

1-Find the top 3 airlines that serve the most routes in each country.

Consider both (source and destination)

Query:

```
WITH airline_route_counts AS (
  SELECT
    r.airline_id,
    a.country,
    COUNT(*) AS route_count
  FROM db_SCHEMA1.fact_routes r
  JOIN db_SCHEMA1.dim_airports a ON r.source_airport_id = a.airport_id
  GROUP BY r.airline_id, a.country

  UNION ALL

  SELECT
    r.airline_id,
    CASE
      WHEN r.destination_airport_id != r.source_airport_id THEN a.country
      ELSE NULL
    END AS country,
    COUNT(*) AS route_count
  FROM db_SCHEMA1.fact_routes r
  JOIN db_SCHEMA1.dim_airports a ON r.destination_airport_id = a.airport_id
  GROUP BY r.airline_id, a.country, r.destination_airport_id, r.source_airport_id
)
SELECT
  country,
  airline_name,
  route_count
FROM (
  SELECT
    ar.country,
    name as airline_name,
    route_count,
    ROW_NUMBER() OVER (PARTITION BY ar.country ORDER BY route_count DESC) AS rank
  FROM airline_route_counts as ar
  join db_SCHEMA1.dim_airlines as da
  on da.airline_id=ar.airline_id
) ranked_routes
WHERE rank <= 3;
```

Result

	country text	airline_name text	route_count bigint
1	Afghanistan	Ariana Afghan Airlines	11
2	Afghanistan	Safi Airlines	9
3	Afghanistan	Hankook Airline	6
4	Albania	Alitalia	9
5	Albania	Blue Panorama Airlines	7
6	Albania	Air One	6
7	Algeria	Air Algerie	154
8	Algeria	Aigle Azur	25
9	Algeria	Iberia Airlines	5

2-Identify the airports with the most codeshare flights along with the number of codeshare routes.

Query:

```
SELECT
  a.name AS airport_name,
  a.city,
  a.country,
  COUNT(r.flight_number) AS codeshare_routes
FROM db_SCHEMA1.fact_routes r
JOIN db_SCHEMA1.dim_airports a ON r.source_airport_id = a.airport_id
WHERE r.codeshare = TRUE
GROUP BY a.name, a.city, a.country
ORDER BY codeshare_routes DESC;
```

results

	airport_name text	city text	country text	codeshare_routes bigint
1	Hartsfield Jackson Atlanta International Airport	Atlanta	United States	635
2	Chicago O'Hare International Airport	Chicago	United States	283
3	London Heathrow Airport	London	United Kingdom	217
4	Los Angeles International Airport	Los Angeles	United States	212
5	Frankfurt am Main Airport	Frankfurt	Germany	179
6	Vienna International Airport	Vienna	Austria	165
7	Charles de Gaulle International Airport	Paris	France	162
8	Munich Airport	Munich	Germany	155
9	Amsterdam Airport Schiphol	Amsterdam	Netherlands	150

3-Calculate the distance between airports for direct flights (zero stops) and find the longest flight, provide the airline, source, and destination airport details.

Query

```
SELECT
    r.airline_id,
    sa.name AS source_airport,
    da.name AS destination_airport,
    r.distance_km
FROM db_SCHEMA1.fact_routes r
JOIN db_SCHEMA1.dim_airports sa ON r.source_airport_id = sa.airport_id
JOIN db_SCHEMA1.dim_airports da ON r.destination_airport_id = da.airport_id
WHERE r.stopovers = 0
ORDER BY r.distance_km DESC
LIMIT 1;
```

result

	airline_id bigint	source_airport text	destination_airport text	distance_km double precision
1	24	Sydney Kingsford Smith International Airport	Dallas Fort Worth International Airport	13808.197759952754

4-Find which airport hosts the most unique airlines based on the routes operated, along with the number of different airlines operating there

Query

```
SELECT
  a.name AS airport_name,
  a.city,
  COUNT(DISTINCT r.airline_id) AS unique_airlines
FROM db_SCHEMA1.fact_routes r
JOIN db_SCHEMA1.dim_airports a ON r.source_airport_id = a.airport_id
GROUP BY a.name, a.city
ORDER BY unique_airlines DESC
LIMIT 1;
```

Results

	airport_name text	city text	unique_airlines bigint
1	Charles de Gaulle International Airport	Paris	111

5-Find which airline covers the widest range of geographic latitudes or longitudes between the airports it serves.

Query

```
SELECT al.name, MAX(r.distance_km) AS max_distance
FROM db_SCHEMA1.fact_routes r
JOIN db_SCHEMA1.dim_airlines al ON r.airline_id = al.airline_id
GROUP BY al.name
ORDER BY max_distance DESC
LIMIT 1;
```

Results

	name text	max_distance double precision
1	Qantas	13808.197759952754

6-Identify which cities serve multiple types of transport (e.g., air terminal, train station, or port

Query

```
SELECT
    city,
    COUNT(DISTINCT airport_type) AS transport_types_count
FROM db_SCHEMA1.dim_airports
GROUP BY city
HAVING COUNT(DISTINCT airport_type) > 1
ORDER BY transport_types_count DESC;
```

Results

	city text	transport_types_count bigint
1	Hong Kong	5
2	Stockholm	5
3	Auckland	5
4	Prague	4
5	Amsterdam	4
6	Moscow	4
7	St. Petersburg	4
8	Tampa	4
9	Boston	4

Which airports have the highest number of airlines operating and the highest number of routes, indicating potential congestion.

Query

```
WITH airport_airline_counts AS (  
    SELECT  
        r.source_airport_id AS airport_id,  
        COUNT(DISTINCT r.airline_id) AS airline_count  
    FROM db_SCHEMA1.fact_routes r  
    GROUP BY r.source_airport_id  
),  
airport_route_counts AS (  
    SELECT  
        r.source_airport_id AS airport_id,  
        COUNT(*) AS route_count  
    FROM db_SCHEMA1.fact_routes r  
    GROUP BY r.source_airport_id  
)  
SELECT  
    a.airport_id,  
    a.name AS airport_name,  
    a.city,  
    a.country,  
    COALESCE(aa.airline_count, 0) AS airline_count,  
    COALESCE(ar.route_count, 0) AS route_count  
FROM db_SCHEMA1.dim_airports a  
LEFT JOIN airport_airline_counts aa ON a.airport_id = aa.airport_id  
LEFT JOIN airport_route_counts ar ON a.airport_id = ar.airport_id  
ORDER BY airline_count DESC, route_count DESC  
LIMIT 10;
```

Results

	airport_id [PK] integer	airport_name text	city text	country text	airline_count bigint	route_count bigint
1	1382	Charles de Gaulle International Airport	Paris	France	111	541
2	340	Frankfurt am Main Airport	Frankfurt	Germany	104	673
3	3885	Suvarnabhumi Airport	Bangkok	Thailand	103	339
4	1555	Leonardo da Vinci-Fiumicino Airport	Rome	Italy	96	348
5	507	London Heathrow Airport	London	United Kingdom	90	547
6	3316	Singapore Changi Airport	Singapore	Singapore	87	496
7	3077	Hong Kong International Airport	Hong Kong	Hong Kong	87	365
8	2188	Dubai International Airport	Dubai	United Arab Emirates	85	355
9	3364	Beijing Capital International Airport	Beijing	China	83	533