

# **Proyecto: QS Rankings en el mundo y Mexico**

## **1. Definición del proyecto (Fuentes y problemas a resolver)**

### **1) Fuentes de BD:**

Los datos provienen de un dataset de Kaggle con información del ranking anual QS World Universities: <https://www.kaggle.com/prasertk/qs-world-university-rankings-2021?select=QS+World+University+Rankings+2017.csv>

### **2) Problema a resolver:**

La información proviene de una investigación realizada por la Secretaría de Educación que busca identificar a las universidades mejor calificadas en el mundo, compararlas con las mejores Universidades de México así como obtener una idea del perfil que da el sistema educativo frente al mundo para así comenzar a fijar metas realistas para implementar mejoras al sistema y preparar un programa de becas para ayudar a alumnos ejemplares a obtener oportunidades en dichas universidades.

## **2. Definición de la base de datos**

La data proviene de 3 archivos:

- a) QS Ranking 2021: El archivo QS Ranking 2021.csv contiene toda la información relevante sobre la clasificación de las universidades en el QS World University 2021.
- b) QS Ranking 2020: El archivo QS Ranking 2020.csv contiene toda la información relevante sobre la clasificación de las universidades en el QS World University 2020.

## **Diagrama Entidad Relación**

## **Glosario**

## QS Ranking 2020 y QS Rankings 2021

- **university** (String/Varchar): Nombre de la universidad.
- **year** (Decimal/Int): Año en que se realizó la clasificación.
- **rank\_display** (Decimal/Decimal): posición en la clasificación que se encuentra basada en su calificación. Puede haber empates.
- **university** (String/Varchar): Nombre de la universidad.
- **score** (Decimal): Las instituciones son evaluadas de acuerdo con las siguientes seis métricas:
  - Reputación académica (40%)
  - Reputación del empleador (10%)
  - Ratio profesorado/alumnos (20%)
  - Citas por profesorado (20%)
  - Ratio de profesorado internacional (5%)
  - Ratio de estudiantes internacionales (5\$)
- **link** (String/Varchar): Hipervínculo a la Home Page de la universidad en el sitio web de QS.
- **country** (Decimal): El país de la institución.
- **city** (String/Varchar): La ciudad de la institución.
- **region** (String/Varchar): Región donde se encuentra la universidad (puede no aplicar).
- **logo** (String/Varchar): Hipervínculo al logo de la institución en la página web de QS Top Universities.

## Creación de BBDD en Mongo DB

Colecciones de QS Rankings 2020 y QS Ranking 2021

The screenshot shows the MongoDB Compass interface with three collections listed under the "Collections" tab:

- QS Rankings 2019**:
  - Storage size: 4.10 kB
  - Documents: 1 K
  - Avg. document size: 362.00 B
  - Indexes: 1
  - Total index size: 4.10 kB
- QS Rankings 2020**:
  - Storage size: 122.68 kB
  - Documents: 1.1 K
  - Avg. document size: 360.00 B
  - Indexes: 1
  - Total index size: 28.67 kB
- QS Rankings 2021**:
  - Storage size: 4.10 kB
  - Documents: 1.2 K
  - Avg. document size: 361.00 B
  - Indexes: 1
  - Total index size: 4.10 kB

The left sidebar shows the local database with 13 databases and 34 collections, and a search bar for "Filter your data".

# Creación de BBDD en Mongo DB

## Colecciones de QS Rankings 2020 y QS Ranking 2021

MySQL Workbench

File Edit View Query Database Server Tools Scripting Help

Navigator: oswaldogonzalez - Schema: oswaldogonzalez - Schema: qs2021 qs2020 qs2020 qs2020 qs2020 qs2020

Query 1: oswaldogonzalez - Schema: oswaldogonzalez - Schema: qs2020; Limit to 1000 rows

1 • SELECT \* FROM diegooswaldogonzalez.qs2020;

year	rank_display	university	score	link	country	city	region	logo
2020	8	UCL	94.8	https://www.topuniversities.com/universities/.../UCL	United Kingdom	London	Europe	https://www.topuniversities.com/sites/default/f...
2020	9	Imperial College London	94.1	https://www.topuniversities.com/universities/.../Imperial-College-London	United Kingdom	London	Europe	https://www.topuniversities.com/sites/default/f...
2020	10	University of Chicago	92.0	https://www.topuniversities.com/universities/.../University-of-Chicago	United States	Chicago	North America	https://www.topuniversities.com/sites/default/f...
2020	11	Nanyang Technological University, Singapore	91.8	https://www.topuniversities.com/universities/.../Nanyang-Tech...	Singapore	Singapore	Asia	https://www.topuniversities.com/sites/default/f...
2020	11	National University of Singapore (NUS)	91.8	https://www.topuniversities.com/universities/.../National-University-of-Singapore-NUS	Singapore	Singapore	Asia	https://www.topuniversities.com/sites/default/f...
2020	13	Princeton University	90.9	https://www.topuniversities.com/universities/.../Princeton	United States	Princeton	North America	https://www.topuniversities.com/sites/default/f...
2020	14	Cornell University	89.3	https://www.topuniversities.com/universities/.../Cornell	United States	Ithaca	North America	https://www.topuniversities.com/sites/default/f...
2020	15	University of Pennsylvania	88.9	https://www.topuniversities.com/universities/.../University-of-Pennsylvania	United States	Philadelphia	North America	https://www.topuniversities.com/sites/default/f...
2020	16	Tsinghua University	88.4	https://www.topuniversities.com/universities/.../Tsinghua	China (Mainland)	Beijing	Asia	https://www.topuniversities.com/sites/default/f...
2020	17	Yale University	87.7	https://www.topuniversities.com/universities/.../Yale	United States	New Haven	North America	https://www.topuniversities.com/sites/default/f...
2020	18	Columbia University	87.4	https://www.topuniversities.com/universities/.../Columbia	United States	New York City	North America	https://www.topuniversities.com/sites/default/f...
2020	18	EPFL	87.4	https://www.topuniversities.com/universities/.../EPFL	Switzerland	Lausanne	Europe	https://www.topuniversities.com/sites/default/f...
2020	20	The University of Edinburgh	86.2	https://www.topuniversities.com/universities/.../The-University-of-Edinburgh	United Kingdom	Edinburgh	Europe	https://www.topuniversities.com/sites/default/f...
2020	21	University of Michigan-Ann Arbor	86.0	https://www.topuniversities.com/universities/.../University-of-Michigan-Ann-Arbor	United States	Ann Arbor	North America	https://www.topuniversities.com/sites/default/f...
2020	22	Peking University	84.3	https://www.topuniversities.com/universities/.../Peking	China (Mainland)	Beijing	Asia	https://www.topuniversities.com/sites/default/f...
2020	22	The University of Tokyo	84.3	https://www.topuniversities.com/universities/.../The-University-of-Tokyo	Japan	Tokyo	Asia	https://www.topuniversities.com/sites/default/f...
2020	24	Johns Hopkins University	83.9	https://www.topuniversities.com/universities/.../Johns-Hopkins	United States	Baltimore	North America	https://www.topuniversities.com/sites/default/f...
2020	25	Duke University	83.8	https://www.topuniversities.com/universities/.../Duke	United States	Durham	North America	https://www.topuniversities.com/sites/default/f...
2020	25	The University of Hong Kong	83.8	https://www.topuniversities.com/universities/.../The-University-of-Hong-Kong	Hong Kong SAR	Hong Kong	Asia	https://www.topuniversities.com/sites/default/f...
2020	27	The University of Manchester	82.7	https://www.topuniversities.com/universities/.../The-University-of-Manchester	United Kingdom	Manchester	Europe	https://www.topuniversities.com/sites/default/f...
2020	28	University of California, Berkeley (UCB)	82.6	https://www.topuniversities.com/universities/.../University-of-California-Berkeley-UCB	United States	Berkeley	North America	https://www.topuniversities.com/sites/default/f...
2020	29	The Australian National University	82.1	https://www.topuniversities.com/universities/.../The-Australian-National-University	Australia	Canberra	Oceania	https://www.topuniversities.com/sites/default/f...
2020	29	University of Toronto	82.1	https://www.topuniversities.com/universities/.../University-of-Toronto	Canada	Toronto	North America	https://www.topuniversities.com/sites/default/f...
2020	31	Northwestern University	81.5	https://www.topuniversities.com/universities/.../Northwestern	United States	Evanston	North America	https://www.topuniversities.com/sites/default/f...
2020	32	The Hong Kong University of Science and Technology	80.6	https://www.topuniversities.com/universities/.../The-Hong-Kong-University-of-Science-and-Technology	Hong Kong SAR	Hong Kong	Asia	https://www.topuniversities.com/sites/default/f...
2020	33	King's College London	80.5	https://www.topuniversities.com/universities/.../King-s-College-London	United Kingdom	London	Europe	https://www.topuniversities.com/sites/default/f...
2020	33	Kyoto University	80.5	https://www.topuniversities.com/universities/.../Kyoto	Japan	Kyoto	Asia	https://www.topuniversities.com/sites/default/f...
2020	35	McGill University	80.4	https://www.topuniversities.com/universities/.../McGill	Canada	Montreal	North America	https://www.topuniversities.com/sites/default/f...

