

# Udiddit, a social news aggregator

## Introduction

Udiddit, a social news aggregation, web content rating, and discussion website, is currently using a risky and unreliable Postgres database schema to store the forum posts, discussions, and votes made by their users about different topics.

The schema allows posts to be created by registered users on certain topics, and can include a URL or a text content. It also allows registered users to cast an upvote (like) or downvote (dislike) for any forum post that has been created. In addition to this, the schema also allows registered users to add comments on posts.

Here is the DDL used to create the schema:

```
CREATE TABLE bad_posts (  
    id SERIAL PRIMARY KEY,  
    topic VARCHAR(50),  
    username VARCHAR(50),  
    title VARCHAR(150),  
    url VARCHAR(4000) DEFAULT NULL,  
    text_content TEXT DEFAULT NULL,  
    upvotes TEXT,  
    downvotes TEXT  
);  
  
CREATE TABLE bad_comments (  
    id SERIAL PRIMARY KEY,  
    username VARCHAR(50),  
    post_id BIGINT,  
    text_content TEXT  
);
```

## Part I: Investigate the existing schema

As a first step, investigate this schema and some of the sample data in the project's SQL workspace. Then, in your own words, outline three (3) specific things that could be improved about this schema. Don't hesitate to outline more if you want to stand out!

1. There should be a Users Table. Unfortunately, this SQL Database is not normalised. One reason is due to Users. There should be a User\_ID that should be associated with each Username, which should be unique.
2. There are no foreign key relationships. One problem that may come about is that a Comment cannot exist without a Post.
3. UpVotes and DownVotes should not be of TEXT type. They should be of int type. A user should be able to select +1 or -1. With this schema, one could write anything in UpVotes and DownVotes when it should explicitly be a number.

## Part II: Create the DDL for your new schema

Having done this initial investigation and assessment, your next goal is to dive deep into the heart of the problem and create a new schema for Udiddit. Your new schema should at least reflect fixes to the shortcomings you pointed to in the previous exercise. To help you create the new schema, a few guidelines are provided to you:

1. Guideline #1: here is a list of features and specifications that Udiddit needs in order to support its website and administrative interface:
  - a. Allow new users to register:
    - i. Each username has to be unique
    - ii. Usernames can be composed of at most 25 characters
    - iii. Usernames can't be empty
    - iv. We won't worry about user passwords for this project
  - b. Allow registered users to create new topics:
    - i. Topic names have to be unique.
    - ii. The topic's name is at most 30 characters
    - iii. The topic's name can't be empty
    - iv. Topics can have an optional description of at most 500 characters.
  - c. Allow registered users to create new posts on existing topics:
    - i. Posts have a required title of at most 100 characters
    - ii. The title of a post can't be empty.
    - iii. Posts should contain either a URL or a text content, **but not both**.
    - iv. If a topic gets deleted, all the posts associated with it should be automatically deleted too.
    - v. If the user who created the post gets deleted, then the post will remain, but it will become dissociated from that user.
  - d. Allow registered users to comment on existing posts:
    - i. A comment's text content can't be empty.
    - ii. Contrary to the current linear comments, the new structure should

- allow comment threads at arbitrary levels.
  - iii. If a post gets deleted, all comments associated with it should be automatically deleted too.
  - iv. If the user who created the comment gets deleted, then the comment will remain, but it will become dissociated from that user.
  - v. If a comment gets deleted, then all its descendants in the thread structure should be automatically deleted too.
  - e. Make sure that a given user can only vote once on a given post:
    - i. Hint: you can store the (up/down) value of the vote as the values 1 and -1 respectively.
    - ii. If the user who cast a vote gets deleted, then all their votes will remain, but will become dissociated from the user.
    - iii. If a post gets deleted, then all the votes for that post should be automatically deleted too.
2. Guideline #2: here is a list of queries that Udiddit needs in order to support its website and administrative interface. Note that you don't need to produce the DQL for those queries: they are only provided to guide the design of your new database schema.
- a. List all users who haven't logged in in the last year.
  - b. List all users who haven't created any post.
  - c. Find a user by their username.
  - d. List all topics that don't have any posts.
  - e. Find a topic by its name.
  - f. List the latest 20 posts for a given topic.
  - g. List the latest 20 posts made by a given user.
  - h. Find all posts that link to a specific URL, for moderation purposes.
  - i. List all the top-level comments (those that don't have a parent comment) for a given post.
  - j. List all the direct children of a parent comment.
  - k. List the latest 20 comments made by a given user.
  - l. Compute the score of a post, defined as the difference between the number of upvotes and the number of downvotes
3. Guideline #3: you'll need to use normalization, various constraints, as well as indexes in your new database schema. You should use named constraints and indexes to make your schema cleaner.
4. Guideline #4: your new database schema will be composed of five (5) tables that should have an auto-incrementing id as their primary key.

