

SQL – University Rankings

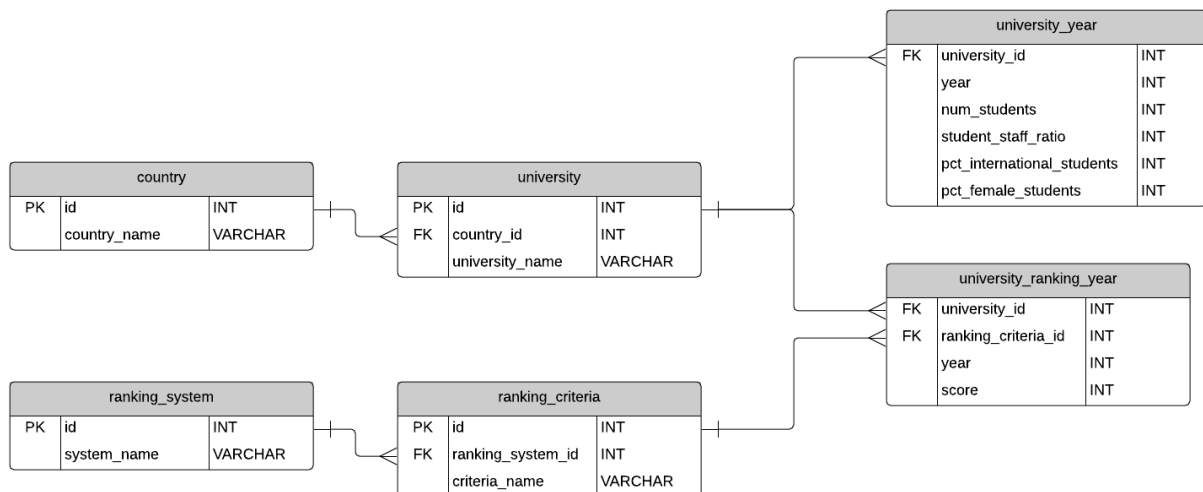
This project solves 20 questions using MySQL.

Sample database used for this project was made by GitHub user bbrumm:

https://github.com/bbrumm/databasestar/tree/main/sample_databases/sample_db_university/mysql

Additional info can be found on this site: <https://www.databasestar.com/sample-database-university-rankings/>

ERD for this database



Source: <https://www.databasestar.com/sample-database-university-rankings/>

After importing and reviewing the database, I wrote 20 questions that I want to know the answer to.

1. Count of universities

```
SELECT COUNT(university_name) AS count_of_universities  
FROM university;
```

Result:

1247 universities

2. Count of countries

```
SELECT COUNT(country_name) AS count_of_countries  
FROM country;
```

Result:

74 countries

3. Count of universities for each country

```
SELECT country_id, country.country_name, COUNT(university_name) AS count_of_universities
FROM university
LEFT JOIN country
      ON university.country_id = country.id
GROUP BY country_id
ORDER BY count_of_universities DESC
LIMIT 10;
```

Result:

country_id	country_name	count_of_universities
73	United States of America	273
11	China	96
72	United Kingdom	89
33	Japan	81
20	France	68
21	Germany	68
32	Italy	54
63	Spain	43
9	Canada	37
62	South Korea	37

4. What is the ranking system?

```
SELECT ranking_system.system_name, criteria_name
FROM ranking_criteria
LEFT JOIN ranking_system
    ON ranking_system_id = ranking_system.id;
```

Result:

system_name	criteria_name
Times Higher Education World University Ranking	Teaching
Times Higher Education World University Ranking	International
Times Higher Education World University Ranking	Research
Times Higher Education World University Ranking	Citations
Times Higher Education World University Ranking	Income
Times Higher Education World University Ranking	Total Times
Shanghai Ranking	Alumni
Shanghai Ranking	Award
Shanghai Ranking	HiCi
Shanghai Ranking	N and S
Shanghai Ranking	Pub
Shanghai Ranking	PCP
Shanghai Ranking	Total Shanghai
Center for World University Rankings	Quality of Education Rank
Center for World University Rankings	Alumni Employment Rank
Center for World University Rankings	Quality of Faculty Rank
Center for World University Rankings	Publications Rank
Center for World University Rankings	Influence Rank
Center for World University Rankings	Citations Rank
Center for World University Rankings	Patents Rank
Center for World University Rankings	Total CWUR

