Coding Challenge SQL

Virtual Art Gallery Shema DDL and DML

Schema Design:

1. Artists table:

```
CREATE TABLE Artists (
ArtistID INT PRIMARY KEY,
Name VARCHAR(255) NOT NULL,
Biography TEXT,
Nationality VARCHAR(100)
);
```

2. Categories table:

```
CREATE TABLE Categories (
CategoryID INT PRIMARY KEY,
Name VARCHAR(100) NOT NULL
);
```

3. Artworks table:

```
CREATE TABLE Artworks (
ArtworkID INT PRIMARY KEY,
Title VARCHAR(255) NOT NULL,
ArtistID INT,
CategoryID INT,
Year INT,
Description TEXT,
ImageURL VARCHAR(255),
FOREIGN KEY (ArtistID) REFERENCES Artists (ArtistID),
FOREIGN KEY (CategoryID) REFERENCES Categories (CategoryID)
);
```

4. Exhibitions table:

```
CREATE TABLE Exhibitions (
ExhibitionID INT PRIMARY KEY,
Title VARCHAR(255) NOT NULL,
StartDate DATE,
EndDate DATE,
Description TEXT
);
```

5. ExhibitionArtworks table:

```
CREATE TABLE ExhibitionArtworks (
ExhibitionID INT,
ArtworkID INT,
PRIMARY KEY (ExhibitionID, ArtworkID),
FOREIGN KEY (ExhibitionID) REFERENCES Exhibitions (ExhibitionID),
FOREIGN KEY (ArtworkID) REFERENCES Artworks (ArtworkID)
);
```

Sample Datas:

1. Artists table:

```
INSERT INTO Artists (ArtistID, Name, Biography, Nationality) VALUES
(1, 'Pablo Picasso', 'Renowned Spanish painter and sculptor.', 'Spanish'),
(2, 'Vincent van Gogh', 'Dutch post-impressionist painter.', 'Dutch'),
(3, 'Leonardo da Vinci', 'Italian polymath of the Renaissance.', 'Italian');
```

2. Categories table:

```
INSERT INTO Categories (CategoryID, Name) VALUES
(1, 'Painting'),
(2, 'Sculpture'),
(3, 'Photography');
```

3. Artworks table:

INSERT INTO Artworks (ArtworkID, Title, ArtistID, CategoryID, Year, Description, ImageURL) VALUES
(1, 'Starry Night', 2, 1, 1889, 'A famous painting by Vincent van Gogh.', 'starry_night.jpg'),

(2, 'Mona Lisa', 3, 1, 1503, 'The iconic portrait by Leonardo da Vinci.', 'mona_lisa.jpg'),

(3, 'Guernica', 1, 1, 1937, 'Pablo Picasso\'s powerful anti-war mural.', 'guernica.jpg');

4. Exhibitions table:

INSERT INTO Exhibitions (ExhibitionID, Title, StartDate, EndDate, Description) VALUES

(1, 'Modern Art Masterpieces', '2023-01-01', '2023-03-01', 'A collection of modern art masterpieces.'),

(2, 'Renaissance Art', '2023-04-01', '2023-06-01', 'A showcase of Renaissance art treasures.');

5. ExhibitionArtworks table:

INSERT INTO ExhibitionArtworks (ExhibitionID, ArtworkID) VALUES

(1, 1),

(1, 2),

(1, 3),

(2, 2);

Solve the below queries:

1. Retrieve the names of all artists along with the number of artworks they have in the gallery, and list them in descending order of the number of artworks.

```
SELECT a.Name, COUNT(ar.ArtworkID) AS ArtworkCount

FROM Artists a

LEFT JOIN Artworks ar ON a.ArtistID = ar.ArtistID

GROUP BY a.Name

ORDER BY ArtworkCount DESC;
```

```
mysql> SELECT a.Name, COUNT(ar.ArtworkID) AS ArtworkCount
    -> FROM Artists a
    -> LEFT JOIN Artworks ar ON a.ArtistID = ar.ArtistID
    -> GROUP BY a.Name
    -> ORDER BY ArtworkCount DESC;
+------------------+--------------+
| Name             | ArtworkCount |
+------------------+--------------+
| Pablo Picasso    |            1 |
| Vincent van Gogh |            1 |
| Leonardo da Vinci |            1 |
+------------------+--------------+
3 rows in set (0.01 sec)
```

2. List the titles of artworks created by artists from 'Spanish' and 'Dutch' nationalities, and order them by the year in ascending order.

