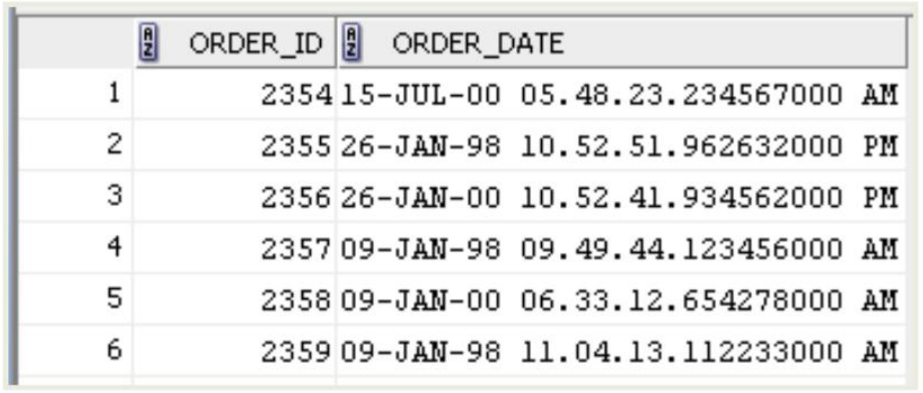
Using Comparison Operators

```
SELECT   order_id,  order_date
FROM   orders
WHERE   order_id <= 2400 ;
```



	ORDER_ID	ORDER_DATE
1	2354	15-JUL-00 05.48.23.234567000 AM
2	2355	26-JAN-98 10.52.51.962632000 PM
3	2356	26-JAN-00 10.52.41.934562000 PM
4	2357	09-JAN-98 09.49.44.123456000 AM
5	2358	09-JAN-00 06.33.12.654278000 AM
6	2359	09-JAN-98 11.04.13.112233000 AM

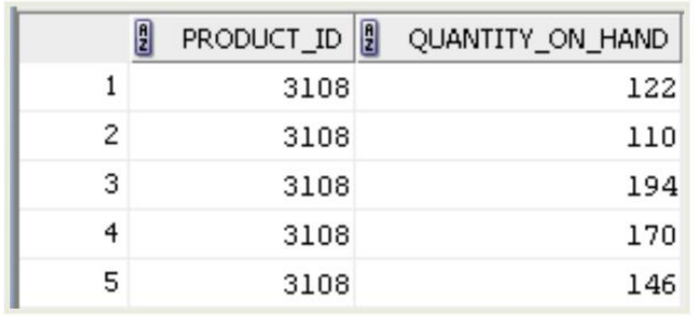
■ ■ ■

Range Conditions Using the BETWEEN Operator

- **Use the BETWEEN operator to display rows based on a range of values:**

```
SELECT   product_id,  quantity_on_hand
FROM   inventories
WHERE   product_id  BETWEEN  3100  AND  3108;
```

Lower limit **Upper limit**

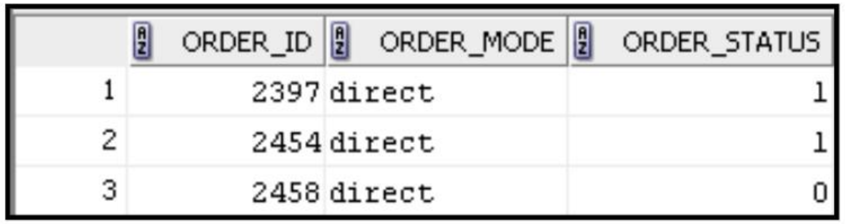


	PRODUCT_ID	QUANTITY_ON_HAND
1	3108	122
2	3108	110
3	3108	194
4	3108	170
5	3108	146

Membership Condition Using the `IN` Operator

- **Use the IN operator to test for values in a list:**

```
SELECT   order_id,  order_mode,  order_status
FROM   orders
WHERE   order_id  IN  (2458, 2397, 2454) ;
```



	ORDER_ID	ORDER_MODE	ORDER_STATUS
1	2397	direct	1
2	2454	direct	1
3	2458	direct	0

Pattern Matching Using the LIKE Operator

Use the LIKE operator to perform wildcard searches of valid search string values.