5. Highest number of students in 2015, top 10

```
SELECT year, country.country_name, university.university_name, num_students
FROM university_year
JOIN university
    ON university_id = university.id
JOIN country
    ON university.country_id = country.id
WHERE year = 2015
ORDER BY num_students DESC
LIMIT 10 ;
```

Result:

year	country_name	university_name	num_students
2015	United States of America	Arizona State University	83236
2015	Canada	University of Toronto	66198
2015	United States of America	Indiana University	62468
2015	United States of America	University of Massachusetts	56959
2015	United States of America	Ohio State University	51462
2015	Australia	Monash University	50882
2015	United States of America	Texas A&M University	50657
2015	Canada	University of British Columbia	50152
2015	United States of America	University of Florida	50095
2015	United States of America	University of Texas at Austin	49427

6. Best Universities by overall ranking Total Times in 2015, top 20

```
SELECT year, country.country_name, university.university_name, score
FROM university_ranking_year
JOIN university
    ON university_id = university.id
JOIN country
    ON university.country_id = country.id
WHERE year = 2015 AND ranking_criteria_id = 6
ORDER BY score DESC
LIMIT 20;
```

Result:

year	country_name	university_name	score
2015	United States of America	California Institute of Technology	94
2015	United States of America	Harvard University	93
2015	United Kingdom	University of Oxford	93
2015	United States of America	Stanford University	93
2015	United Kingdom	University of Cambridge	92
2015	United States of America	Massachusetts Institute of Technology	92
2015	United States of America	Princeton University	91
2015	United States of America	University of California, Berkeley	90
2015	United Kingdom	Imperial College London	88
2015	United States of America	Yale University	88
2015	United States of America	University of Chicago	87
2015	United States of America	University of California, Los Angeles	86
2015	Switzerland	ETH Zurich – Swiss Federal Institute of Technology Zurich	85
2015	United States of America	Columbia University	84
2015	United States of America	Johns Hopkins University	83
2015	United States of America	University of Pennsylvania	81
2015	United States of America	University of Michigan	81
2015	United States of America	Duke University	80
2015	United States of America	Cornell University	79
2015	Canada	University of Toronto	79

7. Top university in each country in 2015 by Total CWUR

```
WITH top_by_country AS(
SELECT year, country.country_name, university.university_name, score,
       ROW_NUMBER() OVER (PARTITION BY country.country_name ORDER BY score DESC) AS
rownum
FROM university_ranking_year
JOIN university
      ON university_id = university.id
JOIN country
      ON university.country_id = country.id
WHERE year = 2015 AND ranking_criteria_id = 21
)
```

```
SELECT year, country_name, university_name, score
FROM top_by_country
WHERE rownum = 1
```

Result:

year	country_name	university_name	score
2015	Argentina	University of Buenos Aires	45
2015	Australia	University of Sydney	52
2015	Austria	University of Vienna	47
2015	Belgium	Katholieke Universiteit Leuven	52
2015	Brazil	University of São Paulo	49
2015	Bulgaria	Sofia University	44
2015	Canada	University of Toronto	60
2015	Chile	University of Chile	45
2015	China	Peking University	54
2015	Colombia	University of Los Andes (Colombia)	44
2015	Croatia	University of Zagreb	45
2015	Cyprus	University of Cyprus	44
2015	Czech Republic	Charles University in Prague	46
2015	Denmark	University of Copenhagen	53
2015	Egypt	Mansoura University	44
2015	Estonia	University of Tartu	45
2015	Finland	University of Helsinki	50
2015	France	École Polytechnique	59
2015	Germany	Ludwig Maximilian University of Munich	52

