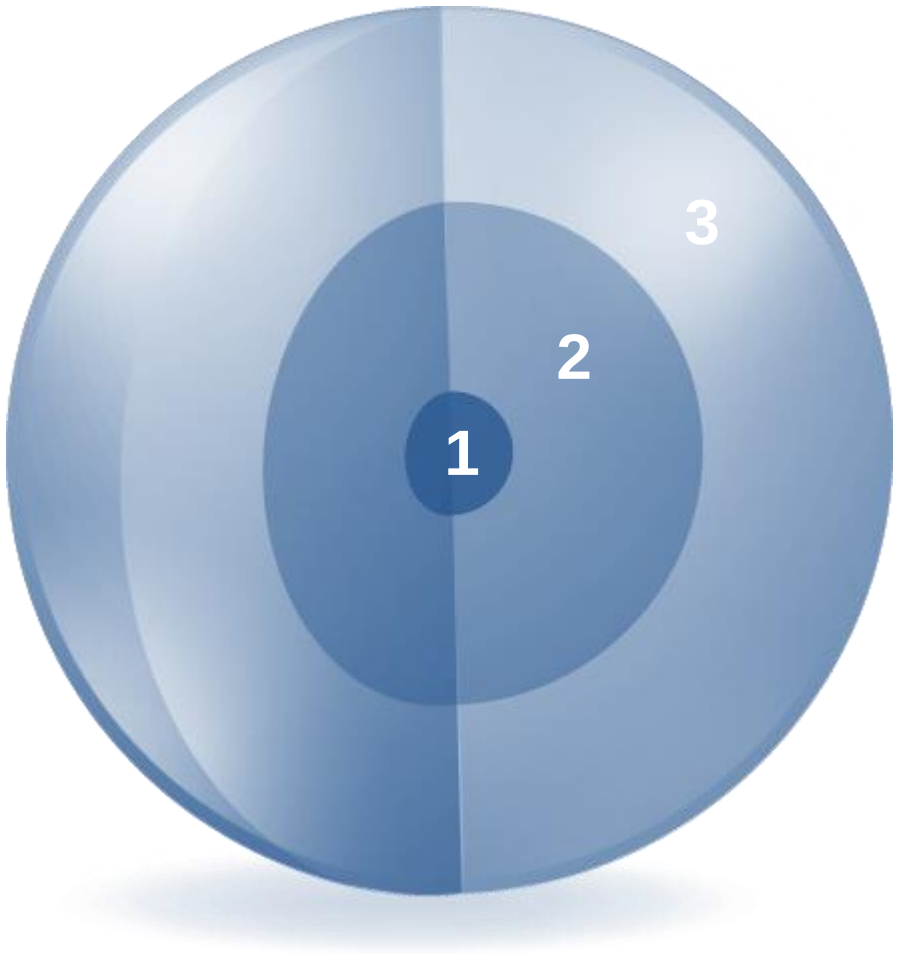
Restricting and Sorting Data

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)];
```

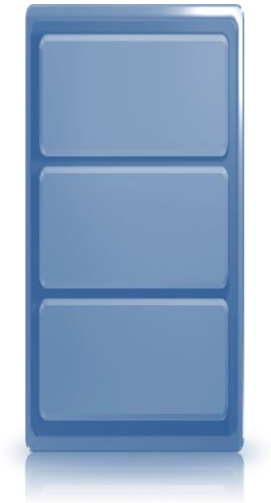
- **The WHERE clause follows the FROM clause.**

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

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

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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)

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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

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

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

1

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

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

2

