CS307-Database Project 2

`Group Session`: Thursday 3-4

`Group Number`: 306

`Name(SID)`: 钟志源(12110517)、刘浩贤(12111515)

`Contribution`: 钟志源（java backend implementation, report writing）刘浩贤（database function design and implementation）

`Percentages of contributions`： 50% : 50%

API Specification

1. Manipulation

1.1 Account Handler

A class that handles all the account related operations(login, register, logout).

- `static String getUser()`: Return the current user's username.
- `void logout()` : Logout the current user.
- `void login()` : Ask for the username, and login the user.
- `void register()` : Ask for the username, phone number, ID, and register the user.
- `boolean nameIsIn(String name)` : Check if the `name` is in the `Authors` table. Return true if it is in the table, false otherwise.

1.2 Action Handler

A class that handles all the actions related operations, including like, favorite, share, follow/unfollow, block/unblock, three in one(like, favorite, share at the same time).

- `void likePost()`: Ask for a post ID, and like the post.
- `void favoritePost()`: Ask for a post ID, and favorite the post.
- `void sharePost()`: Ask for a post ID, and share the post.
- `void threeInOne()`: Ask for a post ID, and like, favorite, share the post at the same time(一键三连).
- `boolean postIsIn(int pid)`: Check if the `pid` is in the `Posts` table. Return true if it is, false otherwise.
- `void followUser()`: Ask for a username, and follow the user.
- `void unfollowUser()`: Ask for a username, and unfollow the user.
- `void blockUser()`: Ask for a username, and block the user.
- `void unblockUser()`: Ask for a username, and unblock the user.

1.3 Post Handler

A class that handles creating and deleting posts.

- `public void deletePost()`: Ask for a post ID, and check if the current user is the author of the post. If yes, delete the post.
- `public void createPost()`: Ask for a post title, content, and tags, and create a post under the current user.

1.4 Reply Handler

A class that handles replying a post and replying a reply.

- `public void replyPost(boolean isAnonymous)`: Ask for a post ID, and reply the post anonymously or not according to the `isAnonymous` parameter.
- `public void replyReply(boolean isAnonymous)`: Ask for a first_reply ID, and reply the reply anonymously or not according to the `isAnonymous` parameter.

1.5 Me Handler

A class that handles all the information of the current user.

- `void showLikedPosts()`: Show all the posts that the current user liked.
- `void showFavoritePosts()`: Show all the posts that the current user favorites.
- `void showSharedPosts()`: Show all the posts that the current user shared.
- `void showFollowingList()`: Show all the users that the current user is following.
- `void showBlockUsers()`: Show all the users that the current user has blocked.
- `void showMyPosts()`: Show all the posts that the current user has posted.
- `void showMyReplies()`: Show all the replies that the current user has posted.

1.6 Browse Handler

A class that handles all the browsing operations, including browse (posts, with replies), hot search list display and update, Multi-search.

- `void browsePost(int opcode)`: Browse posts according to the `opcode`. For `opcode`, 1 means browse posts only, 2 means browse posts with first replies, 3 means browse posts with all replies. Ask for browsing parameters, including the parameters `codes` and the corresponding `values`. Then call `multiSearch` to do the search.
- `void multiSearch(String[] codes, String[] values, int opcode)`: Multi-value search according to the `codes`, `values` and `opcode`.
    - For `opcode`, 1 means search posts only, 2 means search posts with first replies, 3 means search posts with all replies.
    - For `codes`, 1 means search by `author name`, 2 means search by `keyword`, 3 means search by `categories`, 4 means search by `from_time`, 5 means search by `to_time`, 6 means search by `reply name`, 7 means search by `post id`.

    - For `values`, the value of `codes[i]` is `values[i]`.
- `void update_hot_search_list(String searchContent)`: Update the hot search list according to the `searchContent`.
- `void showHotSearchList()`: Show the hot search list.

1.7 Printer

A class that handles all the printing operations, to print the results in cli.