SELECT ar.Title, ar.Year

FROM Artworks ar

JOIN Artists a ON ar.ArtistID = a.ArtistID

WHERE a.Nationality IN ('Spanish', 'Dutch')

ORDER BY ar.Year ASC;

```
mysql> SELECT ar.Title, ar.Year
    -> FROM Artworks ar
    -> JOIN Artists a ON ar.ArtistID = a.ArtistID
    -> WHERE a.Nationality IN ('Spanish', 'Dutch')
    -> ORDER BY ar.Year ASC;
+--------------+------+
| Title        | Year |
+--------------+------+
| Starry Night | 1889 |
| Guernica     | 1937 |
+--------------+------+
2 rows in set (0.01 sec)
```

3. Find the names of all artists who have artworks in the 'Painting' category, and the number of artworks they have in this category.

SELECT a.Name, COUNT(ar.ArtworkID) AS ArtworkCount

FROM Artists a

JOIN Artworks ar ON a.ArtistID = ar.ArtistID

JOIN Categories c ON ar.CategoryID = c.CategoryID

WHERE c.Name = 'Painting'

GROUP BY a.Name;

```
mysql> SELECT a.Name, COUNT(ar.ArtworkID) AS ArtworkCount
    -> FROM Artists a
    -> JOIN Artworks ar ON a.ArtistID = ar.ArtistID
    -> JOIN Categories c ON ar.CategoryID = c.CategoryID
    -> WHERE c.Name = 'Painting'
    -> GROUP BY a.Name;
+------------------+--------------+
| Name             | ArtworkCount |
+------------------+--------------+
| Leonardo da Vinci |            1 |
| Pablo Picasso     |            1 |
| Vincent van Gogh  |            1 |
+------------------+--------------+
3 rows in set (0.00 sec)
```

4. List the names of artworks from the 'Modern Art Masterpieces' exhibition, along with their artists and categories.

SELECT ar.Title, a.Name AS ArtistName, c.Name AS CategoryName

FROM ExhibitionArtworks ea

JOIN Artworks ar ON ea.ArtworkID = ar.ArtworkID

JOIN Artists a ON ar.ArtistID = a.ArtistID

JOIN Categories c ON ar.CategoryID = c.CategoryID

JOIN Exhibitions e ON ea.ExhibitionID = e.ExhibitionID

WHERE e.Title = 'Modern Art Masterpieces';

```
mysql> SELECT ar.Title, a.Name AS ArtistName, c.Name AS CategoryName
    -> FROM ExhibitionArtworks ea
    -> JOIN Artworks ar ON ea.ArtworkID = ar.ArtworkID
    -> JOIN Artists a ON ar.ArtistID = a.ArtistID
    -> JOIN Categories c ON ar.CategoryID = c.CategoryID
    -> JOIN Exhibitions e ON ea.ExhibitionID = e.ExhibitionID
    -> WHERE e.Title = 'Modern Art Masterpieces';
+-------------+------------------+--------------+
| Title       | ArtistName       | CategoryName |
+-------------+------------------+--------------+
| Starry Night | Vincent van Gogh  | Painting     |
| Mona Lisa    | Leonardo da Vinci | Painting     |
| Guernica     | Pablo Picasso     | Painting     |
+-------------+------------------+--------------+
3 rows in set (0.00 sec)
```

5. Find the artists who have more than two artworks in the gallery.

SELECT a.Name

FROM Artists a

JOIN Artworks ar ON a.ArtistID = ar.ArtistID

GROUP BY a.Name

HAVING COUNT(ar.ArtworkID) > 2;

[It is a empty set because there is no artists who have more than two artworks]

```
mysql> SELECT a.Name
    -> FROM Artists a
    -> JOIN Artworks ar ON a.ArtistID = ar.ArtistID
    -> GROUP BY a.Name
    -> HAVING COUNT(ar.ArtworkID) > 2;
Empty set (0.00 sec)
```

6. Find the titles of artworks that were exhibited in both 'Modern Art Masterpieces' and 'Renaissance Art' exhibitions.

SELECT ar.Title

FROM Artworks ar

JOIN ExhibitionArtworks ea1 ON ar.ArtworkID = ea1.ArtworkID

JOIN Exhibitions e1 ON ea1.ExhibitionID = e1.ExhibitionID

JOIN ExhibitionArtworks ea2 ON ar.ArtworkID = ea2.ArtworkID

JOIN Exhibitions e2 ON ea2.ExhibitionID = e2.ExhibitionID

WHERE e1.Title = 'Modern Art Masterpieces' AND e2.Title = 'Renaissance Art';

```
mysql> SELECT ar.Title
    -> FROM Artworks ar
    -> JOIN ExhibitionArtworks ea1 ON ar.ArtworkID = ea1.ArtworkID
    -> JOIN Exhibitions e1 ON ea1.ExhibitionID = e1.ExhibitionID
    -> JOIN ExhibitionArtworks ea2 ON ar.ArtworkID = ea2.ArtworkID
    -> JOIN Exhibitions e2 ON ea2.ExhibitionID = e2.ExhibitionID
    -> WHERE e1.Title = 'Modern Art Masterpieces' AND e2.Title = 'Renaissance Art';
+-----------+
| Title     |
+-----------+
| Mona Lisa |
+-----------+
1 row in set (0.00 sec)
```