2015	Greece	National and Kapodistrian University of Athens	46
2015	Hong Kong	University of Hong Kong	48
2015	Hungary	Eötvös Loránd University	45
2015	Iceland	University of Iceland	45
2015	India	Indian Institute of Technology Delhi	46
2015	Iran	Shahid Beheshti University of Medical Sciences	44
2015	Ireland	Trinity College, Dublin	48
2015	Israel	Hebrew University of Jerusalem	66
2015	Italy	Sapienza University of Rome	50
2015	Japan	University of Tokyo	78
2015	Lebanon	American University of Beirut	44
2015	Lithuania	Vilnius University	44
2015	Malaysia	University of Science, Malaysia	45
2015	Mexico	National Autonomous University of Mexico	46
2015	Netherlands	Utrecht University	52
2015	New Zealand	University of Auckland	46
2015	Norway	University of Oslo	51
2015	Poland	University of Warsaw	45
2015	Portugal	University of Porto	46
2015	Puerto Rico	University of Puerto Rico at Mayagüez	44
2015	Romania	University of Bucharest	44
2015	Russia	Lomonosov Moscow State University	54
2015	Saudi Arabia	King Saud University	45
2015	Serbia	University of Belgrade	44
2015	Singapore	National University of Singapore	53
2015	Slovakia	Comenius University in Bratislava	44
2015	Slovenia	University of Ljubljana	45
2015	South Africa	University of the Witwatersrand	49
2015	South Korea	Seoul National University	65
2015	Spain	University of Barcelona	50
2015	Sweden	Karolinska Institute	53
2015	Switzerland	Swiss Federal Institute of Technology in Zurich	67
2015	Taiwan	National Taiwan University	54
2015	Thailand	Chulalongkorn University	46
2015	Turkey	Middle East Technical University	45
2015	Uganda	Makerere University	44
2015	United Arab Emirates	United Arab Emirates University	44
2015	United Kingdom	University of Cambridge	97
2015	United States of America	Harvard University	100
2015	Uruguay	University of the Republic (Uruguay)	44

8. Average ranking for USA, Germany and China in 2015 by Total CWUR

```
SELECT year, country.country_name, AVG(score) AS average_score
FROM university_ranking_year
JOIN university
    ON university_id = university.id
JOIN country
    ON university.country_id = country.id
WHERE year = 2015 AND ranking_criteria_id = 21
GROUP BY country.country_name
HAVING country.country_name = "United States of America" OR
    country.country_name = "Germany" OR
    country.country_name = "China"
ORDER BY average_score DESC;
```

Result:

year	country_name	average_score
2015	United States of America	50.0699
2015	Germany	46.2727
2015	China	44.7952

9. Top 10 Universities with improved ranking from 2012 to 2015 by Total TIMES

```
CREATE TABLE year_2012 AS
SELECT year, country.country_name, university.university_name, score AS score_2012
FROM university_ranking_year
JOIN university
    ON university_id = university.id
JOIN country
    ON university.country_id = country.id
WHERE year = 2012 AND ranking_criteria_id = 6;
```

```
CREATE TABLE year_2015 AS
SELECT year, country.country_name, university.university_name, score AS score_2015
FROM university_ranking_year
JOIN university
    ON university_id = university.id
JOIN country
    ON university.country_id = country.id
WHERE year = 2015 AND ranking_criteria_id = 6;
```

```
CREATE TABLE year_diff AS
SELECT year_2012.country_name, year_2012.university_name, year_2012.score_2012,
year_2015.score_2015
FROM year_2012
JOIN year_2015
    ON year_2012.university_name = year_2015.university_name;

SELECT country_name, university_name, score_2015-score_2012 AS diff
FROM year_diff
ORDER BY diff DESC
LIMIT 10;
```

Result:

country_name	university_name	diff
Singapore	Nanyang Technological University	17
South Korea	Seoul National University	15
Netherlands	Erasmus University Rotterdam	13
Netherlands	Maastricht University	12
Germany	Free University of Berlin	11
South Korea	Korea Advanced Institute of Science and Technology (KAIST)	10
Germany	University of Tübingen	10
United States of America	Boston College	10
Australia	University of New South Wales	9
Denmark	Technical University of Denmark	9

10. Worst 10 universities with declining ranking

```
SELECT country_name, university_name, score_2015-score_2012 AS diff
FROM year_diff
ORDER BY diff ASC
LIMIT 10;
```