Search conditions can contain either literal characters or numbers:

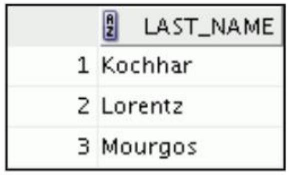
- **% denotes zero or many characters.**
- **_ denotes one character.**

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

Combining Wildcard Characters

- You can combine the two wildcard characters (%, _) with literal characters for pattern matching:

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



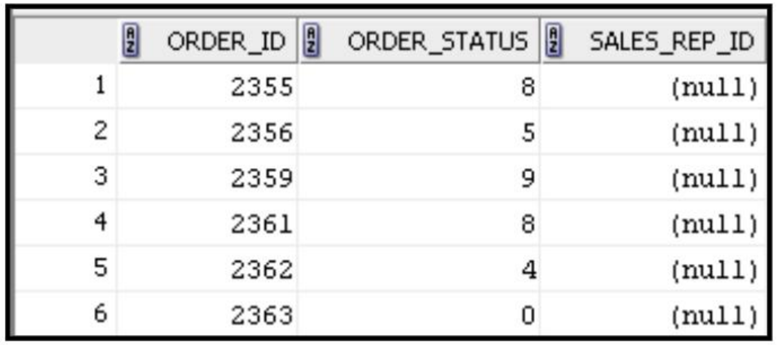
	LAST_NAME
1	Kochhar
2	Lorentz
3	Mourgos

- 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   order_ID,  order_status,  sales_rep_id
  FROM   orders
WHERE  sales_rep_id  IS  NULL;
```



	ORDER_ID	ORDER_STATUS	SALES_REP_ID
1	2355	8	(null)
2	2356	5	(null)
3	2359	9	(null)
4	2361	8	(null)
5	2362	4	(null)
6	2363	0	(null)

■ ■ ■

Defining Conditions Using the Logical Operators

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 condition is false

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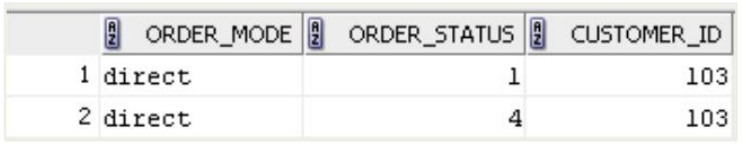
Using the AND Operator

•**AND requires both the component conditions to be true:**