Administration Schemas Information

MySQL Workbench

File Edit View Query Database Server Tools Scripting Help

Navigator: oswaldogonzalez - Schema: oswaldogonzalez - Schema: qs2021 qs2020 qs2020 qs2020 qs2020 qs2020

Query 1: oswaldogonzalez - Schema: oswaldogonzalez - Schema: qs2021; Limit to 1000 rows

1 • SELECT \* FROM diegooswaldogonzalez.qs2021;

year	rank_display	university	score	link	country	city	region	logo
2021	16	École Normale Supérieure de Lyon	48.1	https://www.topuniversities.com/universities/.../Ecole-Normale-Supérieure-de-Lyon	France	Lyon	Europe	https://www.topuniversities.com/sites/default/f...
2021	17	Alma University	53.6	https://www.topuniversities.com/universities/.../Alma	Finland	Esbo	Europe	https://www.topuniversities.com/sites/default/f...
2021	147	Aarhus University	51.0	https://www.topuniversities.com/universities/.../Aarhus	Denmark	Aarhus	Europe	https://www.topuniversities.com/sites/default/f...
2021	165	Al-Farabi Kazakh National University	46.9	https://www.topuniversities.com/universities/.../Al-Farabi-Kazakh-National-University	Kazakhstan	Almaty	Asia	https://www.topuniversities.com/sites/default/f...
2021	175	Albert-Ludwigs-Universität Freiburg	45.8	https://www.topuniversities.com/universities/.../Albert-Ludwigs-Universität-Freiburg	Germany	Freiburg im Breisgau	Europe	https://www.topuniversities.com/sites/default/f...
2021	166	Alma Mater Studiorum - University of Bologna	48.2	https://www.topuniversities.com/universities/.../Alma-Mater-Studiorum---University-of-Bologna	Italy	Bologna	Europe	https://www.topuniversities.com/sites/default/f...
2021	220	American University of Beirut (AUB)	40.4	https://www.topuniversities.com/universities/.../American-University-of-Beirut-(AUB)	Lebanon	Beirut	Asia	https://www.topuniversities.com/sites/default/f...
2021	222	Arizona State University	40.4	https://www.topuniversities.com/universities/.../Arizona-State	United States	Phoenix	North America	https://www.topuniversities.com/sites/default/f...
2021	110	Boston University	55.8	https://www.topuniversities.com/universities/.../Boston	United States	Boston	North America	https://www.topuniversities.com/sites/default/f...
2021	60	Brown University	70.0	https://www.topuniversities.com/universities/.../Brown	United States	Providence	North America	https://www.topuniversities.com/sites/default/f...
2021	4	Carlo Ginzburg Institute of Technology (Cagliari)	97.9	https://www.topuniversities.com/universities/.../Carlo-Ginzburg-Institute-of-Technology-(Cagliari)	Italy	Cagliari	Europe	https://www.topuniversities.com/sites/default/f...
2021	159	Cardiff University	48.5	https://www.topuniversities.com/universities/.../Cardiff	United Kingdom	Cardiff	Europe	https://www.topuniversities.com/sites/default/f...
2021	51	Carnegie Mellon University	73.4	https://www.topuniversities.com/universities/.../Carnegie-Mellon	United States	Pittsburgh	North America	https://www.topuniversities.com/sites/default/f...
2021	162	Case Western Reserve University	47.4	https://www.topuniversities.com/universities/.../Case-Western-Reserve	United States	Cleveland	North America	https://www.topuniversities.com/sites/default/f...
2021	138	CentraleSupélec	52.3	https://www.topuniversities.com/universities/.../CentraleSupélec	France	Saint-Aubin	Europe	https://www.topuniversities.com/sites/default/f...
2021	139	Chalmers University of Technology	52.2	https://www.topuniversities.com/universities/.../Chalmers-University-of-Technology	Sweden	Göteborg	Europe	https://www.topuniversities.com/sites/default/f...
2021	208	Chulalongkorn University	41.6	https://www.topuniversities.com/universities/.../Chulalongkorn	Thailand	Bangkok	Asia	https://www.topuniversities.com/sites/default/f...
2021	48	City University of Hong Kong	74.3	https://www.topuniversities.com/universities/.../City-University-of-Hong-Kong	China (Hong Kong)	Hong Kong	Asia	https://www.topuniversities.com/sites/default/f...
2021	19	Columbia University	86.5	https://www.topuniversities.com/universities/.../Columbia	United States	New York City	North America	https://www.topuniversities.com/sites/default/f...
2021	206	Complutense University of Madrid	41.9	https://www.topuniversities.com/universities/.../Complutense-University-of-Madrid	Spain	Madrid	Europe	https://www.topuniversities.com/sites/default/f...
2021	18	Cornell University	87.6	https://www.topuniversities.com/universities/.../Cornell	United States	Ithaca	North America	https://www.topuniversities.com/sites/default/f...
2021	217	Curtin University	40.5	https://www.topuniversities.com/universities/.../Curtin	Australia	Perth	Oceania	https://www.topuniversities.com/sites/default/f...
2021	203	Dartmouth College	42.6	https://www.topuniversities.com/universities/.../Dartmouth	United States	Hanover	North America	https://www.topuniversities.com/sites/default/f...
2021	77	Delft University of Technology	70.7	https://www.topuniversities.com/universities/.../Delft-University-of-Technology	Netherlands	Delft	Europe	https://www.topuniversities.com/sites/default/f...
2021	42	Duke University	76.4	https://www.topuniversities.com/universities/.../Duke	United States	Durham	North America	https://www.topuniversities.com/sites/default/f...
2021	86	Durham University	62.2	https://www.topuniversities.com/universities/.../Durham	United Kingdom	Durham	Europe	https://www.topuniversities.com/sites/default/f...
2021	175	Eberhard Karls Universität Tübingen	45.8	https://www.topuniversities.com/universities/.../Eberhard-Karls-Universität-Tübingen	Germany	Tübingen	Europe	https://www.topuniversities.com/sites/default/f...
2021	61	Fondazione Università di Roma "Sapienza"	80.9	https://www.topuniversities.com/universities/.../Fondazione-Università-di-Roma-Sapienza	Italy	Roma	Europe	https://www.topuniversities.com/sites/default/f...

Administration Schemas Information

Table: qs2021

Output

Action Output

#	Time	Action	Message
138	12:37:13	select count(*) from qs2021 LIMIT 0, 1000	1 row(s) returned
139	12:37:20	SELECT * FROM diegooswaldogonzalez.qs2020 LIMIT 0, 1000	299 row(s) returned
140	12:40:29	SELECT * FROM diegooswaldogonzalez.qs2021 LIMIT 0, 1000	235 row(s) returned
141	12:40:31	SELECT * FROM diegooswaldogonzalez.qs2020 LIMIT 0, 1000	299 row(s) returned
142	12:40:41	SELECT * FROM diegooswaldogonzalez.qs2020 LIMIT 0, 1000	299 row(s) returned
143	12:40:42	SELECT * FROM diegooswaldogonzalez.qs2021 LIMIT 0, 1000	235 row(s) returned

Object Info Session

## 3. Consultas

1) ¿Cuáles han sido las 5 primeras universidades en 2021, excluyendo aquellas que no tienen calificación o clasificación?

The screenshot shows the MongoDB Compass interface. On the left, the sidebar lists databases and collections, including 'BEDUProjects' and 'QS Rankings 2021'. The main area shows the 'QS Rankings 2021' collection with the following data:

rank_display	university
1	Massachusetts Institute of Technology (MIT)
2	Stanford University
3	Harvard University
4	California Institute of Technology (Caltech)
5	University of Oxford

The screenshot shows MySQL Workbench. The 'Schemas' pane on the left shows the database structure, including tables like 'qs2020' and 'qs2021'. The 'Query 1' pane contains the following SQL code:

```

17 year int,
18 rank_display int,
19 university varchar(100) primary key,
20 score decimal(3,1),
21 link varchar(150),
22 country varchar(50),
23 city varchar(50),
24 region varchar(50),
25 logo varchar(150)
)
27
28 • use DiegoOswaldoGonzalez;
29 • select count(*) from qs2021;
30
31 • use DiegoOswaldoGonzalez;
32 • use qs2021;
33
34 • SELECT university FROM qs2021
35     ORDER BY rank_display ASC
36     LIMIT 5;
37

```

The 'Result Grid' pane shows the results of the query:

university
Stanford University
Harvard University
California Institute of Technology (Caltech)
University of Oxford
ETH Zurich - Swiss Federal Institute of Technology

2) ¿Cuáles han sido las 5 universidades que han quedado al final de la clasificación en 2021?

The screenshot displays two windows side-by-side: MongoDB Compass on the left and MySQL Workbench on the right.

**MongoDB Compass (Left):**

- Left Sidebar:** Shows the database structure with 13 DBs and 34 collections. The selected collection is "DiegoOswaldoGonzalezMacias.QS Rankings 2021".
- Top Bar:** Shows the title "MongoDB Compass - clusteredlytnqo.mongodb.net/DiegoOswaldoGonzalezMacias.QS Rankings 2021".
- Document View:** Displays a list of documents with fields like "rank\_display" and "university". A query builder at the top shows the aggregation pipeline:
 

```

      FILTER { $eq: [ { $ne: [ "$name" ] } ] }
      PROJECT { rank_display: 1, university: 1, _id: 0 }
      SORT { rank_display: -1 }
      COLLATION { locale: 'simple' }
      
```
- Bottom Bar:** Includes buttons for "VIEW", "FIND", "RESET", and "REFRESH". It also shows statistics: DOCUMENTS 1.2k, STORAGE SIZE 4.1KB, AVG. SIZE 36.1B, INDEXES 1, TOTAL SIZE 4.1KB, and AVG. SIZE 4.1KB.

