University Selection System

Accessible university selection system is vital for a student's college selection process as it is in a limited time frame and has multiple options to select from. With millions of students from around the globe applying to a few elite universities, students find it hard to understand what's the actual location, what courses are offered and placements of university. To make things easy and provide a solution, I thought and designed a **University Selection System** using **SQL.**

The system project showcases how structured data storage and Sql queries can be used to:

i. Find the suitable **university** from the available options.
ii. Track educational **performance** of different countries.
iii. Calculate the **ROI (Return on Investment)** for students.

The system consist of multiple tables:

A. **University**: The name and establishment year of Universities.
B. **QS Ranking**: The global university rank by QS.
C. **Location**: The address of university.
D. **Fees**: The lowest and highest as well as average fees of each university.
E. **Placement**: The placement percentage by each university.
F. **Courses**: The availability of courses offered by each university.

By the use of **SQL Functions, Joins, Grouping and Filtering**, the system project simulates the real world selection process between options of universities and shows how students and education guidance businesses can make data driven decisions.

Problem Statement and Queries:

1. **Problem Statement:** For each country, find the total number of universities listed, their average QS rank, and the average tuition fee. Order the results by the number of universities in descending order.

```sql
USE  UNIVERSITYDB;

-- QUERY 1 Country Performance Overview --
SELECT
    l.country,
    COUNT(u.id) AS number_of_universities,
    ROUND(AVG(q.ranking), 2) AS average_rank,
    ROUND(AVG(f.average_fee), 2) AS average_fee
FROM
    university u
JOIN
    location l ON u.id = l.uni_id
JOIN
    qs_ranking q ON u.id = q.uni_id
JOIN
    fees f ON u.id = f.uni_id
GROUP BY
    l.country
ORDER BY
    number_of_universities DESC;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Conter

country	number_of_universities	average_rank	average_fee
USA	28	42.43	56250.00
United Kingdom	18	48.67	34222.22
Australia	7	38.86	39285.71
China	6	45.33	10166.67
Germany	6	78.17	2833.33
Japan	5	63.00	12000.00
Switzerland	5	54.40	3000.00
Canada	4	40.75	39250.00
France	3	39.33	17666.67
Netherlands	3	66.33	18333.33
South Korea	3	62.00	8666.67
Sweden	3	84.00	17666.67
Singapore	2	17.00	33500.00
Hong Kong	1	27.00	23000.00
Belgium	1	52.00	17000.00
Ireland	1	65.00	25000.00
Denmark	1	68.00	15000.00
Finland	1	69.00	18000.00
New Zealand	1	70.00	35000.00
Norway	1	83.00	50.00

2. **Problem Statement:** List the names of universities that have an average placement package greater than $90,000 and an average tuition fee less than $60,000. Also, display their country and rank.

```sql
-- QUERY 2 High-Value Universities (Placement vs. Fees) --
SELECT
    u.name,
    l.country,
    q.ranking
FROM
    university u
JOIN
    location l ON u.id = l.uni_id
JOIN
    qs_ranking q ON u.id = q.uni_id
JOIN
    fees f ON u.id = f.uni_id
JOIN
    placement p ON u.id = p.uni_id
WHERE
    p.average_package_usd > 90000 AND f.average_fee < 60000;
```

Result Grid | Filter Rows: | Export:

name	country	ranking
Princeton University	USA	18
University of Cambridge	United Kingdom	2
ETH Zurich	Switzerland	7
Imperial College London	United Kingdom	6
University of Oxford	United Kingdom	3
EPFL	Switzerland	36
Technical University of Munich	Germany	37
University of Zurich	Switzerland	72

3. **Problem Statement:** Identify the university with the best (lowest) QS rank in the state of 'California'. Display its name, rank, and city.

```sql
-- QUERY 3 Top University in California --
SELECT
    u.name,
    q.ranking,
    l.city
FROM
    university u
JOIN
    qs_ranking q ON u.id = q.uni_id
JOIN
    location l ON u.id = l.uni_id
WHERE
    l.state = 'California'
ORDER BY
    q.ranking ASC
LIMIT 1;
```

Result Grid | Filter Rows:

name	ranking	city
Stanford University	5	Stanford

4. **Problem Statement:** Calculate the average placement percentage and the average placement package for all universities, grouped by country. Only show countries that have more than 3 universities in the database.