```
SELECT   order_mode,  order_status,  customer_id
FROM   orders
WHERE  order_mode  = ' direct '
AND       customer_id = 103;
```

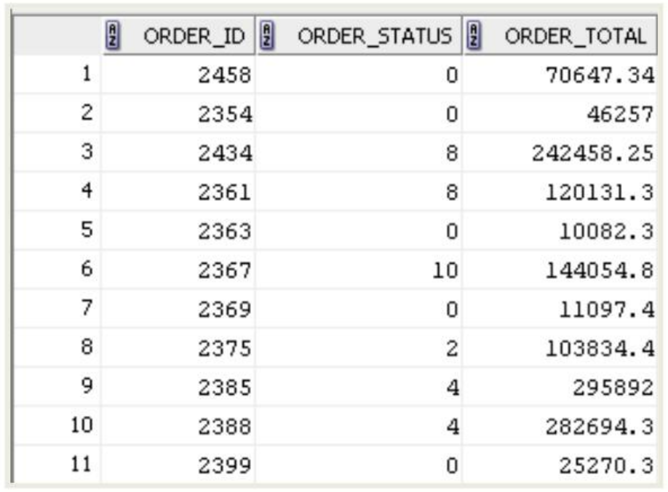


	ORDER_MODE	ORDER_STATUS	CUSTOMER_ID
1	direct	1	103
2	direct	4	103

Using the OR Operator

•**OR requires either component condition to be true:**

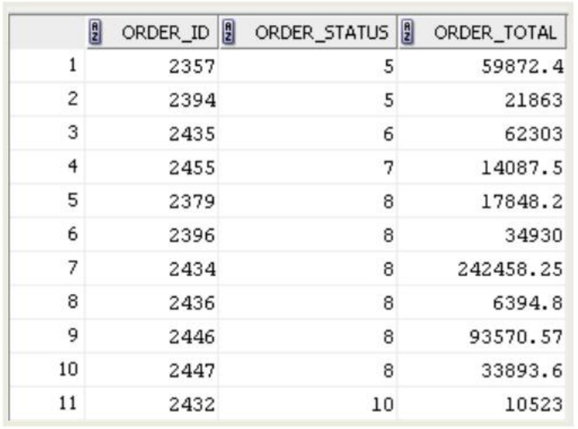
```
SELECT   order_id,  order_status,  order_total
FROM   orders
WHERE  order_status = 0
       OR  order_total  >=  100000 ;
```



	ORDER_ID	ORDER_STATUS	ORDER_TOTAL
1	2458	0	70647.34
2	2354	0	46257
3	2434	8	242458.25
4	2361	8	120131.3
5	2363	0	10082.3
6	2367	10	144054.8
7	2369	0	11097.4
8	2375	2	103834.4
9	2385	4	295892
10	2388	4	282694.3
11	2399	0	25270.3

Using the NOT Operator

```
SELECT   order_id,  order_status,  order_total
FROM   orders
WHERE  order_status
       NOT  IN  (0,1,2,3) ;
```



	ORDER_ID	ORDER_STATUS	ORDER_TOTAL
1	2357	5	59872.4
2	2394	5	21863
3	2435	6	62303
4	2455	7	14087.5
5	2379	8	17848.2
6	2396	8	34930
7	2434	8	242458.25
8	2436	8	6394.8
9	2446	8	93570.57
10	2447	8	33893.6
11	2432	10	10523

■ ■ ■

Rules of Precedence

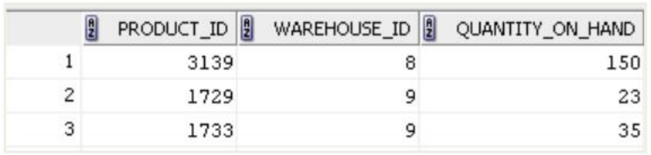
Operator	Meaning
1	Arithmetic operators
2	Concatenation operator
3	Comparison conditions
4	`IS [NOT] NULL, LIKE, [NOT] IN`
5	`[NOT] BETWEEN`
6	Not equal to
7	`NOT` logical condition
8	`AND` logical condition
9	`OR` logical condition

You can use parentheses to override rules of precedence.

Rules of Precedence

1

```
SELECT  *
FROM   inventories
WHERE  warehouse_id = 9
OR         quantity_on_hand = 150
AND        product_id = 3139 ;
```

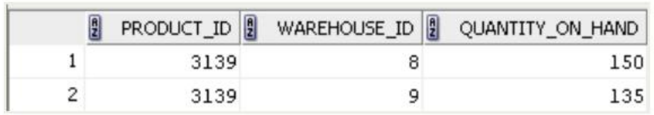


	PRODUCT_ID	WAREHOUSE_ID	QUANTITY_ON_HAND
1	3139	8	150
2	1729	9	23
3	1733	9	35

■ ■ ■

2