**MySQL Workbench (Right):**

- Left Sidebar:** Shows the MySQL schema structure under the "diegooswaldo" database, including tables "qs2020" and "qs2021".
- Central Area:** A SQL editor window titled "Copy 1" contains the following query:
 

```

      26  );
27
28 •  use DiegoOswaldoGonzalez;
29 •  select count(*) from qs2021;
30
31 •  use DiegoOswaldoGonzalez;
32 •  use qs2021;
33
34 •  SELECT university from qs2021
35   order by rank_display asc
36   limit 5;
37
38 •  SELECT university from qs2021
39   order by rank_display desc
40   limit 5;
41
42
43 •  SELECT university, rank_display from qs2021
44   where region like "North America"
45   order by rank_display asc
46   limit 30;
      
```
- Result Grid:** Below the SQL editor, it shows the results of the query, listing universities from the "qs2021" table.

3) ¿Cuántas escuelas en el top 30 son de la región de Norteamérica y que clasificación tienen?

The screenshot shows the MongoDB Compass interface. On the left, the sidebar lists databases (13 DBs) and collections (34 Collections). The main area displays a query results grid for the 'QS Rankings 2021' collection. The query is:

```

{ $and:[{rank_display:{$lte:10}}, {region:"North America"}] }

PROJECT {university: 1, rank_display: 1, region: 1, _id: 0}

SORT { field: -1 } or [{field: -1}]

COLLATION { locale: 'simple' }

```

The results show 15 documents, each representing a university with its rank display value. The data is as follows:

university	rank_display
Massachusetts Institute of Technology (MIT)	1
Stanford University	2
Harvard University	3
California Institute of Technology (Caltech)	4
University of Chicago	5
Princeton University	6
University of Pennsylvania	7
Yale University	8
Duke University	9
Columbia University	10
University of Michigan-Ann Arbor	11
Johns Hopkins University	12
University of Toronto	13
University of Michigan-Dearborn	14
University of California, Berkeley (UCB)	15
McGill University	16
New York University (NYU)	17
University of California, Los Angeles (UCLA)	18
Duke University	19

The screenshot shows the MySQL Workbench interface. The left sidebar shows the database structure for 'qs2021'. The query editor window contains the following SQL code:

```

32 • use qs2021;
33
34 • SELECT university from qs2021
35   order by rank_display asc
36   limit 5;
37
38 • SELECT university from qs2021
39   order by rank_display desc
40   limit 5;
41
42
43 • SELECT university, rank_display from qs2021
44   where region like "North America"
45   order by rank_display asc
46   limit 30;
47
48
49 • SELECT university, rank_display from qs2021
50   where region like "Asia"
51   order by rank_display asc
52   limit 30;

```

The results grid shows the top 30 universities from the 'qs2021' table, ordered by rank display. The data is as follows:

university	rank_display
Stanford University	2
Harvard University	3
California Institute of Technology (Caltech)	4
University of Chicago	5
Princeton University	6
University of Pennsylvania	7
Yale University	8
Duke University	9
Columbia University	10
University of Michigan-Ann Arbor	11
Johns Hopkins University	12
University of Toronto	13
University of Michigan-Dearborn	14
University of California, Berkeley (UCB)	15
McGill University	16
New York University (NYU)	17
University of California, Los Angeles (UCLA)	18
Duke University	19
University of Michigan-Dearborn	20
University of Illinois Urbana-Champaign	21
University of Wisconsin-Madison	22
University of Michigan-Flint	23
University of Illinois Springfield	24
University of Illinois Chicago	25
University of Illinois Urbana-Champaign	26
University of Illinois Springfield	27
University of Illinois Chicago	28
University of Illinois Urbana-Champaign	29
University of Illinois Springfield	30
University of Illinois Chicago	31
University of Illinois Urbana-Champaign	32
University of Illinois Springfield	33
University of Illinois Chicago	34
University of Illinois Urbana-Champaign	35
University of Illinois Springfield	36
Duke University	37

4) ¿Cuántas escuelas en el top 30 son de la región de Europa y que clasificación tienen?

The screenshot displays two database interfaces side-by-side. On the left is MongoDB Compass, showing the 'DiegoOswaldoGonzalezMacias.QS Rankings 2021' collection. The interface includes a sidebar with a tree view of collections and databases, and a main area for viewing documents. A search bar at the top is set to 'rank\_display:5'. The results show several university entries with their rank display values. On the right is MySQL Workbench, showing the 'qs2021' table from the 'diegooswaldogonzalez' database. The 'Query1' tab contains a SQL query that filters the top 30 universities by rank display, ordered by rank display asc, and grouped by university. The results grid shows the top 30 universities, including their names and rank display values.

```

SELECT university, rank_display FROM qs2021
order by rank_display desc
limit 5;
SELECT university, rank_display FROM qs2021
where region like "North America"
order by rank_display asc
limit 30;
SELECT university, rank_display FROM qs2021
where region like "Europe"
order by rank_display asc
limit 30;
SELECT university, rank_display FROM qs2021
where region like "Asia"
order by rank_display asc
limit 30;

```

university	rank_display
University of Oxford	5
ETH Zurich - Swiss Federal Institute of Technology	6
University of Cambridge	7
Imperial College London	8
UCL	10
BPL	14
The University of Edinburgh	20
The University of Manchester	27
King's College London	31
The London School of Economics and Political Sc...	49
Technical University of Munich	50
University PSB	52
Delft University of Technology	57
University of Bristol	58
Ecole Polytechnique	61
University of Amsterdam	61
The University of Warwick	62
Utrecht University / München	63

5) ¿Cuántas escuelas en el top 30 son de la región Asia y que clasificación tienen?

MongoDB Compass - cluster0.ytrnq.mongodb.net/DiegoOswaldoGonzalezMacias.QS Rankings 2021

Local

13 DBS 34 COLLECTIONS

HOSTS: cluster0-shard-00-00-ytnq... cluster0-shard-00-01-ytnq... cluster0-shard-00-02-ytnq...

CLUSTER: Replica Set (alias: 3e252)... 3 Nodes

EDITION: MongoDB 4.4.11 Enterprise

Documents Aggregations Schema Explain Plan Indexes Validation

FILTER: { \$and: [{ rank\_display: { \$lte: 30 } }, { region: "Asia" } ] }

PROJECT: { university: 1, rank\_display: 1, region: 1, \_id: 0 }

SORT: { field: -1 } or { [field, -1] }

COLLATION: { Locale: 'simple' }

DOCUMENTS 1.2K STORAGE SIZE 4.1KB AVG. SIZE 361B INDEXES 1 TOTAL SIZE 4.1KB AVG. SIZE 4.1KB

FIND RESET ...

VIEW

rank\_display: 11  
university: "National University of Singapore (NUS)"  
region: "Asia"

rank\_display: 13  
university: "Nanyang Technological University, Singapore (NTU)"  
region: "Asia"

rank\_display: 15  
university: "Tsinghua University"  
region: "Asia"

rank\_display: 18  
university: "The University of Hong Kong"  
region: "Asia"

rank\_display: 22  
university: "Peking University"  
region: "Asia"

rank\_display: 24  
university: "The University of Tokyo"  
region: "Asia"

rank\_display: 27  
university: "The Hong Kong University of Science and Technology"  
region: "Asia"

Displaying documents 1 - 7 of 7 < > REFRESH

MySQL Workbench

File Edit View Query Database Server Tools Scripting Help

Navigator: Query 1

SCHEMAS: diegosalvadorgonzalez

Tables: qs2020 qs2021

Columns: year rank\_display university score link country city region logo

Queries:

```

46 limit 30;
47
48 • SELECT university, rank_display from qs2021
49   where region like "Europe"
50   order by rank_display asc
51   limit 30;
52
53 • SELECT university, rank_display from qs2021
54   where region like "Asia"
55   order by rank_display asc
56   limit 30;
57
58 • SELECT avg(score) from qs2020
59   where rank_display <10;
60
61
62
63 • SELECT avg(score) from qs2020
64   where region like "Latin America"
65   and rank_display <10;
66

```

Result Grid

university	rank_display
National University of Singapore (NUS)	11
Nanyang Technological University, Singapore (NTU)	13
Tsinghua University	15
The University of Hong Kong	22
Peking University	23
The University of Tokyo	24
The Hong Kong University of Science and Technology	27
Fudan University	34
Seoul National University	37
Kyoto University	38
KAIST (Korea Advanced Institute of Science & Technology)	39
The Chinese University of Hong Kong (CUHK)	43
Shanghai Jiao Tong University	47
City University of Hong Kong	48
Zhejiang University	53
Taipei Institute of Technology (Tokyo Tech)	56
Universität Regensburg (UR)	59
National Taiwan University (NTU)	66

Administration Schemas Information

Table: qs2021

Columns:

year	rank_display	university	score	link	country	city
int	int	char(100)	decimal	varchar	varchar	varchar

