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SQL: Database Programming: Sections Sections 2, 3: Select, Where, Order by, Functions

1-3: Anatomy of a SQL Statement

Join	Display data from two or more related
Operator	A symbol used to perform an operation on some values.
Column	An implementation of an attribute or relationship in a table.
Projection	The capability in SQL to choose the columns in a table that you want returned from a query.
Null	A value that is unavailable, unassigned, unknown, or inapplicable
Column Alias	Renames a column heading.
Expression	A mathematical equation.
Selection	The capability in SQL to choose the rows in a table returned from a query
Query	Retrieves information from the database
SELECT	Specifies the columns to be displayed
FROM	Specifies the table containing the column listed in the select clause
Keyword	An individual SQL command
Clause	Part of a SQL statement
SELECT-FROM	A combination of the two clauses

1. Write a SQL statement that demonstrates projection.

```
SELECT first_name, last_name, student_id
FROM students;
```

2. Write a query that displays the last_name and email addresses for all the people in the DJs on Demand d_client table. The column headings should appear as “Client” and “Email Address.”

```
SELECT last_name as “Client”, email addresses as “Email Address”
FROM d_client;
```

3. The manager of Global Fast Foods decided to give all employees at 5%/hour raise + a $.50 bonus/hour. However, when he looked at the results, he couldn't figure out why the new raises were not as he predicted. Ms. Doe should have a new salary of $7.59, Mr. Miller's salary should be $11.00, and Monique Tuttle should be $63.50. He used the following query. What should he have done?

```
SELECT last_name, (salary*1.05)+.50
FROM f_staffs;
```

4. Which of the following would be the easiest way to see all rows in the d_songs table?
    - C. SELECT *

5. If tax = 8.5% * car_cost and license = car_cost * .01%, which value will produce the largest car payment?
    - B. Payment = car_cost * 1.25 + 5.00 - (tax - license)

6. In the example below, identify the keywords, the clause(s), and the statement(s):

```
SELECT employee_id, last_name
FROM employees
```

- Keywords - SELECT, FROM
- Clauses - SELECT employee_id, last_name; FROM - employees
- Statement - Entire select statement

7. Label each example as SELECTION or PROJECTION.

a. Please give me Mary Adam's email address. - SELECTION
b. I would like only the manager_id column, and none of the other columns. - PROJECTION

8. Which of the following statements are true?
   C. null * .05 = null

9. How will the column headings be labeled in the following example?

```
SELECT bear_id bears, color AS Color, age “age”
FROM animals;
```

   C. BEARS, COLOR, age

10. Which of the following words must be in a SELECT statement in order to return all rows?

D. SELECT *

2-1: Working with Columns, Characters, and Rows

Distinct	A command that suppresses duplicates
Concatenate	Links two columns together to form one character data column
String	A group of character data
Describe	A SQL plus command that displays the structure of a table

1. The manager of Global Fast Foods would like to send out coupons for the upcoming sale. He wants to send one coupon to each household. Create the SELECT statement that returns the customer last name and a mailing address.

SELECT last_name, mailing_address

2. Each statement below has errors. Correct the errors and execute the query in Oracle Application Express.
    a. SELECT first_name
    FROM f_staffs;
    b. SELECT first_name || ‘’ || last_name AS “DJs on Demand Clients”
    FROM d_clients;
    c. SELECT DISTINCT f_order_lines
    FROM quantity;
    d. SELECT order_number
    FROM f_orders;
3. Sue, Bob, and Monique were the employees of the month. Using the f_staffs table, create a SELECT statement to display the results as shown in the Super Star chart.

```
SELECT
‘*** ‘ || first_name || ‘ *** ‘ || first_name || ‘ ***’
AS “Super Star”
FROM
        f_staffs
WHERE
        First_name IN (‘Sue’, ‘Bob’, ‘Monique’);
```

4. Which of the following is TRUE about the following query?

D. no rows will be returned

5. Global Fast Foods has decided to give all staff members a 5% raise. Prepare a report that presents the output as shown in the chart.

SELECT last_name AS “EMPLOYEE LAST NAME”, salary AS “CURRENT SALARY”, (salary * 1.05) AS “SALARY WITH 5% RAISE”
FROM f_staffs;

6. Create a query that will return the structure of the Oracle database EMPLOYEES table. Which columns are marked “nullable”? What does this mean?