```
SELECT  *
FROM   inventories
WHERE  ( warehouse_id = 9
OR         quantity_on_hand = 150 )
AND        product_id = 3139 ;
```



	PRODUCT_ID	WAREHOUSE_ID	QUANTITY_ON_HAND
1	3139	8	150
2	3139	9	135

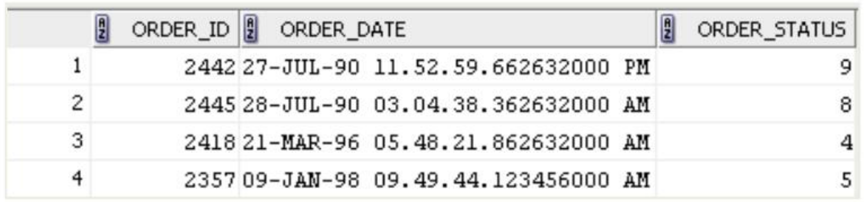
Using the ORDER BY Clause

Sort the 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   order_id,  order_date,  order_status
FROM   orders
ORDER BY   order_date ;
```



	ORDER_ID	ORDER_DATE	ORDER_STATUS
1	2442	27-JUL-90 11.52.59.662632000 PM	9
2	2445	28-JUL-90 03.04.38.362632000 AM	8
3	2418	21-MAR-96 05.48.21.862632000 AM	4
4	2357	09-JAN-98 09.49.44.123456000 AM	5

...

Sorting

Sorting in descending order:

```
SELECT   order_id,  round(order_date),  order_status
FROM   orders
ORDER BY   order_date  desc;
```

1

Sorting by column alias:

```
SELECT   order_id,  round(order_date),  order_status  “Order Status”
FROM   orders
ORDER BY   order_date desc ;
```

2

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Sorting

Sorting by using the column's numeric position:

```
SELECT   last_name, job_id, department_id, hire_date
FROM     employees
ORDER BY 3;
```

3

Sorting by multiple columns:

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

4

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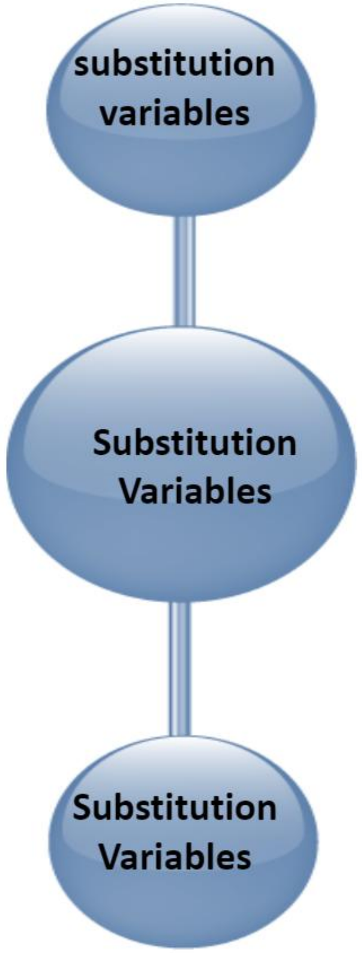
Substitution Variables

... salary = ? …
… department_id = ? …
... last_name = ? ...
I want to query different values.

Substitution Variables



Use substitution variables to:

Temporarily store values with single-ampersand (&) and double-ampersand (&&) substitution

Use substitution variables to supplement the following:

WHERE conditions

ORDER BY clauses

Column expressions

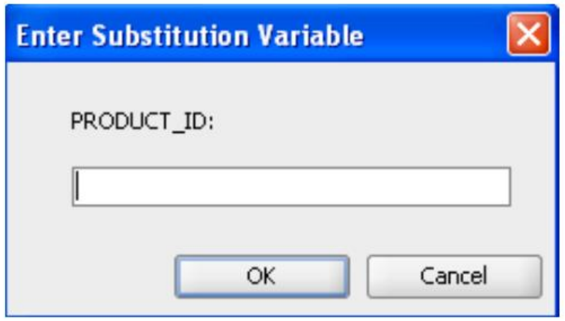
Table names

Entire SELECT statements

Using the Single-Ampersand Substitution Variable

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

```
SELECT  product_id,  warehouse_id,  quantity_on_hand
FROM   inventories
WHERE  product_id  =  &product_id ;
```