6) ¿Cuál es la puntuación promedio de las universidades en el top 10?

```

    [
      {
        "$match": {
          "rank_display": 10
        }
      },
      {
        "$group": {
          "_id": null,
          "universities": {
            "$sum": 1
          },
          "scores": {
            "$sum": "$score"
          }
        }
      },
      {
        "$addFields": {
          "calificacion_promedio_top10": {
            "$divide": ["$scores", "$universities"]
          }
        }
      }
    ]
  
```

**MongoDB Compass - cluster0.ytngq.mongodb.net/DiegoOswaldoGonzalezMacias.QS Rankings 2021**

**Aggregations**

**QS. Top Ranks 19-20-21 P6**

**Output after \$match stage (Sample of 10 documents)**

**Output after \$group stage (Sample of 1 document)**

**Output after \$addFields stage (Sample of 1 document)**

**MySQL Workbench**

**Query 1**

```

SELECT university, rank_display FROM qs2021
WHERE region like "North America"
ORDER BY rank_display ASC
LIMIT 30;

SELECT university, rank_display FROM qs2021
WHERE region like "Europe"
ORDER BY rank_display ASC
LIMIT 30;

SELECT university, rank_display FROM qs2021
WHERE region like "Asia"
ORDER BY rank_display ASC
LIMIT 30;

SELECT avg(score) FROM qs2021
WHERE rank_display < 10;
  
```

**Result Grid**

avg(score)	95.7500
------------	---------

7) ¿Cuál es la puntuación promedio de las 10 mejores universidades Latinoamericanas?

The screenshot shows the MongoDB Compass interface. On the left, the sidebar lists databases (13 DBs, 34 collections) and collections like 'qs\_rankings\_2021'. The main area displays an aggregation pipeline for 'qs\_rankings\_2021' with three stages: \$group, \$addFields, and \$project. The output after each stage is shown as a sample of documents.

```

// Stage 1: $group
{
  "_id": "$country",
  "year": 2021,
  "rank_display": 100,
  "university": "Universidad Nacional Autónoma de México (UNAM)",
  "score": 58.0,
  "link": "https://www.topuniversities.com/universities/unam-national-autonoma-mexico",
  "country": "Mexico"
}

// Stage 2: $addFields
{
  "_id": null,
  "universities": 10,
  "scores": 478
}

// Stage 3: $project
{
  "_id": null,
  "universities": 10,
  "scores": 478,
  "calificacion_promedio_top10": 47.8
}

```

The screenshot shows the MySQL Workbench interface with a query editor window. The code performs several SELECT statements to calculate average scores for different regions based on rank display.

```

SELECT university, rank_display FROM qs2021
WHERE region like "Europe"
ORDER BY rank_display ASC
LIMIT 30;

SELECT university, rank_display FROM qs2021
WHERE region like "Asia"
ORDER BY rank_display ASC
LIMIT 30;

SELECT avg(score) FROM qs2021
WHERE rank_display < 10;

SELECT avg(score) FROM qs2021
WHERE region like "Latin America"
AND rank_display < 10;

```

8) ¿Cuál es la puntuación promedio de las 10 universidades norteamericanas principales?

MongoDB Compass - cluster0ytnqo.mongodb.net/DiegoOswaldoGonzalezMacias.QS Rankings 2021

Local

HOSTS: cluster0-shard-00-00-ytnq..., cluster0-shard-00-01-ytnq..., cluster0-shard-00-02-ytnq...

CLUSTER: Replica Set (alias: 3e252) - 3 Nodes

EDITION: MongoDB 4.4.11 Enterprise

Filter your data

- BEDU Projects
- DiegoOswaldoGonzalezMacias
  - QS Rankings 2019
  - QS Rankings 2020
  - QS Rankings 2021**
  - Starbucks
  - admin
  - local
  - sample\_airbnb
  - sample\_analytics
  - sample\_geospatial
  - sample\_mflix
  - sample\_restaurants
  - sample\_supplies
  - sample\_training
  - sample\_weatherdata

DiegoOswaldoGonzalez.QS Rankings 2021

Documents Aggregations Schema Explain Plan Indexes Validation

COLLATION: ISO\_8859\_1\_CI\_AS\_PAT

QS: Top Ranks 19-20-21 PB

SAVE D

Output after \$limit stage (Sample of 10 documents)

```

1 /**
2 * Provide the number of documents to limit.
3 */
4 10

```

\_id: ObjectId("61f0189e42d170061047e65")
year: 2021
rank\_display: 1
university: "Massachusetts Institute of Technology (MIT)"
score: 92.81
link: "https://www.topuniversities.com/universities/massachusetts-institute-of-technology"
country: "United States"

\_id: ObjectId("61f0189e42d170061047e65")
year: 2021
rank\_display: 2
university: "Stanford University"
score: 92.81
link: "https://www.topuniversities.com/universities/stanford-university"
country: "United States"

\_id: ObjectId("61f0189e42d170061047e65")
year: 2021
rank\_display: 3
university: "Harvard University"
score: 92.81
link: "https://www.topuniversities.com/universities/harvard-university"
country: "United States"

Output after \$group stage (Sample of 1 document)

```

1 /**
2 * $group: The id of the group.
3 * $field: The first field name.
4 * $expression: The new field expression.
5 */
6 {
7   _id: null,
8   universities: [
9     {
10       sum: 1
11     }
12   ],
13   scores: {
14     sum: "$score"
15   }
16 }

```

\_id: null
universities: 10
scores: 928.1

Output after \$addFields stage (Sample of 1 document)

```

1 /**
2 * $addField: The new field name.
3 * $expression: The new field expression.
4 */
5 {
6   _id: null,
7   universities: 10
8   scores: 928.1
9   calificacion_promedio_top10: {
10     $divide: ["$scores", "$universities"]
11   }
12 }

```

\_id: null
universities: 10
scores: 928.1
calificacion\_promedio\_top10: 92.81

MySQL Workbench

File Edit View Query Database Server Tools Scripting Help

Schemas: diegooswaldo\_gonzalez

Tables: qs2020, qs2021

Query:

```

51 limit 30;
52
53 • SELECT university, rank_display from qs2021
54   where region like "Asia"
55   order by rank_display asc
56   limit 30;
57
58 • SELECT avg(score) from qs2021
59   where rank_display <10;
60
61
62
63 • SELECT avg(score) from qs2021
64   where region like "Latin America"
65   and rank_display <10;
66
67
68 • SELECT avg(score) from qs2021
69   where region like "North America"
70   and rank_display <10;
71

```

Result Grid | Filter Rows | Export | Wrap Cell Content | avg(score) | 96.60000

9) ¿Cuál es el promedio de las 10 mejores Universidades mexicanas?

```

1 /**
2  * Provide the number of documents to limit.
3 */
4 10
5
6 /**
7  * _id: The id of the group.
8  * field: The first field name.
9 */
10 {
11   _id: null,
12   universities: {
13     $sum: 1
14   },
15   scores: {
16     $sum: "$Score"
17   }
18 }
19
20 /**
21  * newField: The new field name.
22  * expression: The new field expression.
23 */
24 {
25   $calificacion_promedio_topun {
26     $divisor: ["$scores", "$universities"]
27   }
28 }
29
30 /**
31  * _id: ObjectId("61f49189e42d170d1847e0ef")
32  * year: 2021
33  * rank_display: 100
34  * university: "Universidad Nacional Autónoma de México (UNAM) - Main"
35  * score: 58.8
36  * link: "https://www.topuniversities.com/universities/university-national-autonoma-mexico-main"
37  * country: "Mexico"
38 */
39
40 /**
41  * _id: ObjectId("61f49189e42d170d1847e0997")
42  * year: 2021
43  * rank_display: 155
44  * university: "Tecnológico de Monterrey"
45  * score: 49.0
46  * link: "https://www.topuniversities.com/universities/university-tecnologico-monterrey"
47  * country: "Mexico"
48 */
49
50 /**
51  * _id: null
52  * universities: 10
53  * scores: 180.49999999999999
54  * calificacion_promedio_topun: 10.87
55 */
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74

```

10) ¿Cuáles son las universidades con una puntuación superior al promedio latinoamericano?