Once you've taken the time to think about your new schema, write the DDL for it in the

space provided here:

```
-- Create users table
CREATE TABLE users (
    id SERIAL PRIMARY KEY,
    last_login TIMESTAMP,
    username VARCHAR(25) UNIQUE NOT NULL CHECK (LENGTH(TRIM(username)) > 0)
);

-- Create topics table
CREATE TABLE topics (
    id SERIAL PRIMARY KEY,
    description VARCHAR(500),
    name VARCHAR(30) UNIQUE NOT NULL CHECK (LENGTH(TRIM(name)) > 0)
);

-- Create posts table
CREATE TABLE posts (
    id SERIAL PRIMARY KEY,
    title VARCHAR(100) NOT NULL CHECK (LENGTH(TRIM(title)) > 0),
    created_on TIMESTAMP,
    url VARCHAR(400),
    text_content TEXT,
    topic_id INTEGER REFERENCES topics ON DELETE CASCADE,
    user_id INTEGER REFERENCES users ON DELETE SET NULL,
    CONSTRAINT url_xor_text CHECK (
        (url IS NOT NULL AND text_content IS NULL) OR
        (url IS NULL AND text_content IS NOT NULL)
    )
);
CREATE INDEX ON posts (url);

-- Create comments table
CREATE TABLE comments (
    id SERIAL PRIMARY KEY,
    post_id INTEGER REFERENCES posts ON DELETE CASCADE,
    user_id INTEGER REFERENCES users ON DELETE SET NULL,
    parent_comment_id INTEGER REFERENCES comments ON DELETE CASCADE,
    text_content TEXT NOT NULL CHECK (LENGTH(TRIM(text_content)) > 0),
    created_on TIMESTAMP
);

-- Create votes table
CREATE TABLE votes (
    id SERIAL PRIMARY KEY,
    user_id INTEGER REFERENCES users ON DELETE SET NULL,
    vote SMALLINT NOT NULL CHECK (vote IN (-1, 1)),
    post_id INTEGER,
    CONSTRAINT one_vote_per_user UNIQUE (user_id, post_id)
);
```

## Part III: Migrate the provided data

Now that your new schema is created, it's time to migrate the data from the provided schema in the project's SQL Workspace to your own schema. This will allow you to review some DML and DQL concepts, as you'll be using INSERT...SELECT queries to do so. Here are a few guidelines to help you in this process:

1. Topic descriptions can all be empty

2. Since the bad\_comments table doesn't have the threading feature, you can migrate all comments as top-level comments, i.e. without a parent
3. You can use the Postgres string function **regexp\_split\_to\_table** to unwind the comma-separated votes values into separate rows
4. Don't forget that some users only vote or comment, and haven't created any posts. You'll have to create those users too.
5. The order of your migrations matter! For example, since posts depend on users and topics, you'll have to migrate the latter first.
6. Tip: You can start by running only SELECTs to fine-tune your queries, and use a LIMIT to avoid large data sets. Once you know you have the correct query, you can then run your full INSERT...SELECT query.
7. **NOTE:** The data in your SQL Workspace contains thousands of posts and comments. The DML queries may take at least 10-15 seconds to run.

Write the DML to migrate the current data in bad\_posts and bad\_comments to your new database schema:

```
WITH all_usernames AS (  
    SELECT username FROM bad_posts  
    UNION  
    SELECT username FROM bad_comments  
    UNION  
    SELECT regexp_split_to_table(upvotes, ',') AS username FROM bad_posts  
    UNION  
    SELECT regexp_split_to_table(downvotes, ',') AS username FROM bad_posts  
)  
INSERT INTO "users"("username")  
SELECT DISTINCT username  
FROM all_usernames;  
  
INSERT INTO "topics"("name")  
SELECT DISTINCT topic  
FROM bad_posts;  
  
INSERT INTO posts (user_id, topic_id, title, url, text_content)  
SELECT  
    u.id,  
    t.id,  
    LEFT(bp.title, 100),  
    bp.url,
```

```

        bp.text_content
FROM
    bad_posts bp
JOIN
    users u ON bp.username = u.username
JOIN
    topics t ON bp.topic = t.name;

INSERT INTO comments (post_id, user_id, text_content)
SELECT
    p.id,
    u.id,
    bc.text_content
FROM
    bad_comments bc
JOIN
    users u ON bc.username = u.username
JOIN
    posts p ON p.id = bc.post_id;

INSERT INTO votes (post_id, user_id, vote)
SELECT p.id, u.id, 1 AS vote_up
FROM bad_posts bp
JOIN users u ON u.username = ANY(string_to_array(bp.upvotes, ','))
JOIN posts p ON p.id = bp.id;

INSERT INTO votes (post_id, user_id, vote)
SELECT p.id, u.id, -1 AS vote_down
FROM bad_posts bp
JOIN users u ON u.username = ANY(string_to_array(bp.downvotes, ','))
JOIN posts p ON p.id = bp.id;

```