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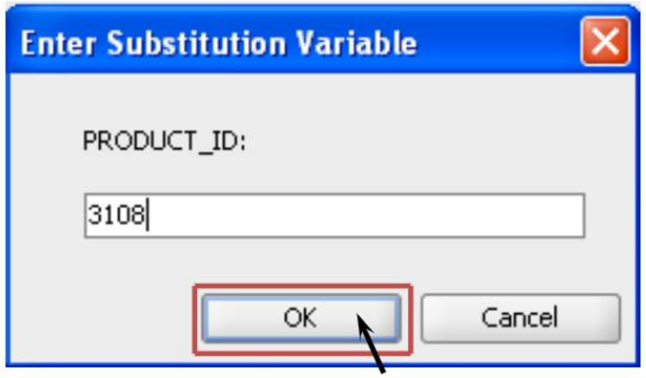
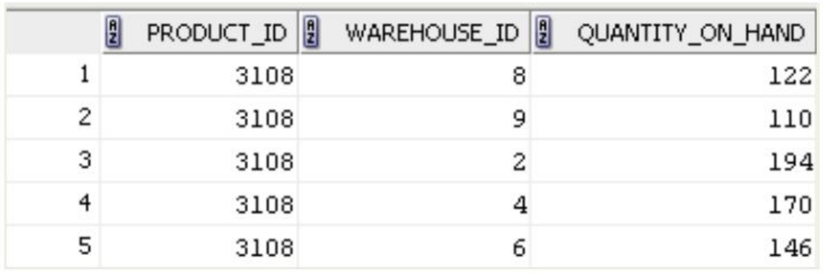
Using the Single-Ampersand Substitution Variable



PRODUCT_ID: 3108

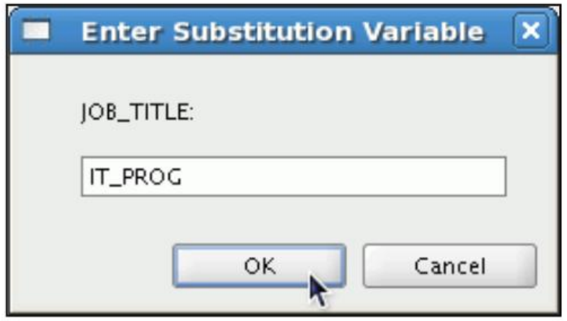


	PRODUCT_ID	WAREHOUSE_ID	QUANTITY_ON_HAND
1	3108	8	122
2	3108	9	110
3	3108	2	194
4	3108	4	170
5	3108	6	146

Character and Date Values with Substitution Variables

- Use single quotation marks for date and character values:

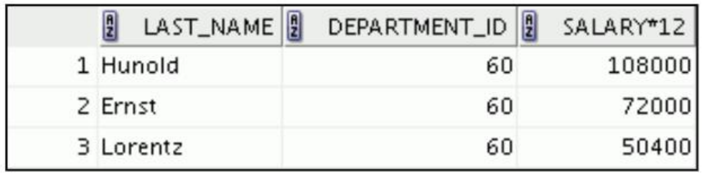
```
SELECT last_name, department_id, salary*12
FROM   employees
WHERE  job_id = '&job_title' ;
```



Enter Substitution Variable

JOB_TITLE:

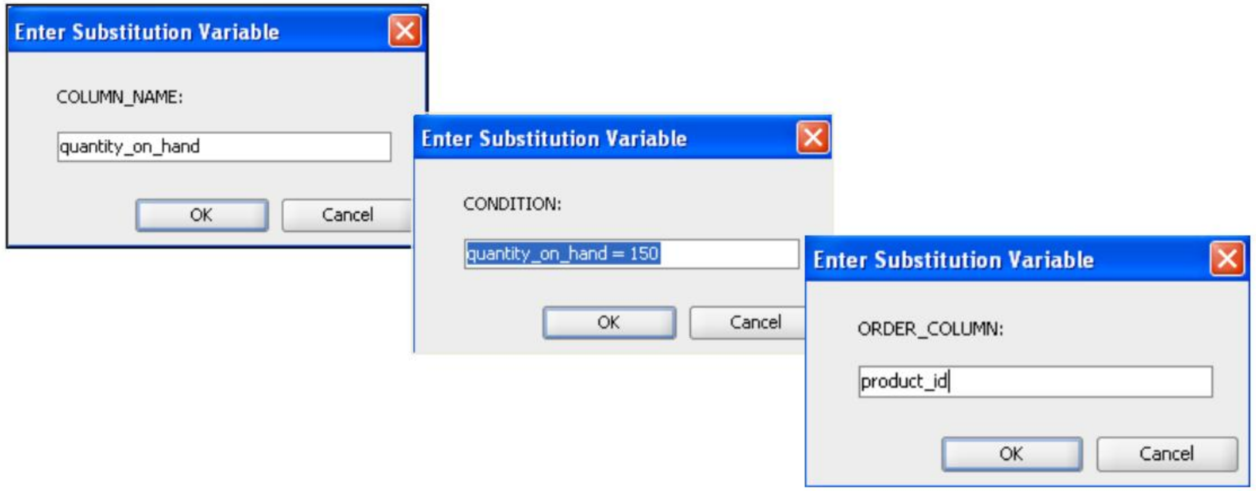
IT_PROG



	LAST_NAME	DEPARTMENT_ID	SALARY*12
1	Hunold	60	108000
2	Ernst	60	72000
3	Lorentz	60	50400

Specifying Column Names, Expressions, and Text

```
SELECT   &column_name
FROM   inventories
WHERE   &Condition
ORDER BY   &Order_column ;
```


Enter Substitution Variable

COLUMN_NAME:

quantity_on_hand

Enter Substitution Variable

CONDITION:

quantity_on_hand = 150

Enter Substitution Variable

ORDER_COLUMN:

product_id

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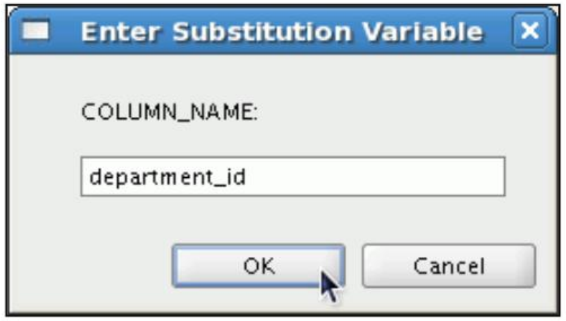
Using the Double-Ampersand Substitution Variable

- Use double ampersand (&&) if you want to reuse the variable value without prompting the user each time:

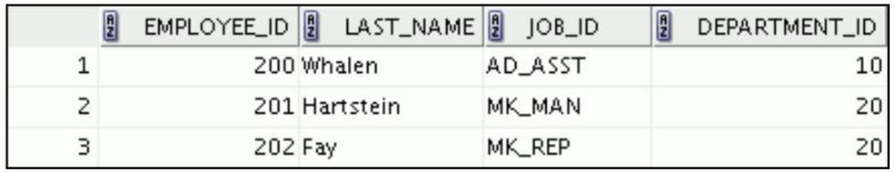
```
SELECT   employee_id, last_name, job_id, &&column_name
FROM     employees
ORDER BY &column_name ;
```



Enter Substitution Variable

COLUMN_NAME:

department_id



	EMPLOYEE_ID	LAST_NAME	JOB_ID	DEPARTMENT_ID
1	200	Whalen	AD_ASST	10
2	201	Hartstein	MK_MAN	20
3	202	Fay	MK_REP	20

...