- `void printPost(ResultSet rs)`: Accept a `ResultSet` **rs** and print the posts in `rs`.
- `void printFirstReply(ResultSet rs)`: Accept a `ResultSet` **rs** and print the posts with first replies in `rs`.
- `void printSecondReply(ResultSet rs, boolean isShowMe)`: Accept a `ResultSet` **rs** and print the posts with second replies in `rs`. If `isShowMe` is true, then only print the posts with second replies that the current user has replied.

2. Controller

A class that handles all the operations.

- Instance and static variables:
    - `Connection con`: The connection to the database.
    - `Scanner in`: The scanner to read the input from the cli.
    - `int opcode`: The current operation code.
    - `DBUtil util`: The database connection utility.
    - Below are the handlers instances:
    - `ActionHandler actionHandler`
    - `AccountHandler accountHandler`
    - `BrowseHandler browseHandler`
    - `ReplyHandler replyHandler`
    - `MeHandler meHandler`
    - `PostHandler postHandler`
- `void getConnection()`: Get the connection `con` to the database.
- `void closeConnection()`: Close all resources in all handlers and close the connection `con`.
- `void welcome()`: Print the welcome message.
- `void prompt()`: Show operation menu and prompt the user to choose an operation.
- `void respond()`: Respond to the user's choice according to `opcode`.

3. Main

The entry of the program, create a `Controller` instance and handle connections and operations.

Advanced Part

1. OpenGauss Deployment

We deployed `OpenGauss` on `openEuler-22.03-LTS` with `Parallel Desktop`. The deployment steps are as follows:

1. Download the `openEuler-22.03-LTS` `iso` file from the official website.
2. Create a new virtual machine with `Parallel Desktop` and install `openEuler-22.03-LTS` on it.
3. Install `OpenGauss` with `openEuler-22.03-LTS` installation package.

We opened `port 7654` for `OpenGauss` and modified the `postgresql.conf` file to allow remote access.(`listen_address= '*'`). Then create a new database and a new user for the project.

2. Usability Enhancement

- `Anonymous reply`: When replying a post or a reply, the user can choose to reply anonymously or not.
  We insert a author named `anonymous` into the `Authors` table. When replying anonymously, we do the reply with the `anonymous` author.
- `Block users`: The user can block other users. When browsing posts, the posts from the blocked users will not be shown. After unblocking a user, the posts from the unblocked user will be shown again.
  We create a table `block_user`, with 3 columns: `block_id`, `author` and `blocked_author`. When `coop` blocks `lhx`, we insert a record `(coop,lhx)` into the `block_user` table. After unblocking, the record will be deleted. When the user search contents, the posts/replies of the blocked users will be filtered.

  ```
  create table block_user
  (
    block_id       SERIAL,
    author         text not null references authors (author_name),
    blocked_author text not null references authors (author_name),
    primary key (author, blocked_author)
  );
  ```

- `Hot search list`: Display the searched content with the order of their appearance frequencies.
  We create a table `hot_search_list`. When the user browse posts with `keyword`/`author name`/`categories`, we insert the content into the table, if it is not in the table. If it is in the table, we update the `frequency` by adding 1.

```
create table hot_search_list
(
  hot_search_id  SERIAL primary key,
  search_content text unique not null,
  frequency      INTEGER
);
```

- `Multi-parameter search`: The user can search posts with multiple parameters.
  We create a function `multi_search` to do the multi-parameter search. The function accepts 3 parameters: `codes`, `values` and `opcode`.
  For `opcode`, 1 means search posts only, 2 means search posts with first replies, 3 means search posts with all replies.
  For `codes`, 1 means search by `author name`, 2 means search by `keyword`, 3 means search by `categories`, 4 means search by `from_time`, 5 means search by `to_time`, 6 means search by `reply name`, 7 means search by `post id`.
  For `values`, the value of `codes[i]` is `values[i]`.
  Then an sql query is assembled according to those parameters and executed. For the details, please refer to the **`multi_search`** function in **`BrowseHandler.java`**.
- `一键三连`： The user can like, favorite, and share a post with one operation.
  We create a function `three_in_one`. The function accepts 2 parameters: `post_id` and `username`. It will do the `like`, `favorite` and `share` operations by inserting into three tables.