	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 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

Sorting by using the column's numeric position:

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

3

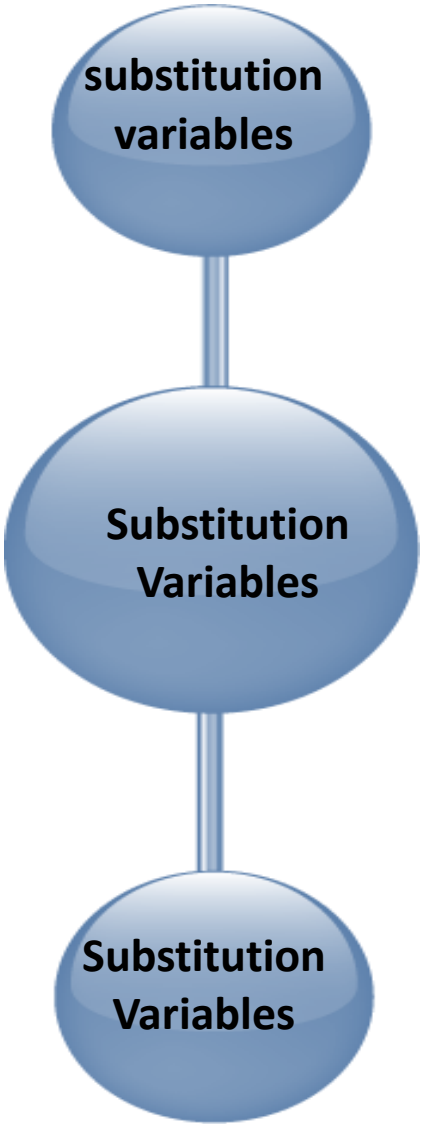
Sorting by multiple columns:

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

4

Substitution Variables

Substitution Variables



Use substitution variables to:

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

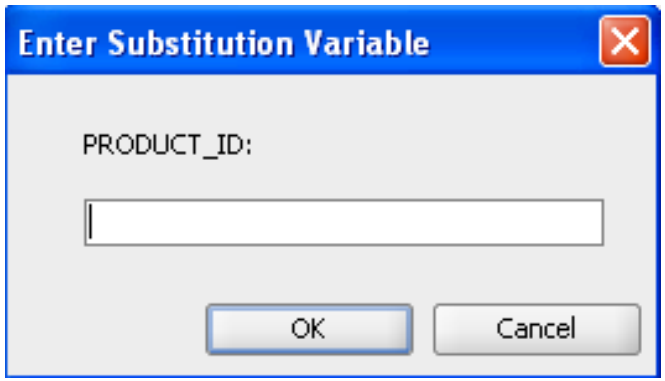
Use substitution variables to supplement the following:

- **WHERE conditions**
- **ORDER BY clauses**
- **Column expressions**
- **Table names**
- **Entire SELECT statements**

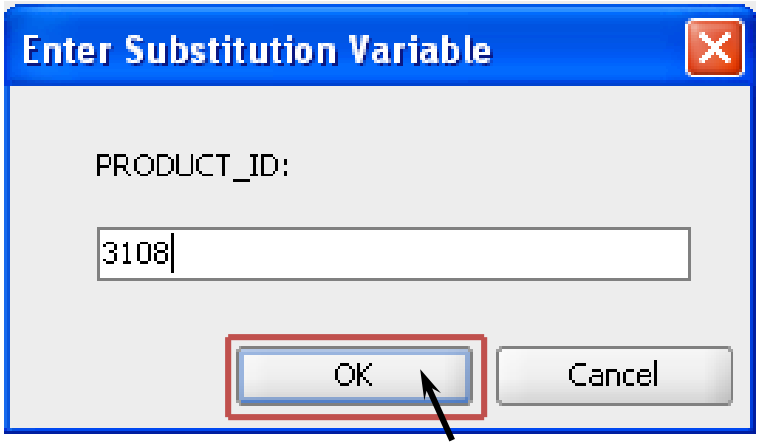
Using the Single-Ampersand Substitution Variable

- **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 ;
```