Using the DEFINE Command

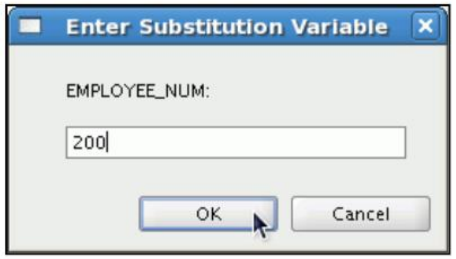
Use the DEFINE command to create and assign a value to a variable.

```
DEFINE  order_num = 2458

SELECT  order_id, order_date, order_mode, order_total
FROM  orders
WHERE  order_id = &order_num ;

UNDEFINE  order_num
```

Using the VERIFY Command

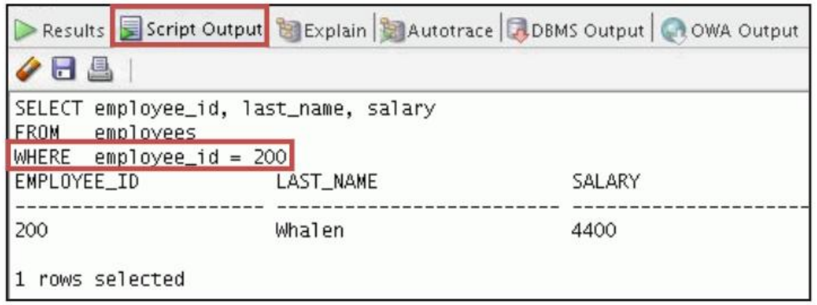
•Use the VERIFY command to toggle the display of the substitution variable, both before and after SQL Developer replaces substitution variables with values:

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



EMPLOYEE_NUM:

200



```
SELECT employee_id, last_name, salary
FROM   employees
WHERE  employee_id = 200
EMPLOYEE_ID            LAST_NAME                SALARY
---------------------- ------------------------ ---------------------
200                    Whalen                   4400

1 rows selected
```

Quiz

•Which of the following are valid operators for the `WHERE` clause?

1. `>=`
2. `IS NULL`
3. `!=`
4. `IS LIKE`
5. `IN BETWEEN`
6. `<>`

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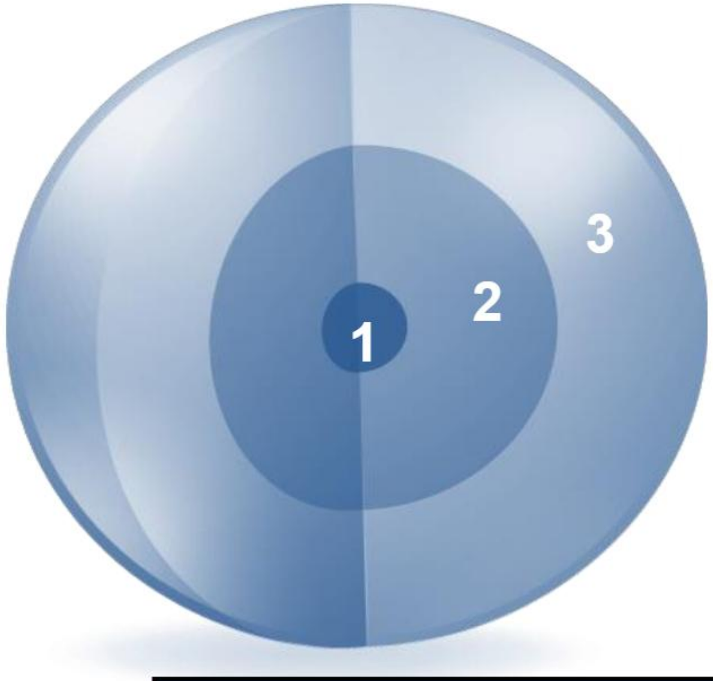
Session Summary