```sql
-- QUERY 4 National Placement Statistics --
SELECT
    l.country,
    ROUND(AVG(p.percent_out_of_total), 2) AS average_placement_percent,
    ROUND(AVG(p.average_package_usd), 2) AS average_package
FROM
    university u
JOIN
    location l ON u.id = l.uni_id
JOIN
    placement p ON u.id = p.uni_id
GROUP BY
    l.country
HAVING
    COUNT(u.id) > 3;
```

country	average_placement_percent	average_package
USA	94.10	93678.57
Canada	87.00	67000.00
Australia	85.64	65000.00
United Kingdom	89.41	78888.89
Japan	88.66	72000.00
China	92.97	80333.33
Switzerland	95.04	96600.00
Germany	92.47	84666.67

5. **Problem Statement:** For universities established before the year 1800, list their name, establishment year, current QS rank, and average placement package. Order them by their rank.

```sql
-- QUERY 5 Historical Universities' Modern Standing --
SELECT
    u.name,
    u.year_established,
    q.ranking,
    p.average_package_usd
FROM
    university u
JOIN
    qs_ranking q ON u.id = q.uni_id
JOIN
    placement p ON u.id = p.uni_id
WHERE
    u.year_established < 1800
ORDER BY
    q.ranking ASC;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

name	year_established	ranking	average_package_usd
University of Cambridge	1209	2	102000
University of Oxford	1096	3	104000
Harvard University	1636	4	112000
University of Pennsylvania	1740	12	97000
Yale University	1701	16	92000
Princeton University	1746	18	105000
The University of Edinburgh	1582	22	73000
Columbia University	1754	23	98000
KU Leuven	1425	52	76000
University of Amsterdam	1632	57	77000
University of Glasgow	1451	62	71000
Trinity College Dublin, The ...	1592	65	74000
Lund University	1666	67	76000
University of Copenhagen	1479	68	78000
University of Helsinki	1640	69	77000
Brown University	1764	73	91000
Heidelberg University	1386	74	85000
University of St Andrews	1413	75	76000
University of Geneva	1559	79	89000
Ludwig-Maximilians-Univers...	1472	84	84000
University of North Carolin...	1789	89	87000
University of Groningen	1614	95	74000
Uppsala University	1477	97	77000
University of Göttingen	1734	98	82000

6. **Problem Statement:** Calculate a simple ROI ratio for each university by dividing the average_package_usd by the average_fee. Display the university name, its country, and this calculated ratio, ordering the results to show the top 10 universities with the best ROI.

```sql
-- QUERY 6 Financial "Return on Investment" (ROI) --
SELECT
    u.name,
    l.country,
    ROUND(p.average_package_usd / f.average_fee, 2) AS ROI
FROM
    university u
JOIN
    location l ON u.id = l.uni_id
JOIN
    fees f ON u.id = f.uni_id
JOIN
    placement p ON u.id = p.uni_id
ORDER BY
    ROI DESC
LIMIT 10;
```

Result Grid | Filter Rows: | Export:

name	country	ROI
University of Oslo	Norway	1580.00
University of Geneva	Switzerland	44.50
Free University of Berlin	Germany	41.50
ETH Zurich	Switzerland	36.00
Humboldt University of Berlin	Germany	33.20
University of Göttingen	Germany	32.80
Technical University of Munich	Germany	30.33
EPFL	Switzerland	30.29
University of Zurich	Switzerland	28.75
Ludwig-Maximilians-Universität München	Germany	28.00

7. **Problem Statement:** Identify cities that host more than 2 universities from the top 100 list. For these cities, display the city name, country, and the total count of top-100 universities located there.

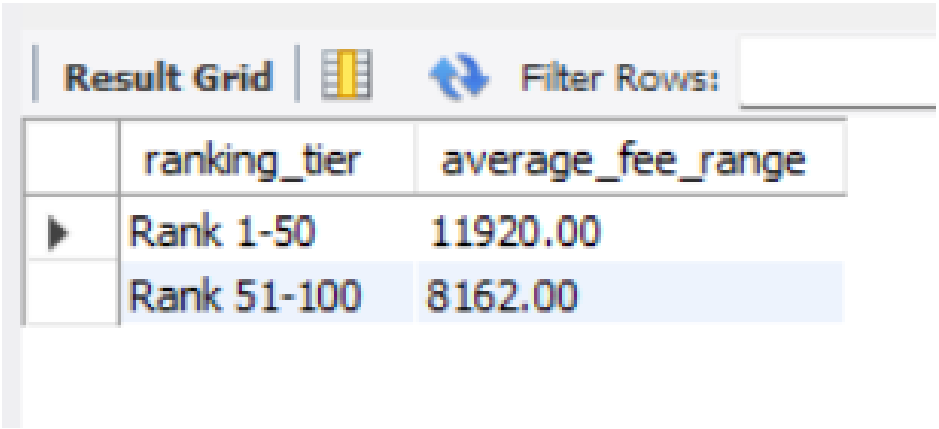
```sql
-- QUERY 7 Global University Hubs --
SELECT
    l.city,
    l.country,
    COUNT(u.id) AS number_of_universities
FROM
    university u
JOIN
    location l ON u.id = l.uni_id
GROUP BY
    l.city, l.country
HAVING
    COUNT(u.id) > 2
ORDER BY
    number_of_universities DESC;
```