MongoDB Compass - cluster0.ytinqo.mongodb.net/DiegoOswaldoGonzalezMacias.QS Rankings 2021

Local

DiegoOswaldoGonzalez... Aggregations

DiegoOswaldoGonzalezMacias.QS Rankings 2021

Documents Aggregations Schema Explain Plan Indexes Validation

Select an operator to construct expressions used in the aggregation pipeline stages. [Learn more](#)

Aggregation Pipeline Stages

Match Output after \$match stage (Sample of 20 documents)

```

1 /**
2 * query: The query in QL.
3 *      id: The id of the group.
4 *      first: The first field name.
5 *      score: {$site: 40.0}.
6 */

```

Scored Documents

group Output after \$group stage (Sample of 1 document)

```

1 /**
2 * _id: null
3 *      Universidades_superiores_a_Mexico : 340
4 */

```

Aggregation Pipeline Stages

MySQL Workbench

File Edit View Query Database Server Tools Scripting Help

Navigator: diegogonzalez

Query 1

```

68 • SELECT avg(score) From qs2021
69 where region like "North America"
70 and rank_display <=10
71
72 • SELECT avg(score) From qs2021
73 where country like "Mexico"
74 and rank_display <=10
75
76 • SELECT avg(score) From qs2021
77 where country like "Mexico"
78 and rank_display <=10
79
80 • select university, score from qs2021
81 where score >
82 (select avg(score) From qs2021
83 where region like "Latin America")
84 order by score asc

```

Result Grid

university	score
Hanover University	\$1.3
RWTH Aachen University	\$1.4
McMaster University	\$1.5
King Abdulaziz University (KAU)	\$1.7
Universiti Sains Malaysia (USM)	\$1.9
Universiti Malaysia (UM)	\$2.0
Chalmers University of Technology	\$2.2
Hokkaido University	\$2.2
CentraleSupélec	\$2.3
PoliTecno di Milano	\$2.4
Universität Bayreuth	\$2.5
Lancaster University	\$2.5
University of Technology Sydney	\$2.6
Universiti Putra Malaysia (UPM)	\$2.7
KIT, Karlsruhe Institute of Technology	\$2.9
Free University Berlin	\$3.2
Ledon University	\$3.4

Table: qs2021

Columns:

- year int
- rank\_display int
- university varchar(255) PK
- score decimal
- link varchar
- country varchar
- city varchar
- region varchar

Output

11) ¿Cuántas universidades del top 50 son de Estados Unidos?

MongoDB Compass - cluster0.ytngq.mongodb.net/DiegoOswaldoGonzalezMacias.QS Rankings 2021

DiegoOswaldoGonzalez... Aggregations

Local 13 DBs 34 Collections C

HOSTS: cluster0-shard-00-00-ytng... cluster0-shard-00-01-ytng... cluster0-shard-00-02-ytng...

CLUSTER: Replica Set (alias:3e252)... 3 Nodes

EDITION: MongoDB 4.4.11 Enterprise

Filter your data

BEDU/Projects

DiegoOswaldoGonzalezMacias

- QS Rankings 2019
- QS Rankings 2020
- QS Rankings 2021**
- Starbucks
- admin
- local
- sample\_arbnb
- sample\_analytics
- sample\_geospatial
- sample\_mflix
- sample\_restaurants
- sample\_supplies
- sample\_training
- sample\_weatherdata

DiegoOswaldoGonzalezMacias.QS Rankings 2021

Documents Aggregations Schema Explain Plan Indexes Validation

QS: Top Ranks 19-20-21 P11 SAVE ▾

Select an operator to construct expressions used in the aggregation pipeline stages. Learn more

\_id: ObjectId("61f0189e42d17b061947e656") year: 2021 rank\_display: 1 university: "Massachusetts Institute of Technology (MIT) score: 100 link: "http://www.topuniversities.com/universities/mas...\_institute-t..." country: "United States"

\_id: ObjectId("61f0189e42d17b061947e657") year: 2021 rank\_display: 2 university: "Stanford University" score: 98.4 link: "http://www.topuniversities.com/universities/sta...\_university" country: "United States"

\_id: ObjectId("61f0189e42d17b061947e658") year: 2021 rank\_display: 3 university: "Harvard University" score: 97.9 link: "http://www.topuniversities.com/universities/har...\_university" country: "United States"

\_id: ObjectId("61f0189e42d17b061947e659") year: 2021 rank\_display: 4 university: "University of Michigan" score: 97 link: "http://www.topuniversities.com/universities/univ...\_country" country: "United States"

Match Output after \$match stage (Sample of 17 documents)

```

1 <!--
2 * query: The query in MQL.
3 *
4 <!--
5 * rank_display: [$lte: 10,
6 * country: "United States"
7 ]

```

Group Output after \$group stage (Sample of 1 document)

```

1 <!--
2 * id: The id of the group.
3 * fieldId: The first field name.
4 *
5 <!--
6 * _id: null,
7 * "Frecuencia_Bin": {
8 *   "Bin": 1
9 * }
10

```

MySQL Workbench

File Edit View Query Database Server Tools Scripting Help

Navigator: SCHEMAS

Filter objects

diegooswaldo\_gonzalez

Tables: qs2020 qs2021

Regions

- year
- rank\_display
- university
- score
- link
- country
- city
- region
- logo

Indexes Foreign Keys Triggers Views Stored Procedures Functions

sys

Query 1

```

73 where country like "Mexico"
74 and rank_display <10;
75
76 • SELECT avg(score) from qs2021
77 where country like "Mexico"
78 and rank_display <10;
79
80 • select university, score from qs2021
81 where score >
82 (select avg(score) from qs2021
83 where region like "Latin America")
84 order by score asc;
85
86 • select count(university) from qs2021
87 where country like "United States"
88 and rank_display <10
89 order by rank_display DESC;

```

Result Grid Filter Rows Export Wrap Cell Content

count(university)

16

Administration Schemas Information

Table: qs2021

Columns:

year	int
rank_display	int
university	varchar
PK	

Result 34 x

12) ¿Cuál ha sido la diferencia o cambio entre las universidades en el top 10 entre 2020 y 2021 respecto a ranking?

MongoDB Compass - cluster0.ytngq.mongodb.net/DiegoOswaldoGonzalezMacias.QS Rankings 2021

Local

HOSTS: cluster0-shard-00-00.ytngq.mongodb.net, cluster0-shard-00-01.ytngq.mongodb.net, cluster0-shard-00-02.ytngq.mongodb.net

CLUSTER: Replica Set (alias:3e252...), 3 Nodes

EDITION: MongoDB 4.4.1 Enterprise

Filter your data:

- DiegoOswaldoGonzalezMacias
- Mexico 2020 - 2021 Score
- Mexico 2020 - 2021 Score
- QS Rankings 2019
- QS Rankings 2020
- QS Rankings 2021
- QS\_Rankings\_2021\_Mexico
- Starbucks
- admin
- local
- sample\_airbnb
- sample\_analytics
- sample\_geospatial
- sample\_mflix
- sample\_restaurants
- sample\_supplies
- sample\_training
- sample\_weatherdata

Aggregations

DiegoOswaldoGonzalezMacias.QS Rankings 2021

Documents Aggregations Schema Explain Plan Indexes Validation

COLLATION: QS Top Ranks 19-20-21 P12

SAMPLE MODE AUTO PREVIEW

Output after \$addFields stage (Sample of 20 documents)

```

1 /**
2 * newField: The new field name.
3 * expression: The new field expression.
4 */
5 [
6   {
7     rank_20: {$arrayElement: ["$rank_old", 0]}
8   }
9 ]

```

Output after \$addFields stage (Sample of 20 documents)

```

1 /**
2 * newField: The new field name.
3 * expression: The new field expression.
4 */
5 [
6   {
7     rank_display_2020: "$rank_20.rank_display"
8   }
9 ]

```

Output after \$project stage (Sample of 20 documents)

```

1 /**
2 * specifications: The fields to
3 * include or exclude.
4 */
5 [
6   {
7     _id: 0,
8     year: 1,
9     rank_display_2020: 1,
10    university: 1,
11    country: 1,
12    city: 1,
13    region: 1,
14    logo: 1
15  }
16 ]

```

Navigator

SCHEMAS: diegooswaldoGonzalez, qs2020, qs2021

Tables: qs2020, qs2021

Columns: \_id, year, rank\_display, university, score, link, country, city, region, logo

Indexes: PRIMARY, Foreign Keys, Triggers

Views: view\_question\_10, view\_question\_10 AS

Stored Procedures, Functions, sys

Administration Schemas Information

Table: qs2021

Columns: year, rank\_display, university, score, link, country, city, region, logo

Action Output

# Time Action

225 14:50:07 SELECT \* FROM diegooswaldoGonzalez.qs2021 LIMIT 0, 1000  
226 14:50:09 SELECT \* FROM diegooswaldoGonzalez.qs2020 LIMIT 0, 1000  
227 14:50:24 SELECT \* FROM diegooswaldoGonzalez.qs2021 LIMIT 0, 1000  
228 14:51:03 SELECT \* FROM diegooswaldoGonzalez.qs2020 LIMIT 0, 1000  
229 14:51:04 SELECT \* FROM diegooswaldoGonzalez.qs2021 LIMIT 0, 1000  
230 14:51:52 create database DiegoGonzalez  
231 14:52:06 SELECT \* FROM diegooswaldoGonzalez.qs2020 LIMIT 0, 1000  
232 14:52:06 SELECT \* FROM diegooswaldoGonzalez.qs2021 LIMIT 0, 1000  
233 14:52:59 select ranking from qs2020 AS A join qs2021 AS B on school = B.school LIMIT 0, 1000  
234 14:54:52 select rank\_display from qs2020 AS A join qs2021 AS B on A.rank\_display = B.rank\_display LIMIT 0, 1000  
235 14:55:27 alter table qs2021 rename column ranking to rank\_display  
236 14:55:27 alter table qs2020 rename column ranking to rank\_display  
237 14:55:40 SELECT \* FROM diegooswaldoGonzalez.qs2021 LIMIT 0, 1000  
238 14:55:40 SELECT \* FROM diegooswaldoGonzalez.qs2020 LIMIT 0, 1000  
239 14:56:03 alter table qs2021 rename column school to university  
240 14:56:11 SELECT \* FROM diegooswaldoGonzalez.qs2020 LIMIT 0, 1000  
241 14:56:12 SELECT \* FROM diegooswaldoGonzalez.qs2021 LIMIT 0, 1000  
242 14:56:24 create database DiegoGonzalez  
243 14:56:52 select rank\_display from qs2020 AS A join qs2021 AS B on A.rank\_display = B.rank\_display LIMIT 0, 1000

Message

235 row(s) returned  
299 row(s) returned  
235 row(s) returned  
299 row(s) returned  
235 row(s) returned  
Error Code: 1007: Can't create database 'diegooswaldoGonzalez'; database exists  
299 row(s) returned  
235 row(s) returned  
Error Code: 1052: Column 'ranking' in field list is ambiguous  
Error Code: 1054: Unknown column 'rank\_display' in field list'  
0 row(s) affected Records: 0 Duplicates: 0 Warnings: 0  
0 row(s) affected Records: 0 Duplicates: 0 Warnings: 0  
235 row(s) returned  
299 row(s) returned  
Error Code: 1054: Unknown column 'school' in 'qs2021'  
299 row(s) returned  
235 row(s) returned  
Error Code: 1007: Can't create database 'diegooswaldoGonzalez'; database exists  
Error Code: 1052: Column 'rank\_display' in field list is ambiguous

13)

¿Cuál ha sido la diferencia en calificación entre las universidades en el top 10 entre 2020 y 2021?

MongoDB Compass - cluster0.ytmgq.mongodb.net/DiegoOswaldoGonzalezMacias.QS Rankings 2021

Local

DiegoOswaldoGonzalezMacias.QS Rankings 2021

Documents Aggregations Schema Explain Plan Indexes Validation

HOSTS: cluster0-shard-00-00-ytmg... cluster0-shard-00-01-ytmg... cluster0-shard-00-02-ytmg...

CLUSTER: Replica Set (alias:3e252)... 3 Nodes

EDITION: MongoDB 4.4.11 Enterprise

Filter your data

Mexico 2020 - 2021 Score

Mexico2020 - 2021\_Score

QS Rankings 2019

QS Rankings 2020

QS Rankings 2021 ...

QS\_Rankings\_2021\_Mexico

Starbucks

admin

local

sample\_arbkb

sample\_analytics

sample\_geospatial

sample\_mfix

sample\_restaurants

sample\_supplies

sample\_training

sample\_weathedata

AddFields

Output after \$AddFields stage (Sample of 20 documents)

```
1 * /*
2 * newfield: The new field name.
3 * expression: The new field expression.
4 */
5 * {
6 *   score_2020: {$arrayElement: ["$score_2021", 1]}
7 * }
```

```
_id: ObjectId("61f0e189e42d170061047e656")
year: 2021
rank_display: 1
university: "Massachusetts Institute of Technology (MIT)"
score: 97.4
link: "https://www.topuniversities.com/universities/mas-institute-t-"
country: "United States"
```

```
_id: ObjectId("61f0e189e42d170061047e657")
year: 2021
rank_display: 2
university: "Stanford University"
score: 97.4
link: "https://www.topuniversities.com/universities/sta-university"
country: "United States"
```

```
_id: ObjectId("61f0e189e42d170061047e657")
year: 2021
rank_display: 3
university: "Harvard University"
score: 97.4
link: "https://www.topuniversities.com/universities/har-university"
country: "United States"
```

```
_id: ObjectId("61f0e189e42d170061047e657")
year: 2021
rank_display: 4
university: "University of Stanford"
score: 97.4
link: "https://www.topuniversities.com/universities/sta-university"
country: "United States"
```

Project

Output after \$Project stage (Sample of 20 documents)

```
1 * /*
2 * specifications: The fields to
3 *   + include or exclude.
4 */
5 * {
6 *   _id: 0,
7 *   year: 1,
8 *   score_2021: 1,
9 *   score_2020: 1,
10 *   university: 1,
11 *   country: 1,
12 *   city: 1,
13 *   region: 1
14 * }
```

```
year: 2021
university: "Massachusetts Institute of Technology (MIT)"
score: 97.4
country: "United States"
city: "Cambridge"
region: "North America"
score_2020: 98.4
```

```
year: 2021
university: "Stanford University"
score: 97.4
country: "United States"
city: "Stanford"
region: "North America"
score_2020: 98.4
```

```
year: 2021
university: "Harvard University"
score: 97.4
country: "United States"
city: "Cambridge"
region: "North America"
```

```
year: 2021
university: "University of Stanford"
score: 97.4
country: "United States"
city: "Palo Alto"
region: "North America"
```

MySQL Workbench

File Edit View Query Database Server Tools Scripting Help

Query 1 qs2020 qs2021

Schemas

diegogonzalez

qs2020

qs2021

Columns

year

rank\_display

university

score

link

country

city

region

logo

Indexes

PRIMARY

ForeignKeys

Triggers

Views

view\_question\_10

university

score

score

Created Procedures

sys

Output

Action Output

Table: qs2021

Columns:

year int

rank\_display int

university varchar(100)

score decimal

link varchar

country varchar

city varchar

region varchar

logo varchar

Action

# Time Action

226 14:50:09 SELECT \* FROM diegogonzalez.qs2020 LIMIT 0, 1000

227 14:50:24 SELECT \* FROM diegogonzalez.qs2021 LIMIT 0, 1000

228 14:51:03 SELECT \* FROM diegogonzalez.qs2020 LIMIT 0, 1000

229 14:51:04 SELECT \* FROM diegogonzalez.qs2021 LIMIT 0, 1000

230 14:51:52 create database DiegoGonzalez

231 14:52:05 SELECT \* FROM diegogonzalez.qs2020 LIMIT 0, 1000

232 14:52:05 SELECT \* FROM diegogonzalez.qs2021 LIMIT 0, 1000

233 14:52:59 select ranking from qs2020 AS A join qs2021 AS B on A.school = B.university LIMIT 0, 1000

234 14:54:52 select rank\_display from qs2020 AS A join qs2021 AS B on A.rank\_display = B.rank\_display LIMIT 0, 1000

235 14:55:27 alter table qs2021 rename column ranking to rank\_display

236 14:55:27 alter table qs2020 rename column ranking to rank\_display

237 14:55:40 SELECT \* FROM diegogonzalez.qs2021 LIMIT 0, 1000

238 14:55:40 SELECT \* FROM diegogonzalez.qs2020 LIMIT 0, 1000

239 14:56:03 altertable qs2021 rename column school to university

240 14:56:11 SELECT \* FROM diegogonzalez.qs2020 LIMIT 0, 1000

241 14:56:11 SELECT \* FROM diegogonzalez.qs2021 LIMIT 0, 1000

242 14:56:24 create database DiegoGonzalez

243 14:56:52 select rank\_display from qs2020 AS A join qs2021 AS B on A.rank\_display = B.rank\_display LIMIT 0, 1000

244 14:57:48 select score from qs2020 AS A join qs2021 AS B on A.score = B.score LIMIT 0, 1000

Object Info Session

14) ¿Cuál ha sido la diferencia en la posición de México respecto 2020 y 2021?

MongoDB Compass - cluster0.ytngq.mongodb.net/DiegoOswaldoGonzalezMacias.QS Rankings 2021

Local

HOSTS: cluster0-shard-00-00.ytngq... cluster0-shard-00-01.ytng... cluster0-shard-00-02.ytng...

CLUSTER: Replica Set (atlas-3e252r-... 3 Nodes

EDITION: MongoDB 4.4.11 Enterprise

Filter your data

BEDUProjects

DiegoOswaldoGonzalezMacias

- QS Rankings 2019
- QS Rankings 2020
- QS Rankings 2021**
- Starbucks
- admin
- local
- sample\_airbnb
- sample\_analytics
- sample\_geospatial
- sample\_mflix
- sample\_restaurants
- sample\_supplies
- sample\_training
- sample\_weatherdata

Aggregations

DiegoOswaldoGonzalez... Aggregations

DiegoOswaldoGonzalez.QS Rankings 2021

Documents Aggregations Schema Explain Plan Indexes Validation

COLLATION: QS: Top Ranks 19-20-21 P14

SAMPLE MODE AUTO PREVIEW

Output after \$group stage (Sample of 20 documents)

```

1 /**
2 * newField: The new field name.
3 * expression: The new field expression.
4 */
5 +
6 {
7   _id: "$rank_object",
8   year: "$year",
9   rank_display: "$rank_display",
10  university: "$university",
11  region: "$region"
12 }

```

Output after \$project stage (Sample of 20 documents)

```

1 /**
2 * specifications: The fields to
3 * include or exclude.
4 */
5 +
6 {
7   _id: "$_id",
8   year: "$year",
9   rank_display: "$rank_display",
10  university: "$university",
11  region: "$region"
12 }

```

Output after \$match stage (Sample of 20 documents)

```

1 /**
2 * query: The query in mongo
3 */
4 +
5 {
6   country: "Mexico"
7 }

```

DOCUMENTS 1.2k STORAGE SIZE 147.5kB AVG. SIZE 36.1B INDEXES 1 TOTAL SIZE 57.3kB

15) ¿Cuál ha sido la diferencia en calificación o puntaje entre las universidades mexicanas en 2020 y 2021?

MongoDB Compass - cluster0.ytngq.mongodb.net/DiegoOswaldoGonzalezMacias.QS Rankings 2021

Local

HOSTS: cluster0-shard-00-00.ytng... cluster0-shard-00-01.ytng... cluster0-shard-00-02.ytng...