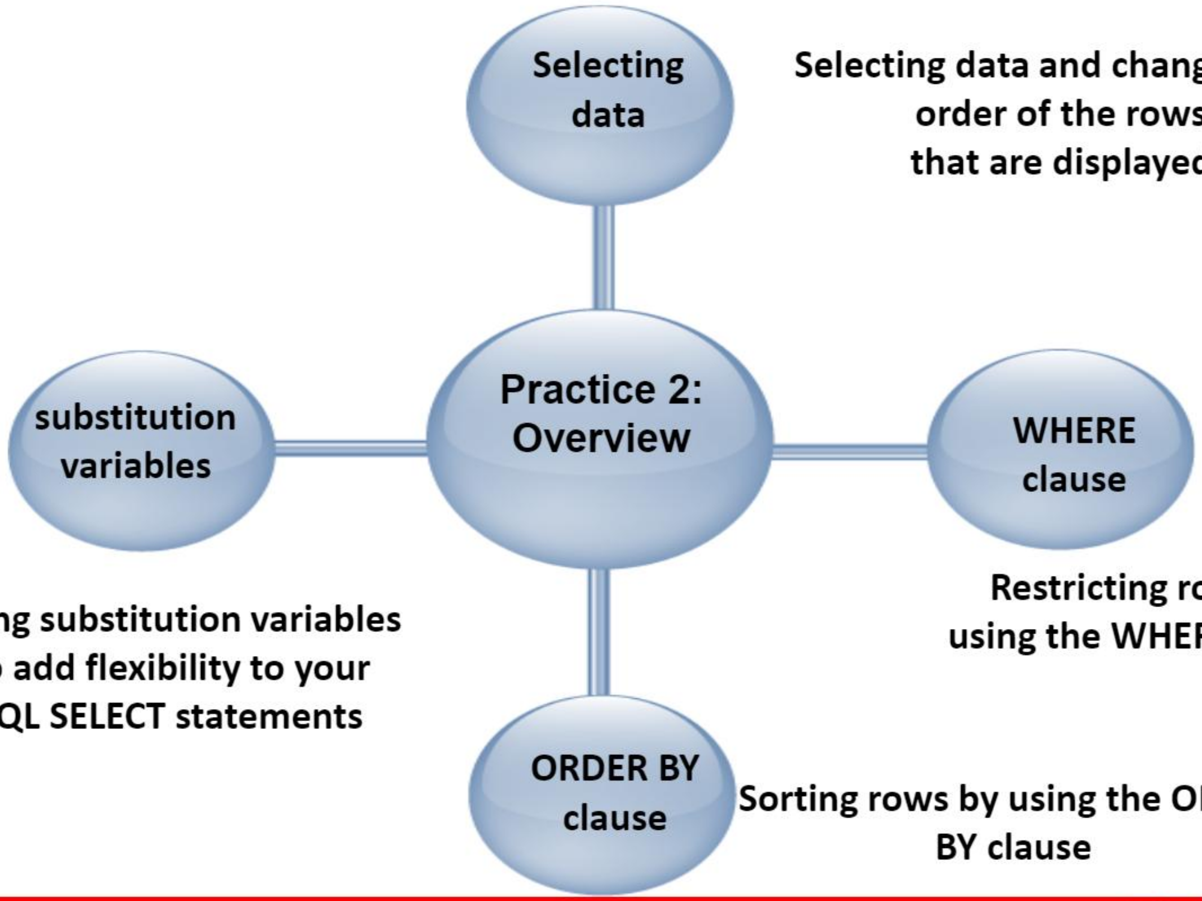


1. Use the WHERE clause to restrict rows of output:
   - Use the comparison conditions
   - Use the BETWEEN, IN, LIKE, and NULL operators
   - Apply the logical AND, OR, and NOT operators
2. Use ampersand substitution to restrict and sort output at run time
3. Use the ORDER BY clause to sort rows of output:

```
SELECT  *|{[DISTINCT] column|expression [alias],...}
FROM    table
[WHERE  condition(s)]
[ORDER BY {column, expr, alias} [ASC|DESC]] ;
```

Practice 2: Overview

This practice covers the following topics:



Selecting data and changing the order of the rows that are displayed

Restricting rows by using the WHERE clause

Sorting rows by using the ORDER BY clause

Using substitution variables to add flexibility to your SQL SELECT statements