Result Grid | Filter Rows:

city	country	number_of_universities
London	United Kingdom	4

8. **Problem Statement:** Does the fee range (highest_fee - lowest_fee) differ between elite and other universities? Calculate the average fee range for two groups: universities ranked 1-50 and those ranked 51-100.

```sql
-- QUERY 8 Fee Range vs. Ranking Tier
SELECT
    CASE
        WHEN q.ranking BETWEEN 1 AND 50 THEN 'Rank 1-50'
        WHEN q.ranking BETWEEN 51 AND 100 THEN 'Rank 51-100'
    END AS ranking_tier,
    ROUND(AVG(f.highest_fee - f.lowest_fee), 2) AS average_fee_range
FROM
    fees f
JOIN
    qs_ranking q ON f.uni_id = q.uni_id
WHERE
    q.ranking <= 100
GROUP BY
    ranking_tier;
```



ranking_tier	average_fee_range
Rank 1-50	11920.00
Rank 51-100	8162.00

9. **Problem Statement:** For each country, identify the university with the highest average tuition fee. Display the country's name, the university's name, and that highest fee.

```sql
-- QUERY 9 Most Expensive University in Each Country
WITH RankedFees AS (
    SELECT
        l.country,
        u.name AS university_name,
        f.average_fee,
        ROW_NUMBER() OVER(PARTITION BY l.country ORDER BY f.average_fee DESC) as rn
    FROM
        university u
    JOIN
        location l ON u.id = l.uni_id
    JOIN
        fees f ON u.id = f.uni_id
)
SELECT
    country,
    university_name,
    average_fee AS highest_average_fee
FROM
    RankedFees
WHERE
    rn = 1;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

country	university_name	highest_average_fee
Australia	The University of Sydney	42000
Belgium	KU Leuven	17000
Canada	University of British Columbia	48000
China	Shanghai Jiao Tong University	11500
Denmark	University of Copenhagen	15000
Finland	University of Helsinki	18000
France	Institut Polytechnique de Paris	20000
Germany	Heidelberg University	4000
Hong Kong	The University of Hong Kong	23000
Ireland	Trinity College Dublin, The University of Dublin	25000
Japan	Nagoya University	13500
Netherlands	University of Amsterdam	19000
New Zeal...	The University of Auckland	35000
Norway	University of Oslo	50
Singapore	National University of Singapore (NUS)	35000
South Korea	Yonsei University	9500
Sweden	KTH Royal Institute of Technology	20000
Switzerland	EPFL	3500
United Kin...	University of Oxford	47000
USA	Columbia University	67000

10. **Problem Statement:** Analyze if a better QS rank correlates to a higher salary. Calculate the average placement package for universities grouped into four tiers: ranks 1-25, 26-50, 51-75, and 76-100.

```sql
-- QUERY 10 Salary by Ranking Tier Analysis
SELECT
    CASE
        WHEN q.ranking BETWEEN 1 AND 25 THEN 'Rank 1-25'
        WHEN q.ranking BETWEEN 26 AND 50 THEN 'Rank 26-50'
        WHEN q.ranking BETWEEN 51 AND 75 THEN 'Rank 51-75'
        WHEN q.ranking BETWEEN 76 AND 100 THEN 'Rank 76-100'
    END AS ranking_tier,
    ROUND(AVG(p.average_package_usd), 2) AS average_package
FROM
    placement p
JOIN
    qs_ranking q ON p.uni_id = q.uni_id
GROUP BY
    ranking_tier
ORDER BY
    MIN(q.ranking);
```

Result Grid | Filter Rows:

ranking_tier	average_package
Rank 1-25	91640.00
Rank 26-50	78880.00
Rank 51-75	78720.00
Rank 76-100	80440.00

11. **Problem Statement:** List the top 10 universities that offer Engineering, based on their QS rank. Display their name, rank, and country.