3. Encapsulation

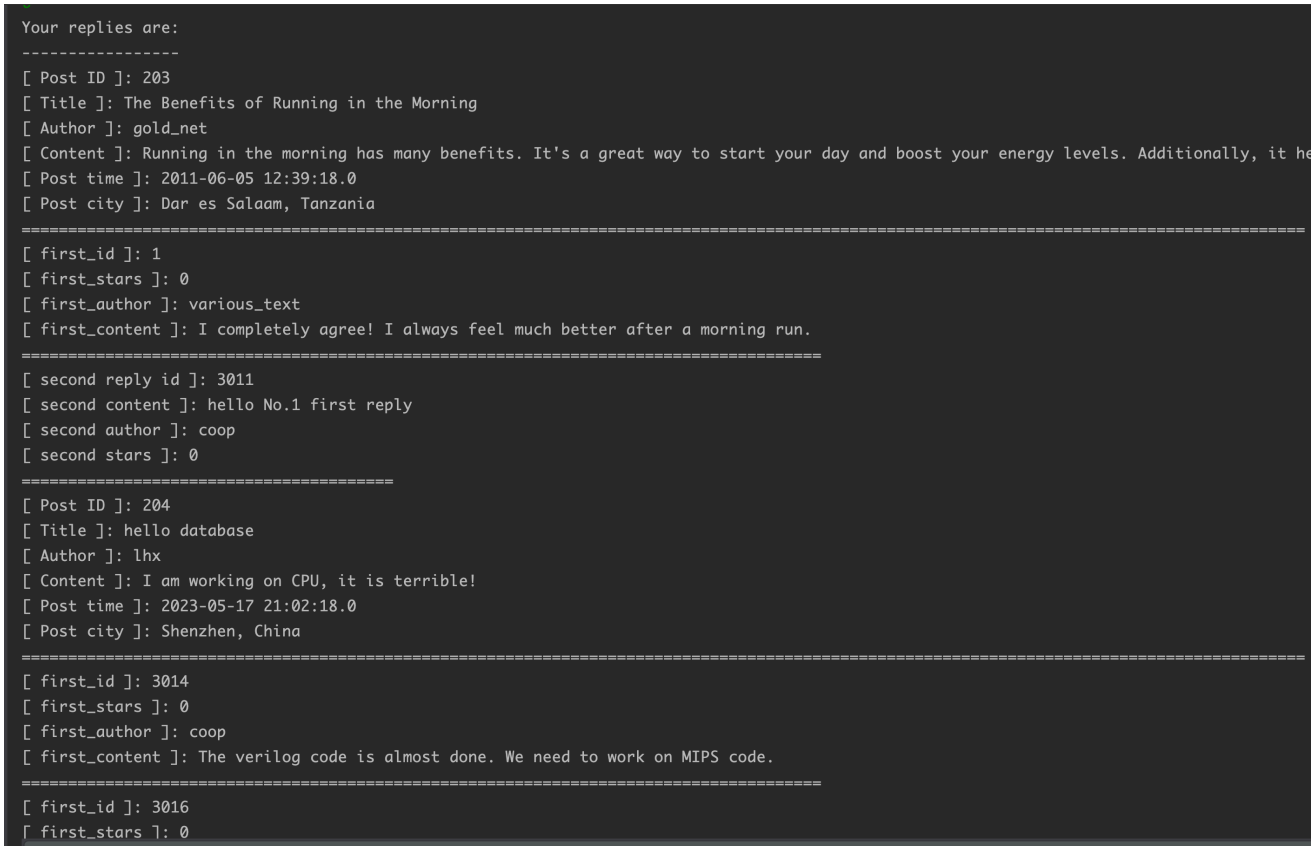
We encapsulate the database connection, manipulation and printing operations into different classes as described in the **API Specification** section. The program can run once to accomplish all the operations.