Using the Single-Ampersand Substitution Variable

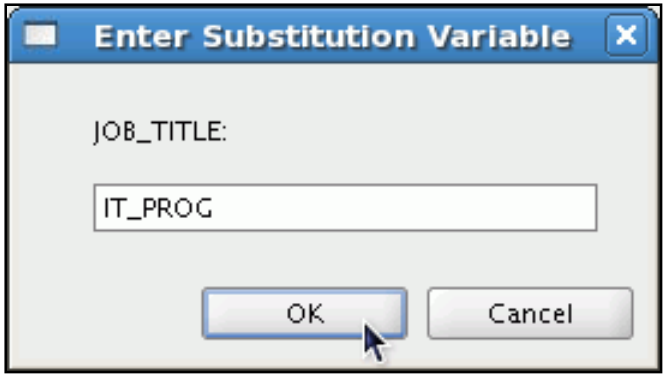


	PRODUCT_ID	WAREHOUSE_ID	QUANTITY_ON_HAND
1	3108	8	122
2	3108	9	110
3	3108	2	194
4	3108	4	170
5	3108	6	146

Character and Date Values with Substitution Variables

- **Use single quotation marks for date and character values:**

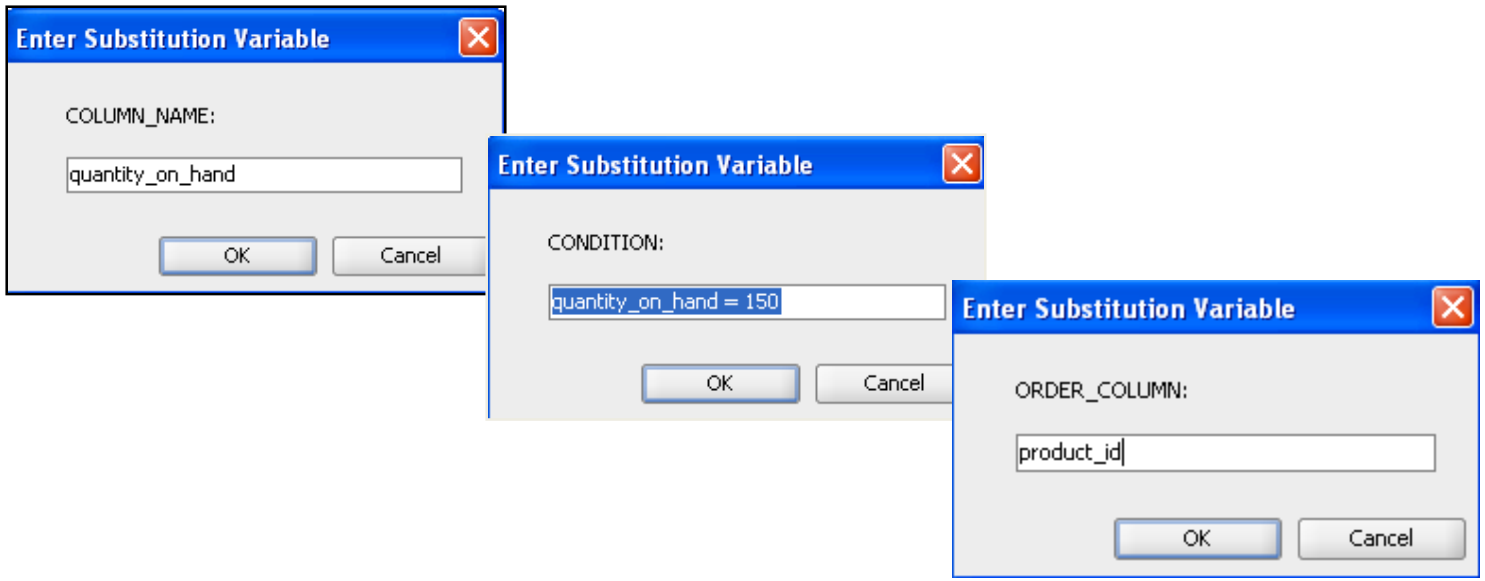
```
SELECT last_name, department_id, salary*12
FROM   employees
WHERE  job_id = '&job_title' ;
```



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

Specifying Column Names, Expressions, and Text

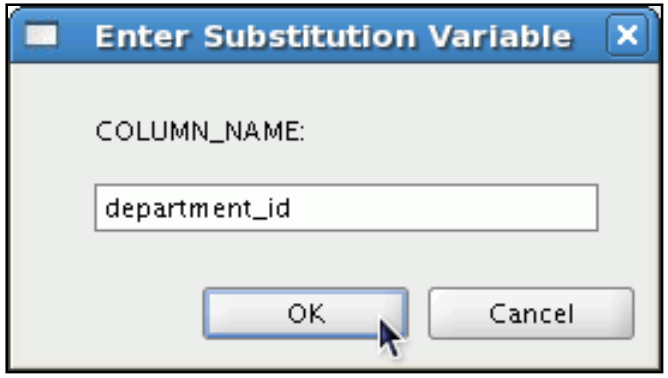
```
SELECT   &column_name
FROM   inventories
WHERE  &Condition
ORDER BY  &Order_column ;
```