DESCRIBE EMPLOYEES

Nullable columns would contain null values that are unknown/not applicable

7. The owners of DJs on Demand would like a report of all items in their D_CDs table with the following column headings:
   Inventory Item, CD TItle, Music Producer, and Year Purchased. Prepare this report.

SELECT inventory_item AS “Inventory Item”, cd_title as “CD Title”, music_producer AS “Music producer”, year_purchased AS “Year Purchased”
FROM D_CDs;

8. TRUE
9. TRUE
10. There are four coding errors in this statement. Can you identify them?
    a. Missing comma after last name
    b. “X” should be *
    c. Before ANNUAL SALARY needs to be AS
    d. Alias needs AS
11. Multiplication
12. B*
13. B. Projection
14. C. Employee
15. B. SELECT salary* (6+ 100)
16. C. SELECT 'Mr./Ms. '||first_name||' '||last_name ||' '||'is an employee of our company.' AS "Employees" FROM employees ;
17. C. keywords cannot be abbreviated or split across lines
18. B. SELECT DEPARTMENT_ID, LAST_NAME, FIRST_NAME FROM employees;
19. SELECT * FROM employees;

2-2: Limit Rows Selected

WHERE	Restricts the rows returned by a select statement
Operators	Compares one expression to another value or expression

1. SELECT
   first_name,
   last_name,
   address
   FROM
   customers
   WHERE
   Customer_id = 456;
2. SELECT
   first_name
   start_date,
   end_date
   FROM
   Promotion_items
   WHERE
   Item_name = ‘ball pen and highlighter’;

3. SELECT
   ‘The ‘ || title || ‘recording in our database is ‘ || title AS “Oldest”

   FROM
   recordings
   WHERE
   release_year = 1997;

4. SELECT produce, title
   FROM d_cds
   WHERE title = ‘Carpe Diem’;

5. SELECT title, year_produced
   FROM D_CDs
   WHERE year_produced < 2000

6. B. 0-4999

7. SELECT
   Studentno, fname, name
   FROM
   Students
   WHERE sex = ‘F’;

8. SELECT
   studentno as ‘Student Number’
   FROM

```
        students
WHERE
        major = ‘PE’;
```

9. SELECT *
   FROM students
   WHERE sex = ‘M’;

10. SELECT title, year_produced
    FROM D_CDs
    WHERE year_produced <> 2000;

11. SELECT *
    FROM employees
    WHERE
    birthdate < TO_DATE('1980-01-01', 'YYYY-MM-DD');

2-3: Comparison Operators

ESCAPE	This option identifies that the escape characters should be interpreted literally
IS NULL	Condition tests for null values
BETWEEN	Displays rows based on a range of values
inclusive	Including the specified limits and the area between them; the numbers 1-10, inclusive
LIKE	Selects rows that match a character pattern
IN	Tests for values in a specified list of values

1. SELECT first_name, last_name, salary
   FROM global_fast_foods_staff
   WHERE salary BETWEEN 5.00 AND 10.00;

2. SELECT location_type, comments
   FROM djs_on_demand_venues
   WHERE location_type = ‘private_home’;

3. SELECT first_name, last_name
   FROM f_staffs
   WHERE salary >= 20.00 AND <= 60.00;

4. SELECT cd_title
   FROM djs_on_demand_cds
   WHERE cd_title LIKE '_a%';

5. SELECT partner_name
   FROM djs_on_demand_partners
   WHERE authorized_expense IS NULL

6. SELECT last_name AS "possible_candidates"
   FROM employees
   WHERE last_name LIKE '%s';

7. C. WHERE quantity IS NULL;

8. SELECT song_title
   FROM djs_on_demand_inventory
   WHERE type_code IN (77, 12, 1);

3-1: Logical Comparisons and Precedence Rules

NOT	Inverts the value of the condition
AND	Both conditions must be true for a record to be selected
Precedence	Rules that determine the order in which expressions are evaluated and calculated
OR	Either condition can be true for a record to be selected

1. The difference is between AND and OR. The first requires both code > 200 is true and the description is one of the specified values. The second will return rows that are either code > 200 or the description matches the values.