Result:

country_name	university_name	diff
Switzerland	University of Zurich	-8
United States of America	University of California, Davis	-7
United States of America	Rutgers, the State University of New Jersey	-7
Canada	McMaster University	-6
Canada	McGill University	-6
United States of America	University of Southern California	-6
United States of America	University of Pittsburgh	-6
Sweden	Karolinska Institute	-6
Canada	University of British Columbia	-5
United States of America	Vanderbilt University	-5

11. Highest and lowest student staff ratio in 2015

```
SELECT year, country.country_name, university.university_name, student_staff_ratio
FROM university_year
JOIN university
    ON university_id = university.id
JOIN country
    ON university.country_id = country.id
WHERE year = 2015
ORDER BY student_staff_ratio DESC -- (ASC)
LIMIT 1 ;
```

year	country_name	university_name	student_staff_ratio
2015	Germany	University of Bonn	70.40

year	country_name	university_name	student_staff_ratio
2015	United States of America	Johns Hopkins University	3.60

12. Highest and lowest international students in 2015

```
SELECT year, country.country_name, university.university_name, pct_international_students
FROM university_year
JOIN university
    ON university_id = university.id
JOIN country
    ON university.country_id = country.id
WHERE year = 2015
ORDER BY pct_international_students DESC – (ASC)
LIMIT 1 ;
```

year	country_name	university_name	pct_international_students
2015	Switzerland	École Polytechnique Fédérale de Lausanne	54

year	country_name	university_name	pct_international_students
2015	United States of America	University of California, Santa Cruz	1

13. Highest and lowest female students pct in 2015

```
SELECT year, country.country_name, university.university_name, pct_female_students
FROM university_year
JOIN university
    ON university_id = university.id
JOIN country
    ON university.country_id = country.id
WHERE year = 2015
ORDER BY pct_female_students DESC
LIMIT 1 ;
```

Result:

year	country_name	university_name	pct_female_students
2015	Sweden	Karolinska Institute	70

```
SELECT year, country.country_name, university.university_name, pct_female_students
FROM university_year
JOIN university
    ON university_id = university.id
JOIN country
    ON university.country_id = country.id
WHERE year = 2015 AND pct_female_students IS NOT NULL
ORDER BY pct_female_students
LIMIT 1 ;
```

Result:

year	country_name	university_name	pct_female_students
2015	Japan	Tokyo Institute of Technology	13

14. Average number of students for each year

```
SELECT year, ROUND(AVG(num_students),0) as average_students  
FROM university_year  
GROUP BY year;
```

Result:

year	average_students
2011	24128
2012	23897
2013	24052
2014	23536
2015	23874
2016	25038

15. Average score for each year, Total Shanghai

```
SELECT year, ROUND(AVG(score),2) AS average_score, COUNT(university_id) num_of_universities
FROM university_ranking_year
WHERE ranking_criteria_id = 13
GROUP BY year;
```

Result:

year	average_score	num_of_universities
2005	37.59	71
2006	37.41	71
2007	37.08	73
2008	37.33	72
2009	37.23	71
2010	37.21	72
2011	37.39	71
2012	37.24	71
2013	37.39	70
2014	36.41	70
2015	36.46	74

16. Students, ranking, female, international, ranking change for University of Cambridge in 2015

```
SELECT year, country.country_name, university.university_name, num_students, student_staff_ratio,  
pct_international_students, pct_female_students
```

```
FROM university_year
```

```
JOIN university
```

```
    ON university_id = university.id
```

```
JOIN country
```

```
    ON university.country_id = country.id
```

```
WHERE year = 2015 AND
```

```
    university.university_name = "University of Cambridge";
```

Result:

year	country_name	university_name	num_students	student_staff_ratio	pct_international_students	pct_female_students
2015	United Kingdom	University of Cambridge	18812	11.80	34	46

17. Comparison of two top universities (California Institute of Technology, University of Oxford)

```
SELECT year, country.country_name, university.university_name, num_students, student_staff_ratio,  
pct_international_students, pct_female_students
```

```
FROM university_year
```

```
JOIN university
```

```
    ON university_id = university.id
```

```
JOIN country
```

```
    ON university.country_id = country.id
```

```
WHERE year = 2015 AND
```

```
    (university.university_name = "University of Oxford" OR
```

```
    university.university_name = "California Institute of Technology") ;
```