7. Find the total number of artworks in each category.

SELECT c.Name, COUNT(ar.ArtworkID) AS TotalArtworks

FROM Categories c

LEFT JOIN Artworks ar ON c.CategoryID = ar.CategoryID

GROUP BY c.Name;

```
mysql> SELECT c.Name, COUNT(ar.ArtworkID) AS TotalArtworks
    -> FROM Categories c
    -> LEFT JOIN Artworks ar ON c.CategoryID = ar.CategoryID
    -> GROUP BY c.Name;
+-------------+---------------+
| Name        | TotalArtworks |
+-------------+---------------+
| Painting    |             3 |
| Photography |             0 |
| Sculpture   |             0 |
+-------------+---------------+
3 rows in set (0.00 sec)
```

8. List artists who have more than 3 artworks in the gallery.

SELECT a.Name

FROM Artists a

JOIN Artworks ar ON a.ArtistID = ar.ArtistID

GROUP BY a.Name

HAVING COUNT(ar.ArtworkID) > 3;

[It is a empty set and It is similar to Q.no-5 but difference in count(Artworks)]

```
mysql> SELECT a.Name
    -> FROM Artists a
    -> JOIN Artworks ar ON a.ArtistID = ar.ArtistID
    -> GROUP BY a.Name
    -> HAVING COUNT(ar.ArtworkID) > 3;
Empty set (0.00 sec)
```

9. Find the artworks created by artists from a specific nationality (e.g., Spanish).

SELECT ar.Title

FROM Artworks ar

JOIN Artists a ON ar.ArtistID = a.ArtistID

WHERE a.Nationality = 'Spanish';

```
mysql> SELECT ar.Title
    -> FROM Artworks ar
    -> JOIN Artists a ON ar.ArtistID = a.ArtistID
    -> WHERE a.Nationality = 'Spanish';
+----------+
| Title    |
+----------+
| Guernica |
+----------+
1 row in set (0.00 sec)
```

10. List exhibitions that feature artwork by both Vincent van Gogh and Leonardo da Vinci.

```
SELECT e.Title
FROM Exhibitions e
JOIN ExhibitionArtworks ea ON e.ExhibitionID = ea.ExhibitionID
JOIN Artworks ar ON ea.ArtworkID = ar.ArtworkID
JOIN Artists a ON ar.ArtistID = a.ArtistID
WHERE a.Name IN ('Vincent van Gogh', 'Leonardo da Vinci')
GROUP BY e.Title
HAVING COUNT(DISTINCT a.Name) = 2;
```

```
mysql> SELECT e.Title
    -> FROM Exhibitions e
    -> JOIN ExhibitionArtworks ea ON e.ExhibitionID = ea.ExhibitionID
    -> JOIN Artworks ar ON ea.ArtworkID = ar.ArtworkID
    -> JOIN Artists a ON ar.ArtistID = a.ArtistID
    -> WHERE a.Name IN ('Vincent van Gogh', 'Leonardo da Vinci')
    -> GROUP BY e.Title
    -> HAVING COUNT(DISTINCT a.Name) = 2;
+-------------------------+
| Title                   |
+-------------------------+
| Modern Art Masterpieces |
+-------------------------+
1 row in set (0.00 sec)
```

11. Find all the artworks that have not been included in any exhibition.

```
SELECT ar.Title
FROM Artworks ar
LEFT JOIN ExhibitionArtworks ea ON ar.ArtworkID = ea.ArtworkID
WHERE ea.ExhibitionID IS NULL;
```

[It is a empty set because all the artworks are included in exhibition.]

```
mysql> SELECT ar.Title
    -> FROM Artworks ar
    -> LEFT JOIN ExhibitionArtworks ea ON ar.ArtworkID = ea.ArtworkID
    -> WHERE ea.ExhibitionID IS NULL;
Empty set (0.01 sec)
```

12. List artists who have created artworks in all available categories.

```
SELECT a.Name
```

FROM Artists a

JOIN Artworks ar ON a.ArtistID = ar.ArtistID

JOIN Categories c ON ar.CategoryID = c.CategoryID

GROUP BY a.Name

HAVING COUNT(DISTINCT c.CategoryID) = (SELECT COUNT(*) FROM Categories);