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 ;
```



	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

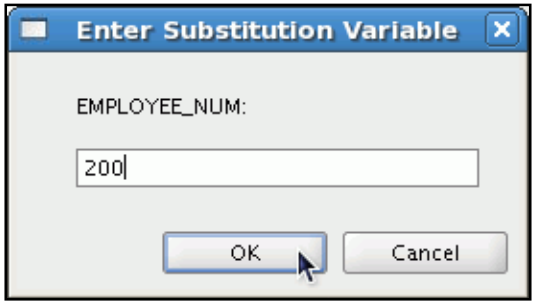
Use the DEFINE command to create and assign a value to a variable.

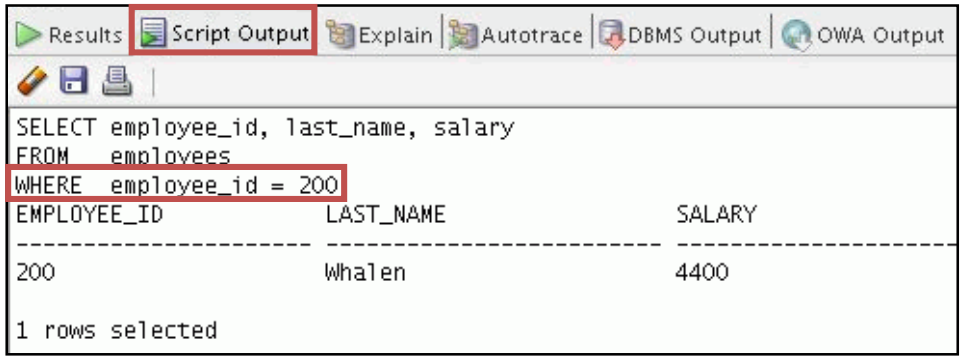
```
DEFINE   order_num  =  2458

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;
```



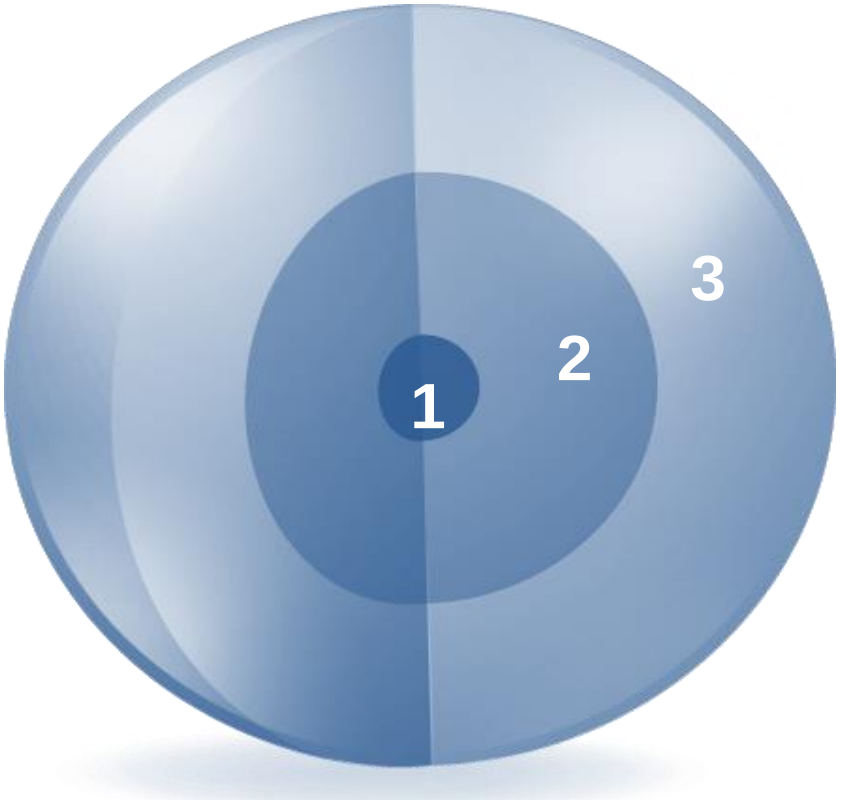


Quiz

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

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

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: