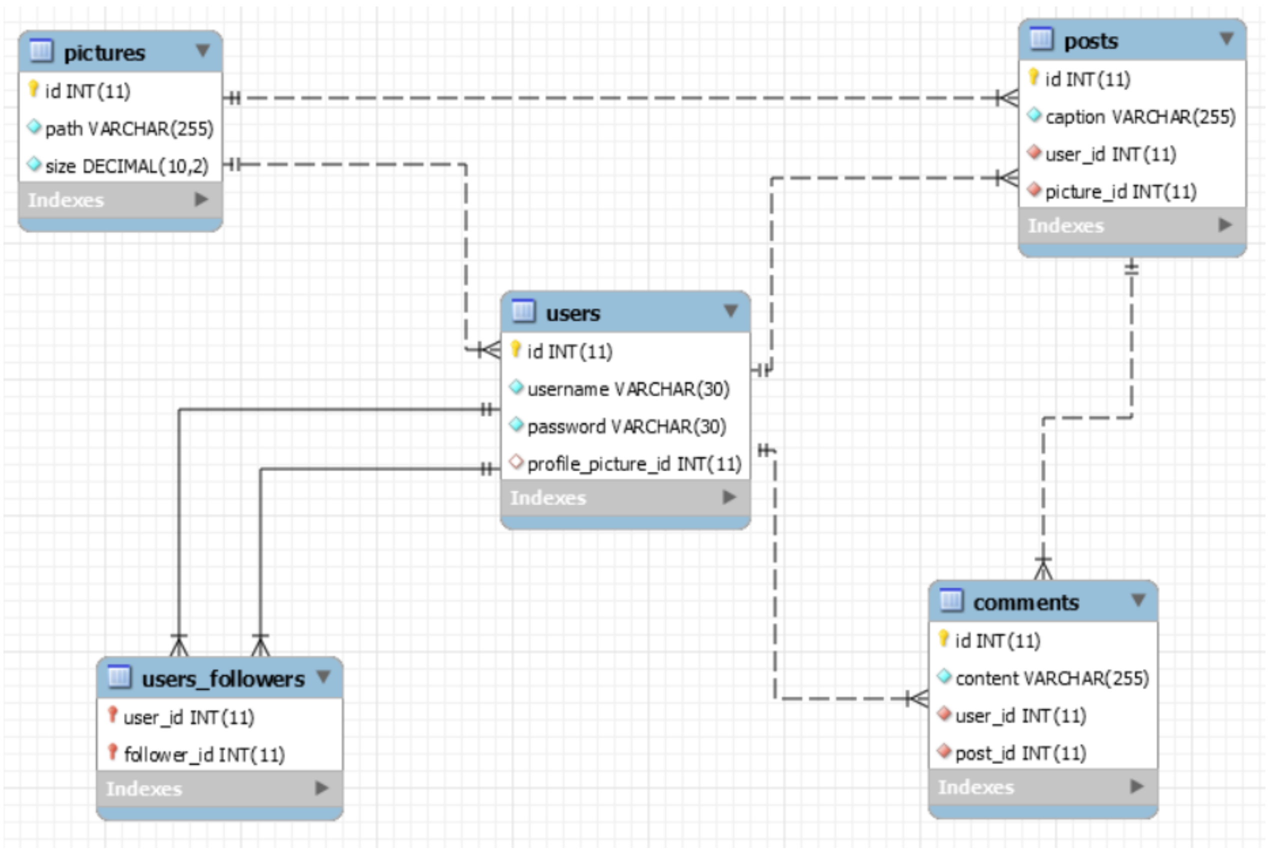
Database Basics (MySQL) Retake Exam
Instagraph

You've most likely heard of Instagram. Well … There is a side project called "Instagraph" which is the back-up data of Instagram. You are one of the few selected to work in the multi-billion company, as one of the back-up database managers. You'll need to prove your skills by designing and manipulating data in the Instagraph prototype.

Section 0: Database Overview

You have been given an Entity / Relationship Diagram of the Instagraph Database:



The Instagraph Database needs to hold information about pictures, users, posts and comments.

Your task is to create a database called **`instagraph_db`**. Then you will have to create several **tables**.

- **`pictures`** – contains information about the **pictures**.
- **`users`** – contains information about the **users**.
  - Each **`user`** may have a **`profile picture`**.
- **`posts`** – contains information about the **posts**.
  - Each **`post`** has a **`user`**.
  - Each **`post`** has a **`picture`**.
- **`comments`** – contains information about the **comments**.
  - Each **`comment`** has a **`user`**.
  - Each **`comment`** has a **`post`**.
- **`users_followers`** – a **many** to **many** table connected to the **users**.

Section 1: Data Definition Language (DDL) – 40 pts

Make sure you implement the whole database correctly on your local machine, so that you could work with it.

The instructions you'll be given will be the minimal needed for you to implement the database.

01. Table Design

You have been tasked to create the tables in the database by the following models:

pictures

Column Name	Data Type	Constraints
`id`	**Integer,** from **1** to **2,147,483,647.**	**Primary Key** **AUTO_INCREMENT**
`path`	A **string** containing a maximum of **255 characters**. Unicode is **NOT** needed.	**NULL** is **NOT** permitted**.**
`size`	**Decimal**, **up** to **10 digits**, **2** of which after the **decimal point**.	**NULL** is **NOT** permitted**.**

users

Column Name	Data Type	Constraints
`id`	**Integer,** from **1** to **2,147,483,647.**	**Primary Key** **AUTO_INCREMENT**
`username`	A **string** containing a maximum of **30 characters**. Unicode is **NOT** needed.	**NULL** is **NOT** permitted**.** **UNIQUE** values.
`password`	A **string** containing a maximum of **30 characters**. Unicode is **NOT** needed.	**NULL** is **NOT** permitted**.**
`profile_picture_id`	**Integer**, from **1** to **2,147,483,647.**	Relationship with table **`pictures`**.

posts

Column Name	Data Type	Constraints
`id`	**Integer**, from **1** to **2,147,483,647.**	**Primary Key** **AUTO_INCREMENT**
`caption`	A **string** containing a maximum of **255 characters**. Unicode is **NOT** needed.	**NULL** is **NOT** permitted.
`user_id`	**Integer**, from **1** to **2,147,483,647.**	Relationship with table **`users`**. **NULL** is **NOT** permitted**.**
`picture_id`	**Integer**, from **1** to **2,147,483,647.**	Relationship with table **`pictures`**. **NULL** is **NOT** permitted**.**

comments

Column Name	Data Type	Constraints
`id`	**Integer**, from **1** to **2,147,483,647.**	**Primary Key** **AUTO_INCREMENT**
`content`	A **string** containing a maximum of **255 characters**. Unicode is **NOT** needed.	**NULL** is **NOT** permitted.
`user_id`	**Integer**, from **1** to **2,147,483,647.**	Relationship with table **`users`**. **NULL** is **NOT** permitted**.**
`post_id`	**Integer**, from **1** to **2,147,483,647.**	Relationship with table **`posts`**. **NULL** is **NOT** permitted**.**

users_followers

Column Name	Data Type	Constraints
`user_id`	**Integer**, from **1** to **2,147,483,647.**	Relationship with table **`users`**.
`follower_id`	**Integer**, from **1** to **2,147,483,647.**	Relationship with table **`users`**.

Submit your solutions in Judge on the first task. Submit **all** SQL table creation statements.

You will also be given a **`data.sql`** file. It will contain a **dataset** with random data which you will need to **store** in your **local database**. This data will be given to you so you will not have to think of data and lose essential time in the process. The data is in the form of **INSERT** statement queries.

Section 2: Data Manipulation Language (DML) – 30 pts

Here we need to do several manipulations in the database, like changing data, adding data etc.

02. Data Insertion

You will have to **INSERT** records of data into the **`comments`** table, based on the **`posts`** table. For **`posts`** with **`id`** between **1** and **10**, insert data in the **`comments`** table with the following values:

- **`content`** – set it to **"`Omg!{name}!This is so cool!`".** Where the **name** is the **`username`** of the **`user`** that **posted** the **`post`**.
- **`user_id`** – **MULTIPLY** the **`id`** of the **`post`** by **3** and **DIVIDE** it by **2**.
    - **ROUND** the resulting value **UP**.
- **`post_id`** – the **`post`**'s id**.**

03. Data Update

UPDATE all **`users`** which do **NOT** have a **`profile picture.`** **Set** their **`profile picture id`** to the **count** of **followers** they have. If they have **`0`**, set it to the **`user's id`**.

04. Data Deletion

Naturally, unpopular profiles are being treated as abandoned. **DELETE** all **`users`** which do **NOT follow** anyone and **no one follows** them.

Section 3: Querying – 100 pts

And now we need to do some data extraction. **Note** that the **example results** from **this section** use a **fresh database**. It is **highly recommended** that you **clear** the **database** that has been **manipulated** by the **previous problems** from the **DML section** and **insert again** the **dataset** you've been given, to ensure **maximum consistency** with the **examples** given in this section.

05. Users

Extract from the database, all of the **`users`**.

ORDER the results **ascending** by **`user id`**.

Required Columns

- `id (users)`
- `username`

Example

id	username
1	**`UnderSinduxrein`**
...	...

06. Cheaters

Apparently, there was a bug that allowed users to follow themselves. You need to track them.

Extract from the database, all of the **`users`**, which follow themselves.

ORDER the results **ascending** by **`user id`**.

Required Columns

- `id (users)`
- `username`

Example

id	username
2	**`BlaAntigadsa`**
...	...

07. High Quality Pictures

High quality pictures have bigger size, naturally. Extract from the database, all of the **`pictures`**, which have **`size`**, **GREATER** than **50000**, and their **`path`** contains "**`jpeg`**" or "**`png`**".

ORDER the results **descending** by **`picture size`**.

Required Columns

- `id (pictures)`
- `path`
- `size`

Example

id	path	size
44	src/folders/resources/images/profile/browsed/png/841p0J240a.png	73543.36
...	...	...

08. Comments and Users

Extract from the database, all of the **`comments`**, and the users that posted them, so that they end up in the following format:

`{username} : {commentContent}`

ORDER the results **descending** by **`comment id`**.

Required Columns

- `id (comments)`
- `full_comment`

Example

id	full_comment
50	BlaSinduxrein : I cannot beleive this Simply amazing! Lol
...	...

09. Profile Pictures

Extract from the database, all of the **`users`**, which have the same **`profile picture`**.

Extract the **`size`** of the **`picture`** and add "**KB**" to the **end** of it.

ORDER the results **ascending** by **`user id`**.

Required Columns

- `id (users)`
- `username`
- `size (pictures)`

Example

id	username	size
7	WhatTerrorBel	44273.27KB
...	...	...

10. Spam Posts

Extract from the database, the **top 5 posts**, in terms of **count** of **comments** on them.

ORDER the results **descending** by **comments (count of comments)**, and **ascending** by **post id**.

Required Columns

- **id (posts)**
- **caption (posts)**
- **comments (count of comments)**

Example

id	caption	comments
36	#feminist #happy #ring #my #swag #gerynikol #sleepless #yolo	4
...	...	...

11. Most Popular User

Extract from the database, the **most popular user** – the **1st** in terms of **count** of **followers**.

Required Columns

- **id (users)**
- **username**
- **posts (count of posts)**
- **followers (count of followers)**

Example

id	username	posts	followers
19	ZendArmyhow	3	9

12. Commenting Myself

Extract from the database, for every **user** – the **count** of **comments** he has on his **posts** by **himself**.

In other words, **extract** for each **user**, the **count** of **comments** he has **placed** on his own **posts**.

ORDER the results **descending** by **my_comments (count of comments)**, and **ascending** by **user id**.

Required Columns

- id (users)
- username
- my_comments (count of comments)

Example

id	username	my_comments
10	ScoreSinduxIana	2
...	...	...

13. User Top Posts

Extract from the database, the for every **user** – the **post** with the **HIGHEST count** of **comments** on it.

If the **user** has **NO posts**, **IGNORE** him.

If there are **2 posts** at the **top** with the **same count** of **comments**, **pick** the **one** with the **LOWER id**.

ORDER the results **ascending** by **user id**.

Required Columns

- id (users)
- username
- post (top post caption)

Example

id	username	post
1	UnderSinduxrein	#gerynikol #happy #sky #epic #everything #suzanita
...	...	...

14. Posts and Commentators

Extract from the database, the for every **post** – the **count** of **users** that have comments on it.

NOTE: **1 user** may have **more** than **1 comment** on the **post**.

ORDER the results **descending** by **users** (**count of users**), and **ascending** by **post id**.

Required Columns

- id (posts)
- caption
- users (count of users)

Example

id	caption	users
36	**#feminist #happy #ring #my #swag #gerynikol #sleepless #yolo**	**4**
...	...	...

Section 4: Programmability – 30 pts

The time has come for you to prove that you can be a little more dynamic on the database. So you will have to write several procedures.

15. Post

Create a stored procedure **udp_post** which accepts the following parameters:

- **username**
- **password**
- **caption**
- **path**

And checks the following things:

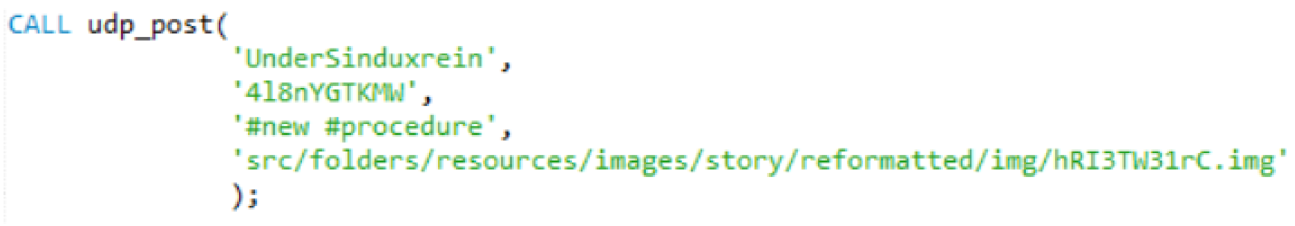
If the **password** does **NOT** match the **username** in the **users** table:

Throw an exception with error code '**45000**' and message '**Password is incorrect!**'.

If there is no **picture** with the given **path** in the **pictures** table:

Throw an exception with error code '**45000**' and message '**The picture does not exist!**'.

If **all checks pass**, extract the **id** of the corresponding **user**, from the **users** table, then the **picture id** from the **pictures** table and **INSERT** a new **post** into the **posts** table with the extracted data.



```
CALL udp_post(
              'UnderSinduxrein',
              '4l8nYGTKMW',
              '#new #procedure',
              'src/folders/resources/images/story/reformatted/img/hRI3TW31rC.img'
              );
```

Result

id	caption	user_id	picture_id
...	...		...
41	**#new #procedure**	**1**	**45**

16. Filter

Create a stored procedure **`udp_filter`** which accepts the following parameters:

- **`hashtag`**

And extracts all **`posts`** that **CONTAIN** the **given hashtag** in their **`caption`**.

The procedure should **extract** the **`user's username`**.

The **hashtag** will be given **WITHOUT** the '**#**' sign.

The **`posts`** should be ordered **ascending** by **`post id`**.

```
CALL udp_filter('cool');
```

Result

id	caption	user
2	**`#cool #justdoit #sky #ocean #reason #feminist #gram #faith #hope #insta`**	**`HighAsmahow`**
7	**`#cool #suzanita #the #dawn #my`**	**`HighAsmahow`**
...	...	