[It is a empty set because there is no artists who have created artworks in all available categories]

```
mysql> SELECT a.Name
    -> FROM Artists a
    -> JOIN Artworks ar ON a.ArtistID = ar.ArtistID
    -> JOIN Categories c ON ar.CategoryID = c.CategoryID
    -> GROUP BY a.Name
    -> HAVING COUNT(DISTINCT c.CategoryID) = (SELECT COUNT(*) FROM Categories);
Empty set (0.00 sec)
```

13. List the total number of artworks in each category.

[This question is similar to Q.no-7]

14. Find the artists who have more than 2 artworks in the gallery.

[This question is similar to Q.no-5]

15. List the categories with the average year of artworks they contain, only for categories with more than 1 artwork.

SELECT c.Name, AVG(ar.Year) AS AvgYear

FROM Categories c

JOIN Artworks ar ON c.CategoryID = ar.CategoryID

GROUP BY c.Name

HAVING COUNT(ar.ArtworkID) > 1;

```
mysql> SELECT c.Name, AVG(ar.Year) AS AvgYear
    -> FROM Categories c
    -> JOIN Artworks ar ON c.CategoryID = ar.CategoryID
    -> GROUP BY c.Name
    -> HAVING COUNT(ar.ArtworkID) > 1;
+----------+-----------+
| Name     | AvgYear   |
+----------+-----------+
| Painting | 1776.3333 |
+----------+-----------+
1 row in set (0.00 sec)
```

16. Find the artworks that were exhibited in the 'Modern Art Masterpieces' exhibition.

```
SELECT ar.Title

FROM Artworks ar

JOIN ExhibitionArtworks ea ON ar.ArtworkID = ea.ArtworkID

JOIN Exhibitions e ON ea.ExhibitionID = e.ExhibitionID

WHERE e.Title = 'Modern Art Masterpieces';
```

```
mysql> SELECT ar.Title
    -> FROM Artworks ar
    -> JOIN ExhibitionArtworks ea ON ar.ArtworkID = ea.ArtworkID
    -> JOIN Exhibitions e ON ea.ExhibitionID = e.ExhibitionID
    -> WHERE e.Title = 'Modern Art Masterpieces';
+--------------+
| Title        |
+--------------+
| Starry Night |
| Mona Lisa    |
| Guernica     |
+--------------+
3 rows in set (0.00 sec)
```

17. Find the categories where the average year of artworks is greater than the average year of all artworks.

```
SELECT c.Name

FROM Categories c

JOIN Artworks ar ON c.CategoryID = ar.CategoryID

GROUP BY c.CategoryID, c.Name

HAVING AVG(ar.Year) > (SELECT AVG(Year) FROM Artworks);
```

[It is a empty set]

```
mysql> SELECT c.Name
    -> FROM Categories c
    -> JOIN Artworks ar ON c.CategoryID = ar.CategoryID
    -> GROUP BY c.CategoryID, c.Name
    -> HAVING AVG(ar.Year) > (SELECT AVG(Year) FROM Artworks);
Empty set (0.00 sec)
```

18. List the artworks that were not exhibited in any exhibition.

[This question is similar to Q.no-11]

19. Show artists who have artworks in the same category as "Mona Lisa."

SELECT DISTINCT a.Name

FROM Artists a

JOIN Artworks ar ON a.ArtistID = ar.ArtistID

WHERE ar.CategoryID = (SELECT CategoryID FROM Artworks WHERE Title = 'Mona Lisa');

```
mysql> SELECT DISTINCT a.Name
    -> FROM Artists a
    -> JOIN Artworks ar ON a.ArtistID = ar.ArtistID
    -> WHERE ar.CategoryID = (SELECT CategoryID FROM Artworks WHERE Title = 'Mona Lisa');
+-------------------+
| Name              |
+-------------------+
| Vincent van Gogh  |
| Leonardo da Vinci |
| Pablo Picasso     |
+-------------------+
3 rows in set (0.00 sec)
```

20. List the names of artists and the number of artworks they have in the gallery.

SELECT a.Name, COUNT(ar.ArtworkID) AS ArtworkCount

FROM Artists a

LEFT JOIN Artworks ar ON a.ArtistID = ar.ArtistID

GROUP BY a.Name;

[This question is similar to Q.no-1 but here I used JOINS]

```
mysql> SELECT a.Name, COUNT(ar.ArtworkID) AS ArtworkCount
    -> FROM Artists a
    -> LEFT JOIN Artworks ar ON a.ArtistID = ar.ArtistID
    -> GROUP BY a.Name;
+-------------------+--------------+
| Name              | ArtworkCount |
+-------------------+--------------+
| Leonardo da Vinci |            1 |
| Pablo Picasso     |            1 |
| Vincent van Gogh  |            1 |
+-------------------+--------------+
3 rows in set (0.01 sec)
```