```sql
-- QUERY 11 Top Engineering Schools
SELECT
    u.name,
    q.ranking,
    l.country
FROM
    university u
JOIN
    qs_ranking q ON u.id = q.uni_id
JOIN
    location l ON u.id = l.uni_id
JOIN
    courses c ON u.id = c.uni_id
WHERE
    c.engineering = 'Yes'
ORDER BY
    q.ranking ASC
LIMIT 10;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

name	ranking	country
Massachusetts Institute of Technology (MIT)	1	USA
University of Cambridge	2	United Kingdom
University of Oxford	3	United Kingdom
Harvard University	4	USA
Stanford University	5	USA
Imperial College London	6	United Kingdom
ETH Zurich	7	Switzerland
National University of Singapore (NUS)	8	Singapore
UCL	9	United Kingdom
University of California, Berkeley (UCB)	10	USA

12. **Problem Statement:** Find universities located in the USA that offer both Law and Medicine. Display their names and average tuition fees.

```
199     -- QUERY 12 Law & Medicine Hubs in the USA
200 •   SELECT
201         u.name,
202         f.average AS average_tuition_fee
203     FROM
204         university u
205     JOIN
206         location l ON u.id = l.uni_id
207     JOIN
208         courses c ON u.id = c.uni_id
209     JOIN
210         fees f ON u.id = f.uni_id
211     WHERE
212         l.country = 'USA' AND c.law = 'Yes' AND c.medicine = 'Yes';
```

Result Grid | Filter Rows: | Export:

name	average_tuition_fee
Yale University	62000
University of Chicago	65000
Stanford University	64000
Northwestern University	64000
Columbia University	67000
University of Michigan-Ann Arbor	55000
Cornell University	63000
University of Pennsylvania	62000
Harvard University	60000
New York University (NYU)	60000
University of California, Los Ang...	46000
The University of Texas at Austin	45000
University of Washington	44000
Duke University	66000
University of Wisconsin-Madison	43000
University of North Carolina, Ch...	41000
Washington University in St. Louis	64000

13. **Problem Statement:** Compare the average placement package for universities that offer Engineering versus those that do not.

```
214    -- QUERY 13 Specialized Universities Analysis (Placement)
215    SELECT
216        CASE
217            WHEN c.engineering = 'Yes' THEN 'Offers Engineering'
218            ELSE 'Does Not Offer Engineering'
219        END AS engineering_status,
220        ROUND(AVG(p.average_package_usd), 2) AS average_package
221    FROM
222        placement p
223    JOIN
224        courses c ON p.uni_id = c.uni_id
225    GROUP BY
226        engineering_status;
```

Result Grid | Filter Rows:

engineering_status	average_package
Offers Engineering	82149.43
Does Not Offer Engineering	84230.77

14. **Problem Statement:** Count how many universities in the 'Top 25' ranking tier also offer a Humanities program.

```
228     -- QUERY 14 Humanities in the Top Tier
229 •   SELECT
230         COUNT(u.id) AS top_25_with_humanities
231     FROM
232         university u
233     JOIN
234         qs_ranking q ON u.id = q.uni_id
235     JOIN
236         courses c ON u.id = c.uni_id
237     WHERE
238         q.ranking <= 25 AND c.humanities = 'Yes';
```

Result Grid | Filter Rows:

top_25_with_humanities
24

15. **Problem Statement:** For each country, count the total number of universities that offer a Medicine program. Order the results by the count in descending order.

```
240     -- QUERY 15 Course Availability by Country.
241 •   SELECT
242         l.country,
243         COUNT(c.uni_id) AS universities_with_medicine
244     FROM
245         courses c
246     JOIN
247         location l ON c.uni_id = l.uni_id
248     WHERE
249         c.medicine = 'Yes'
250     GROUP BY
251         l.country
252     ORDER BY
253         universities_with_medicine DESC;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

country	universities_with_medicine
USA	21
United Kingdom	15
Australia	7
Germany	6
Japan	5
China	5
Canada	4
Switzerland	3
Singapore	2
South Korea	2
Netherlands	2
Sweden	2
Hong Kong	1
Belgium	1
France	1
Ireland	1
Denmark	1
Finland	1
New Zealand	1
Norway	1

Conclusions: This project demonstrates how a database-driven approach can be used to select and rank university selection efficiently. By designing structured tables and running different queries, we were able to extract meaningful information such as location, courses and fees of different universities. These insights can support better decision-making for improving efficiency, resource utilization, and student satisfaction in university.