CLUSTER: Replica Set (atlas-3e252r-... 3 Nodes

EDITION: MongoDB 4.4.11 Enterprise

Filter your data

DiegoOswaldoGonzalezMacias

- Mexico 2020 - 2021 Score
- Mexico2020 - 2021\_Score
- QS Rankings 2019**
- QS Rankings 2020
- QS Rankings 2021**
- QS Rankings\_2021\_Mexico
- Starbucks
- admin
- local
- sample\_airbnb
- sample\_analytics
- sample\_geospatial
- sample\_mflix
- sample\_restaurants
- sample\_supplies
- sample\_training
- sample\_weatherdata

Aggregations

DiegoOswaldoGonzalez... Aggregations

DiegoOswaldoGonzalez.QS Rankings 2021

Documents Aggregations Schema Explain Plan Indexes Validation

COLLATION: QS: Top Ranks 19-20-21 P15

SAMPLE MODE AUTO PREVIEW

Output after \$group stage (Sample of 10 documents)

```

1 /**
2 * newField: The new field name.
3 * expression: The new field expression.
4 */
5 +
6 {
7   _id: "$ObjectID('61f0189e42d170610474040")",
8   year: 2021,
9   rank_display: 188,
10  university: "Universidad Nacional Autónoma de México (UNAM)",
11  score: 58.8,
12  link: "https://www.topuniversities.com/universities/un-national-auto...",
13  country: "Mexico"
14 }

```

Output after \$addFields stage (Sample of 10 documents)

```

1 /**
2 * specifications: The fields to
3 * include or exclude.
4 */
5 +
6 {
7   _id: "$_id",
8   year: "$year",
9   rank_display: "$rank_display",
10  university: "$university",
11  score: "$score",
12  link: "$link"
13 }

```

Output after \$project stage (Sample of 10 documents)

```

1 /**
2 * specifications: The fields to
3 * include or exclude.
4 */
5 +
6 {
7   _id: 0,
8   year: 2021,
9   rank_display: 188,
10  university: "Universidad Nacional Autónoma de México (UNAM)",
11  score: 58.8,
12  city: "Mexico City",
13  region: "Latin America"
14 }

```

DOCUMENTS 1.2k STORAGE SIZE 147.5kB AVG. SIZE 36.1B INDEXES 1 TOTAL SIZE 57.3kB

The screenshot shows the MySQL Workbench interface. On the left, the Navigator pane displays the database schema for 'diegooswaldogonzalez'. It includes tables like 'qs2020' and 'qs2021', and views like 'view\_question\_10'. The 'Tables' section for 'qs2021' lists columns such as 'year', 'rank\_display', 'university', 'score', 'link', 'country', 'city', 'region', and 'logo'. The 'View' section lists the 'view\_question\_10' view with columns 'university', 'score', and 'rank\_display'. The 'Output' pane at the bottom shows a log of SQL statements and their execution times, along with error messages for failed statements. One notable error is 'Error Code: 1007. Can't create database 'diegooswaldogonzalez'; database exists'.

```

98 • create view View_Question_10 AS
99   (select university, score from qs2021
100  where score >
101    (select avg(score) from qs2021
102     where region like "Latin America")
103    order by score asc)
104
105  select rank_display
106    from qs2020
107   join qs2021 using (rank_display);
108
109  select score
110    from qs2020 AS A
111   join qs2021 AS B
112     on A.score = B.score
113   where country like "Mexico";
114
115

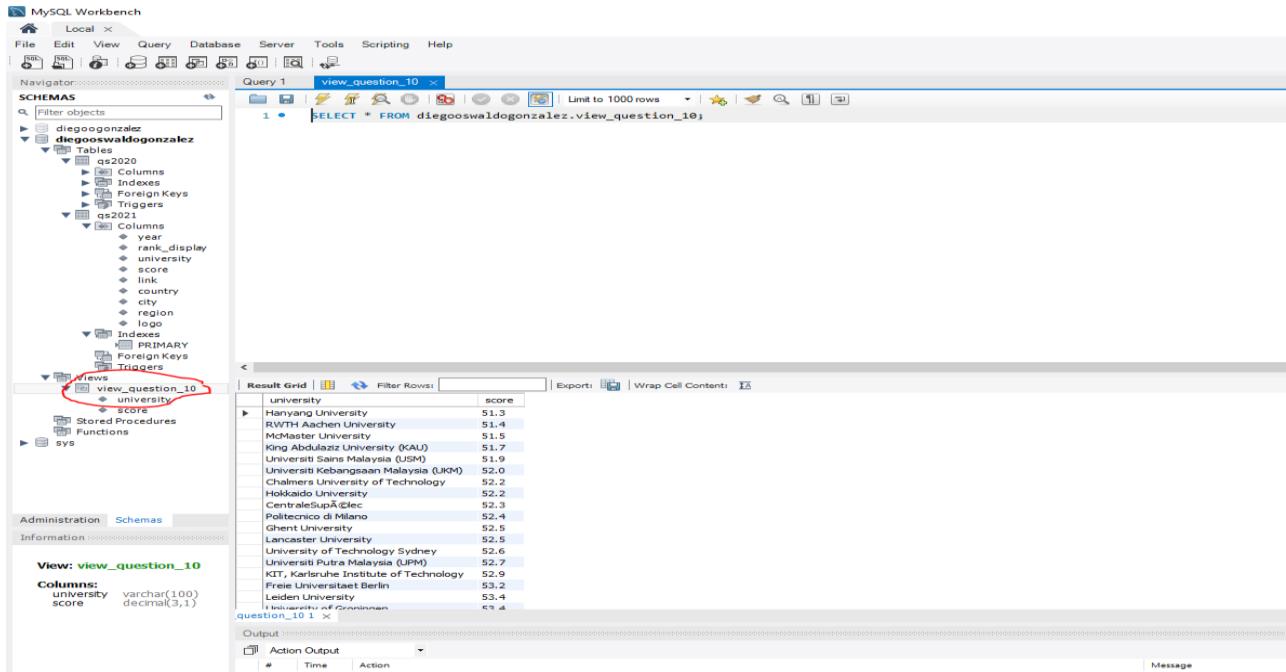
```

Output

Time	Action	Message
227 14:50:24	SELECT * FROM diegooswaldogonzalez.qs2021 LIMIT 0, 1000	235 row(s) returned
228 14:51:03	SELECT * FROM diegooswaldogonzalez.qs2020 LIMIT 0, 1000	299 row(s) returned
229 14:51:04	SELECT * FROM diegooswaldogonzalez.qs2021 LIMIT 0, 1000	235 row(s) returned
230 14:51:52	create database DiegoGonzalez	Error Code: 1007. Can't create database 'diegooswaldogonzalez'; database exists
231 14:52:06	SELECT * FROM diegooswaldogonzalez.qs2020 LIMIT 0, 1000	299 row(s) returned
232 14:52:06	SELECT * FROM diegooswaldogonzalez.qs2021 LIMIT 0, 1000	235 row(s) returned
233 14:52:59	select ranking from qs2020 AS A join qs2021 as B on A.school = B.university LIMIT 0, 1000	Error Code: 1052. Column 'ranking' in field list is ambiguous
234 14:54:52	select rank_display from qs2020 AS A join qs2021 as B on A.rank_display = B.rank_display LIMIT 0, 1000	Error Code: 1054. Unknown column 'rank_display' in field list
235 14:55:27	alter table qs2021 rename column ranking to rank_display	0 row(s) affected Records: 0 Duplicates: 0 Warnings: 0
236 14:55:27	alter table qs2020 rename column ranking to rank_display	0 row(s) affected Records: 0 Duplicates: 0 Warnings: 0
237 14:55:40	SELECT * FROM diegooswaldogonzalez.qs2021 LIMIT 0, 1000	235 row(s) returned
238 14:55:40	SELECT * FROM diegooswaldogonzalez.qs2020 LIMIT 0, 1000	299 row(s) returned
239 14:56:03	alter table qs2021 rename school to university	Error Code: 1054. Unknown column 'school' in 'qs2021'
240 14:56:11	SELECT * FROM diegooswaldogonzalez.qs2020 LIMIT 0, 1000	299 row(s) returned
241 14:56:12	SELECT * FROM diegooswaldogonzalez.qs2021 LIMIT 0, 1000	235 row(s) returned
242 14:56:24	create database DiegoGonzalez	Error Code: 1007. Can't create database 'diegooswaldogonzalez'; database exists
243 14:56:52	select rank_display from qs2020 AS A join qs2021 as B on A.rank_display = B.rank_display LIMIT 0, 1000	Error Code: 1052. Column 'rank_display' in field list is ambiguous
244 14:57:48	select score from qs2020 AS A join qs2021 as B on A.score = B.score LIMIT 0, 1000	Error Code: 1052. Column 'score' in field list is ambiguous
245 14:59:28	select score from qs2020 AS A join qs2021 as B on A.score = B.score where country like "Mexico" LIMIT 0, 1000	Error Code: 1052. Column 'score' in field list is ambiguous

## 4. Vistas relevantes

The screenshot shows the MongoDB Compass interface. The left sidebar shows the database connection and a list of collections, including 'DiegoOswaldoGonzalezMacias.QS Rankings 20-21 Scores'. The main pane displays the contents of this collection as a list of documents. Each document contains fields such as 'year', 'university', 'score', 'link', 'country', 'city', 'region', and 'score\_2020'. The interface includes a search bar, a toolbar with various operations, and a detailed view of the selected document.