4.Connection Pool

We use `Connection Pool` introduced in the lab session. The `ProxoolUtil` implementation of `DBUtil` handles the connection pool. 5 connections are created at the start of the program.

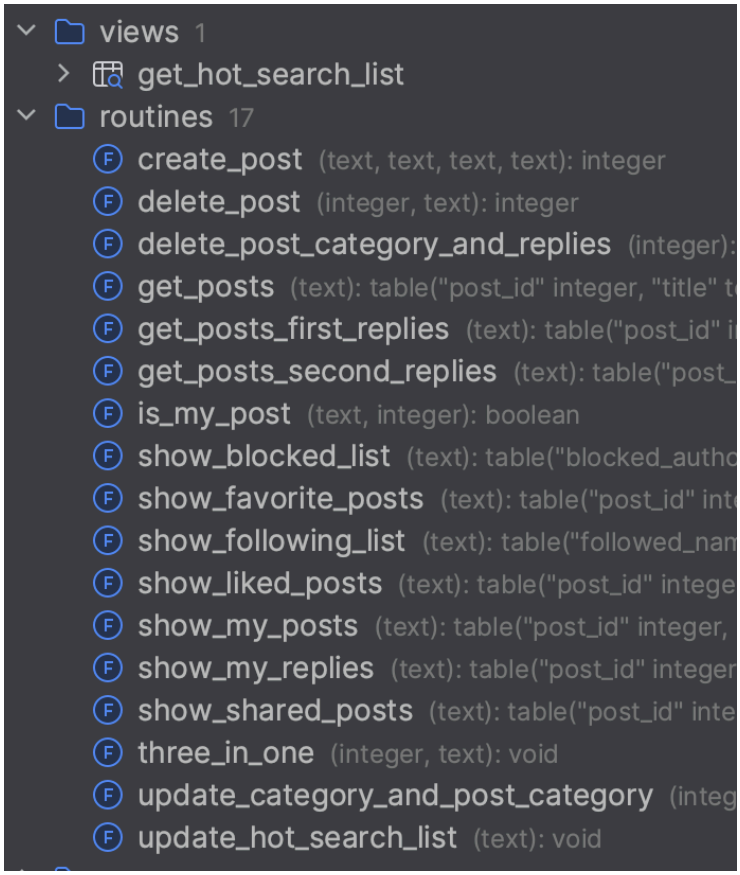
5.Display Format Design

We use `===` to separate different posts and the indentation of `===` indicates the boundary between posts, first replies and second replies. And we use `---` to split operation sections to make it clear.



6. Procedures, Functions, Index and View

We encapsulate most of the operations into procedures and functions at database level. For details, please refer to the **`functions.sql`** file.
We create a view on `hot_search_list` to show the hot search list.
For indexing, we apologized that we didn't explain it clearly during the demonstration. We did use indexes besides primary keys. We create indexes on `author_name` of `posts`, `favorite_author_name` of `post_favorite`, `shared_author_name` of `author_shared_posts`, `liked_author_name` of `author_liked_posts`, `first_id` of `second_replies`. For table details and indexes, please refer to the **`tables.sql`** file. These indexes can speed up searching which author has liked, shared or favorited which post, and speed up the join operation when browsing posts with replies.


views 1
get_hot_search_list
routines 17
create_post (text, text, text, text): integer
delete_post (integer, text): integer
delete_post_category_and_replies (integer):
get_posts (text): table("post_id" integer, "title" t
get_posts_first_replies (text): table("post_id" i
get_posts_second_replies (text): table("post_
is_my_post (text, integer): boolean
show_blocked_list (text): table("blocked_autho
show_favorite_posts (text): table("post_id" int
show_following_list (text): table("followed_nam
show_liked_posts (text): table("post_id" intege
show_my_posts (text): table("post_id" integer,
show_my_replies (text): table("post_id" integer
show_shared_posts (text): table("post_id" inte
three_in_one (integer, text): void
update_category_and_post_category (integ
update_hot_search_list (text): void