Result:

year	country_name	university_name	num_students	student_staff_ratio	pct_international_students	pct_female_students
2015	United States of America	California Institute of Technology	2243	6.90	27	33
2015	United Kingdom	University of Oxford	19919	11.60	34	46

18. Top 1 university for each ranking criteria

```
SELECT
    criteria_name, score, university_name, country_name, year
FROM (
    SELECT
        year, country.country_name, university.university_name, ranking_criteria_id,
        ranking_criteria.criteria_name,
        score, ROW_NUMBER() OVER (PARTITION BY ranking_criteria_id ORDER BY score DESC) AS
        rownum
    FROM university_ranking_year
    JOIN university
        ON university_id = university.id
    JOIN country
        ON university.country_id = country.id
    JOIN ranking_criteria
        ON university_ranking_year.ranking_criteria_id = ranking_criteria.id
    WHERE year = 2015
) AS top_by_criteria
WHERE
    rownum = 1
ORDER BY
    ranking_criteria_id ASC;
```

Result:

criteria_name	score	university_name	country_name	year
Teaching	93	Harvard University	United States of America	2015
International	99	École Polytechnique Fédérale de Lausanne	Switzerland	2015
Research	99	Harvard University	United States of America	2015
Citations	100	California Institute of Technology	United States of America	2015
Income	100	Johns Hopkins University	United States of America	2015

Total Times	94	California Institute of Technology	United States of America	2015
Alumni	100	Harvard University	United States of America	2015
Award	100	Harvard University	United States of America	2015
HiCi	100	Harvard University	United States of America	2015
N and S	100	Harvard University	United States of America	2015
Pub	100	Harvard University	United States of America	2015
PCP	100	California Institute of Technology	United States of America	2015
Total Shanghai	100	Harvard University	United States of America	2015
Quality of Education Rank	367	Seoul National University	South Korea	2015
Alumni Employment Rank	567	University of California, San Diego	United States of America	2015
Quality of Faculty Rank	218	Seoul National University	South Korea	2015
Publications Rank	1000	University of Wales, Trinity Saint David	United Kingdom	2015
Influence Rank	991	National Chung Cheng University	Taiwan	2015
Citations Rank	812	Mines ParisTech	France	2015
Patents Rank	871	École normale supérieure - Paris	France	2015
Total CWUR	100	Harvard University	United States of America	2015

19. Top 10 universities with more than 50 % female, Total CWUR

```
SELECT u.year, u.university_id, univ.university_name, u.pct_female_students, r.score
FROM university_year u
JOIN university_ranking_year r
    ON u.university_id = r.university_id AND u.year = r.year
JOIN university univ
    ON u.university_id = univ.id
WHERE u.pct_female_students >= 50 AND u.year = 2015 AND r.ranking_criteria_id = 21
ORDER BY r.score DESC
LIMIT 10;
```

Result:

year	university_id	university_name	pct_female_students	score
2015	10	University of California, Berkeley	50	92
2015	8	Yale University	50	87
2015	13	University of Pennsylvania	51	78
2015	19	University of California, Los Angeles	52	77
2015	15	Johns Hopkins University	50	72
2015	23	New York University	55	68
2015	31	University College London	56	62
2015	30	University of Texas at Austin	51	61
2015	84	University of Virginia	52	57
2015	36	University of North Carolina at Chapel Hill	58	57

20. Worst 3 universities by Total CWUR similarities

```
SELECT uy.year, c.country_name AS country, u.university_name AS university, uy.num_students AS
students,
        uy.student_staff_ratio, uy.pct_international_students AS international,
uy.pct_female_students AS female, ur.score
FROM university_year uy
JOIN university u
        ON uy.university_id = u.id
JOIN country c
        ON u.country_id = c.id
JOIN university_ranking_year ur
        ON ur.university_id = u.id
WHERE uy.year = 2015 AND ur.ranking_criteria_id = 21
ORDER BY ur.score ASC
LIMIT 3;
```

Result:

year	country	university	students	student_staff_ratio	international	female	score
2015	Netherlands	Utrecht University	30779	15.40	7	59	43
2015	Australia	University of Sydney	41868	20.20	28	57	44
2015	United States of America	Georgia Institute of Technology	19967	20.10	26	31	44