## 5. Conclusiones

- Mongo probó ser más fácil de comprender para mí que SQL y eso, junto con el hecho que tiene un desempeño muy bueno, fueron las razones por las que decidí enfocarme en Mongo.
- Las partes mas frustrantes del proyecto fueron: formular las preguntas y generar los JSONs correctos.
- El hecho de que muchas universidades no tengan calificación del año 2020 refleja el impacto que tuvo la pandemia en su decisión de no participar o que QS haya decidido no cambiar las calificaciones.
- El desempeño de las Universidades mexicanas esta muy por detrás, incluso de otras universidades latinoamericanas.
- México debería poner mas interés por mejorar en algunas de las métricas evaluadas para ser mas competitivo.

## 6. JSONs

### MongoDB

- **Pregunta 1**

```
{
  filter: {
    rank_display: {
```

```
$ne: NaN
}
},
project: {
rank_display: 1,
university: 1,
_id: 0
},
sort: {
rank_display: 1
},
limit: 5
}
```

- **Pregunta 2**

```
{
filter: {
rank_display: {
$ne: NaN
}
},
project: {
rank_display: 1,
university: 1,
_id: 0
},
sort: {
rank_display: -1
},
limit: 5
}
```

- **Pregunta 3**

```
{
filter: {
$and: [
{
rank_display: {
$lte: 30
}
},
{
region: 'North America'
}
]
},
project: {
university: 1,
rank_display: 1,
```

```
region: 1,  
_id: 0  
},  
limit: 30  
}
```

- **Pregunta 4**

```
{  
filter: {  
$and: [  
{  
rank_display: {  
$lte: 30  
}  
},  
{  
region: 'Europe'  
}  
]  
},  
project: {  
university: 1,  
rank_display: 1,  
region: 1,  
_id: 0  
},  
limit: 30  
}
```

- **Pregunta 5**

```
{  
filter: {  
$and: [  
{  
rank_display: {  
$lte: 30  
}  
},  
{  
region: 'Asia'  
}  
]  
},  
project: {  
university: 1,  
rank_display: 1,  
region: 1,  
_id: 0  
},
```

```
        limit: 30
    }
• Pregunta 6
[{$match: {
    rank_display: {
        $lte: 10
    }
}}, {$group: {
    _id: null,
    universities: {
        $sum: 1
    },
    scores: {
        $sum: '$score'
    }
}}, {$addFields: {
    calificacion_promedio_top10: {
        $divide: [
            '$scores',
            '$universities'
        ]
    }
}}]
```

- **Pregunta 7**

```
[{$match: {
    region: 'Latin America'
}}, {$limit: 10}, {$group: {
    _id: null,
    universities: {
        $sum: 1
    },
    scores: {
        $sum: '$score'
    }
}}, {$addFields: {
    calificacion_promedio_top10: {
        $divide: [
            '$scores',
            '$universities'
        ]
    }
}}]
```

- **Pregunta 8**

```
[{$match: {
    region: 'North America'
}}, {$limit: 10}, {$group: {
```

```
_id: null,  
universities: {  
    $sum: 1  
},  
scores: {  
    $sum: '$score'  
}  
}}, {$addFields: {  
    calificacion_promedio_top10: {  
        $divide: [  
            '$scores',  
            '$universities'  
        ]  
    }  
}}]  
}]
```

- **Pregunta 9**

```
[{$match: {  
    country: 'Mexico'  
}}, {$limit: 10}, {$group: {  
    _id: null,  
    universities: {  
        $sum: 1  
    },  
    scores: {  
        $sum: '$score'  
    }  
}}, {$addFields: {  
    calificacion_promedio_top10: {  
        $divide: [  
            '$scores',  
            '$universities'  
        ]  
    }  
}}]  
}]
```

- **Pregunta 10**

```
[{$match: {  
    score: {  
        $lte: 47.8  
    }  
}}, {$group: {  
    _id: null,  
    Universidades_superiores_a_Mexico: {  
        $sum: 1  
    }  
}}]
```

- **Pregunta 11**

```
[{$match: {  
    rank_display: {  
        $lte: 50  
    },  
    country: 'United States'  
}, {$group: {  
    _id: null,  
    'Frecuencia EUA': {  
        $sum: 1  
    }  
}}]
```

- **Pregunta 12**

```
[{$lookup: {  
    from: 'QS Rankings 2020',  
    localField: 'rank_display',  
    foreignField: 'rank_display',  
    as: 'rank_old'  
}, {$addFields: {  
    rank_20: {  
        $arrayElemAt: [  
            '$rank_old',  
            0  
        ]  
    }  
}}, {$addFields: {  
    rank_display_2020: '$rank_20.rank_display'  
}}, {$project: {  
    _id: 0,  
    year: 1,  
    rank_display_2020: 1,  
    rank_display: 1,  
    university: 1,  
    country: 1,  
    city: 1,  
    region: 1  
}}]
```

- **Pregunta 13**

```
[{$lookup: {  
    from: 'QS Rankings 2020',  
    localField: 'score',  
    foreignField: 'score',  
    as: 'score_old'  
}, {$addFields: {  
    score_20: {  
        $arrayElemAt: [  
            '$score_old',
```

```
    0
  ]
}
}}, {$addFields: {
  score_2020: '$score_20.score'
}}, {$project: {
  _id: 0,
  year: 1,
  score_2020: 1,
  score: 1,
  university: 1,
  country: 1,
  city: 1,
  region: 1
}}]
```

- **Pregunta 14**

```
[{$match: {
  country: 'Mexico'
}}, {$limit: 10}, {$lookup: {
  from: 'QS Rankings 2020',
  localField: 'rank_display',
  foreignField: 'rank_display',
  as: 'rank_old'
}}, {$addFields: {
  rank_20: {
    $arrayElemAt: [
      '$rank_old',
      0
    ]
  }
}}, {$addFields: {
  rank_2020: '$rank_20.rank_display'
}}, {$project: {
  _id: 0,
  year: 1,
  rank_2020: 1,
  rank_display: 1,
  university: 1,
  country: 1,
  city: 1,
  region: 1
}}]
```

**Pregunta 15**

```
[{$match: {
  country: 'Mexico'
}}, {$limit: 10}, {$lookup: {
  from: 'QS Rankings 2020',
  localField: 'score',
  foreignField: 'score',
```

```

    as: 'score_old'
}, {$addFields: {
score_20: {
$arrayElemAt: [
'$score_old',
0
]
}
}}, {$addFields: {
score_2020: '$score_20.score'
}}, {$project: {
_id: 0,
year: 1,
score_2020: 1,
score: 1,
university: 1,
country: 1,
city: 1,
region: 1
}}]
}}
```

## MySQL

```

create database DiegooooGonzalez;
use DiegooooGonzalez;
create table QS2021 (
year int,
rank_display int,
university varchar (100) primary key,
score decimal (3,1),
link varchar (150),
country varchar (50),
city varchar (50),
region varchar (50),
logo varchar (150)
);

use DiegooooGonzalez;
create table QS2020 (
year int,
rank_display int,
university varchar (100) primary key,
score decimal (3,1),
link varchar (150),
country varchar (50),
city varchar (50),
region varchar (50),

```

```
logo varchar (150)
);

use DiegoOswaldoGonzalez;
select count(*) from qs2021;



- Pregunta 1  
SELECT university from qs2020  
order by rank_display asc  
limit 5;
- Pregunta 2  
SELECT university from qs2020  
order by rank_display desc  
limit 5;
- Pregunta 3  
SELECT university, rank_display from qs2020  
where region like "North America"  
order by rank_display asc  
limit 30;
- Pregunta 4  
SELECT university, rank_display from qs2020  
where region like "Europe"  
order by rank_display asc  
limit 30;
- Pregunta 5  
SELECT university, rank_display from qs2020  
where region like "Asia"  
order by rank_display asc  
limit 30;
- Pregunta 6  
SELECT avg(score) from qs2020  
where rank_display <10;
- Pregunta 7  
SELECT avg(score) from qs2020  
where region like "Latin America"  
and rank_display <10;
- Pregunta 8  
SELECT avg(score) from qs2021  
where region like "North America"
- Pregunta 9  
SELECT avg(score) from qs2021  
where country like "Mexico"  
and rank_display <10;
- Pregunta 10  
select university, score from qs2021  
where score >  
(select avg(score) from qs2021

```

where region like "Latin America")  
order by score asc;

- **Pregunta 11**

```
select count(university) from qs2021  
where country like "United States"  
and rank_display <50  
order by rank_display DESC;
```

- **Pregunta 12**

```
select rank_display  
from qs2020 AS A  
join qs2021 as B  
on A.rank_display = B.rank_display;
```

- **Pregunta 13**

```
select score  
from qs2020 AS A  
join qs2021 as B  
on A.score = B.score;
```

- **Pregunta 14**

```
select rank_display  
from qs2020 AS A  
join qs2021 as B  
on A.rank_display = B.rank_display  
where country like "Mexico";
```

- **Pregunta 15**

```
select score  
from qs2020 AS A  
join qs2021 as B  
on A.score = B.score  
where country like "Mexico";
```