2. SELECT last_name
   FROM employees
   WHERE last_name LIKE '%e%' AND last_name LIKE '%i%';

3. SELECT *

FROM employees
WHERE salary > 6.50 AND position != ‘order_taker’;

4. SELECT last_name
   FROM employees
   WHERE last_name LIKE ‘D%’ AND last_name LIKE ‘%a%’AND last_name
   LIKE ‘%e%’;

5. SELECT location_type
   FROM djs_on_demand_venues
   WHERE location_type != ‘private_home’

6. c. NOT, AND, OR

7. SELECT *
   FROM employees
   WHERE hire_date > ‘1998-05-31’ AND hire_date < ‘1999-06-01’ AND
   salary < 8000 AND last_name LIKE ‘%en%’;

8. SELECT *
   FROM employees
   WHERE hire date >= ‘1996-01-01’ AND salary >= 9000 AND
   commission IS NULL;

3-2 - DB programming with SQL

ORDER BY ASC	Orders the rows in ascending order (the default order); A-Z
ORDER BY DESC	Orders the rows in descending order: Z-A
ORDER BY	To arrange according to class, kind, or size

1. SELECT employee_id AS Number
   FROM employees
   ORDER BY Number;

2. SELECT CD_titles
   FROM DJ_list
   ORDER BY year;

3. SELECT songs AS ‘Our collection”
   FROM DJ_list
   ORDER BY song_titles

4. SELECT * FROM DJ_list
   ORDER BY DJ_id

5. SELECT first_name, last_name, student_id,
   parking_place_number
   FROM student_list
   WHERE year = 1
   ORDER BY last_name ASC, first_name DESC;

6. SELECT * FROM employees
   WHERE employee_id < 125

Extension activities

1. Limiting values with the WHERE clause is an example of
   E. Selection
2. You want to sort your CD collection by title, and then by artist. This can be accomplished using:
   C. ORDER BY
3. Which of the following are SQL keywords?
   A,B SELECT, FROM
4. Which of the following are true?
   a. Multiplication and division take priority over addition.
   b. Operators of the same priority are evaluated from left to the right.
   c. Parentheses can be used to override the rules of precedence.
5. The following query was written:
   SELECT DISTINCT last_name
   FROM students
   c. To select last names without duplicates
6. The following string was created using which SELECT clause?
   Abby Rogers is an order taker for Global Fast Foods
   a. d. SELECT first_name ||' ' ||last_name ||' is an '||staff_type||' for Global Fast Foods'
7. Which of the following SELECT clauses will return uppercase column headings?
8. d. SELECT id AS ID, last_name AS NAME, address AS ADDRESS, city AS CITY, state AS STATE, zip AS ZIP, phone_number AS PHONE_NUMBER
9. b. SELECT last_name FROM employees ORDER BY last_name
10. c.Arnie Smithers, administration president, 20000
11. SELECT last_name FROM employees
    WHERE last_name LIKE 'St%';
12.
    a. Salaries below 1900 (e.g., 1800, 1500)
    b. 2. Salaries above 2100 (e.g., 2200, 2500)
    c. 3. Salaries exactly 1900 and exactly 2100 are included
13. Correct each WHERE clause:

a. WHERE department_id NOT IN (101, 102, 103);
b. WHERE last_name = 'King'
c. WHERE start_date LIKE '05-May-1998'
d. WHERE salary BETWEEN 5000 AND 7000
e. WHERE id != 10

14. 625, 902, 410, 499

3-3: Introduction to Functions

1.
   a. Single
   b. Multi
   c. Single
   d. Multi
   e. Single
   f. Single
2.
   a. AVG – Calculates the average value of all records selected in a query.
   b. COUNT – This function counts the occurrences of a specific variable, determining how many instances of that variable exist within a table.
   c. MAX – Identifies the highest value from the records returned in a query.
   d. MIN – Identifies the lowest value from the records returned in a query.
   e. SUM – Adds up all the values in a numerical column within a table to find the total.
3.
   a. SELECT AVG(salary)
      FROM employees;
   b. SELECT COUNT (salary)
      FROM employees;
   c. SELECT MAX(salary)
      FROM employees;
   d. SELECT MIN(salary)
      FROM employees;
   e. SELECT SUM(salary)
      FROM employees;