Group 16 - COMP 421 - Database Systems
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COMP 421 Project Deliverable 3

1. Stored procedure

This stored procedure is used to update the feed of a user by adding to it all the posts on that user's wall as well as all the posts on the walls of that user's friends.
Stored procedure:

```
cs421=> CREATE OR REPLACE FUNCTION fill_feed(inhandle VARCHAR(255)) RETURNS void
AS $$
BEGIN
INSERT INTO feed_view SELECT inhandle, post_id FROM post WHERE wall_id IN (SELECT
wall_id FROM creator WHERE creator.handle = inhandle);
INSERT INTO feed_view SELECT inhandle, post_id FROM post WHERE wall_id IN (SELECT
wall_id FROM creator WHERE creator.handle IN (SELECT usert_handle FROM
usert_friend WHERE friend_handle = inhandle));
END;
$$ LANGUAGE plpgsql;
CREATE FUNCTION
```

Query statement before the stored procedure was executed:

```
cs421=> SELECT * FROM feed_view WHERE usert_handle = 'PutinRF_Eng';
usert_handle | post_id
-------------+---------
(0 rows)
```

Execution of the procedure:

```
cs421=> SELECT fill_feed('PutinRF_Eng');
fill_feed
-----------

(1 row)
```

Result:

```
cs421=> SELECT * FROM feed_view WHERE usert_handle = 'PutinRF_Eng';
usert_handle | post_id
--------------+----------
PutinRF_Eng  |      501
PutinRF_Eng  |      503
PutinRF_Eng  |      502
PutinRF_Eng  |      504
(4 rows)
```

As we can see, the feed_view of PutinRF_Eng now contains the posts that were on that user's walls or on their friends' walls.

2. Application

We made 12 options. They are grouped under 4 initial submenus (Friends, Walls, Events, Notifications).

You can see the program as a jar *Menu.jar* (run with 'java -jar Menu.jar') as well as the source code in the src folder: *Menu.java*.

The application first asks for the users usert_handle:

```
Welcome to Twitbook
Please enter your user handle:
realDonaldTrump
```

The application provides the user with 4 initial submenus to select from:

```
---------- Twitbook ----------
Hello realDonaldTrump, here are five options that you can choose from to try our super cool app!!!
1 - Friends
2 - Walls
3 - Events
4 - Notification
0 - Quit the application
Just type the number of the option you want:
```

Submenu: Friends

Option 1: View all your friends

```
---------- Twitbook ----------
Hello realDonaldTrump, here are five options that you can choose from to try our super cool app!!!
1 - Friends
2 - Walls
3 - Events
4 - Notification
0 - Quit the application
Just type the number of the option you want:
1
(1) Please choose from the following options:
1 - View all your friends
2 - Add friend from search for non friends by name
3 - Add friend from list of non friends with whom you have mutual friends
0 - Return to the previous menu
1
(1) Your friends:
usert_handle: wambrozewicz0,  display_name: Warren Ambrozewicz,  email: wambrozewicz0@accuweather.com
usert_handle: kjanko1,  display_name: Kerrill Janko,  email: kjanko1@mediafire.com
usert_handle: dtolotti6,  display_name: Domingo Tolotti,  email: dtolotti6@webnode.com
usert_handle: abullente,  display_name: Ailsun Bullent,  email: abullente@yellowbook.com
usert_handle: plef,  display_name: Patience Le Barre,  email: plef@csmonitor.com
usert_handle: abaudichon13,  display_name: Allan Baudichon,  email: abaudichon13@ovh.net
usert_handle: bportchmouth1c,  display_name: Brit Portchmouth,  email: bportchmouth1c@house.gov
usert_handle: PutinRF_Eng,  display_name: Vladimir Putin,  email: vladimir.putin@maga.com
---------- Twitbook ----------
Hello realDonaldTrump, here are five options that you can choose from to try our super cool app!!!
1 - Friends
2 - Walls
3 - Events
4 - Notification
0 - Quit the application
Just type the number of the option you want:
```

Option 2: Add friend from search for non friends by name

```
---------- Twitbook ----------
Hello realDonaldTrump, here are five options that you can choose from to try our super cool app!!!
1 - Friends
2 - Walls
3 - Events
4 - Notification
0 - Quit the application
Just type the number of the option you want:
1
(1) Please choose from the following options:
1 - View all your friends
2 - Add friend from search for non friends by name
3 - Add friend from list of non friends with whom you have mutual friends
0 - Return to the previous menu
2
(2) Please enter a search string to match against display names
do
1 - usert_handle: wbradberry21,  display_name: Waldo Bradberry
2 - usert_handle: cdollar22,  display_name: Crawford Dollar
3 - usert_handle: iwanklin2o,  display_name: Isidore Wanklin
4 - usert_handle: hconnealy2y,  display_name: Hernando Connealy
5 - usert_handle: sjenteau3s,  display_name: Shadow Jenteau
6 - usert_handle: bdouty4d,  display_name: Blanche Douty
7 - usert_handle: dvarsey51,  display_name: Domenic Varsey
8 - usert_handle: mdovydenas59,  display_name: Mylo Dovydenas
Please select the number of the user you would like to add as a friend from the list above or type 0 to return to the previous menu:
8
Adding friend mdovydenas59
New friend added succesfully. Here is your updated list of friends:
usert_handle: wambrozewicz0,  display_name: Warren Ambrozewicz,  email: wambrozewicz0@accuweather.com
usert_handle: kjanko1,  display_name: Kerrill Janko,  email: kjanko1@mediafire.com
usert_handle: dtolotti6,  display_name: Domingo Tolotti,  email: dtolotti6@webnode.com
usert_handle: abullente,  display_name: Ailsun Bullent,  email: abullente@yellowbook.com
usert_handle: plef,  display_name: Patience Le Barre,  email: plef@csmonitor.com
usert_handle: abaudichon13,  display_name: Allan Baudichon,  email: abaudichon13@ovh.net
usert_handle: bportchmouth1c,  display_name: Brit Portchmouth,  email: bportchmouth1c@house.gov
usert_handle: mdovydenas59,  display_name: Mylo Dovydenas,  email: mdovydenas59@homestead.com
usert_handle: PutinRF_Eng,  display_name: Vladimir Putin,  email: vladimir.putin@maga.com
```

Option 3: Add friend from list of non friends with whom you have mutual friends

```
---------- Twitbook ----------
Hello realDonaldTrump, here are five options that you can choose from to try our super cool app!!!
1 - Friends
2 - Walls
3 - Events
4 - Notification
0 - Quit the application
Just type the number of the option you want:
1
(1) Please choose from the following options:
1 - View all your friends
2 - Add friend from search for non friends by name
3 - Add friend from list of non friends with whom you have mutual friends
0 - Return to the previous menu
3
(3) Here are users that have mutual friends with you
1 - usert_handle: jmeneer3m,  num_mutual_friends: 1
2 - usert_handle: wminet1f,  num_mutual_friends: 1
3 - usert_handle: srohan1i,  num_mutual_friends: 1
4 - usert_handle: hcheel9,  num_mutual_friends: 1
5 - usert_handle: dnarracott3,  num_mutual_friends: 1
6 - usert_handle: tbeever1h,  num_mutual_friends: 1
7 - usert_handle: onottle1b,  num_mutual_friends: 1
Please select the number of the user you would like to add as a friend from the list above or type 0 to return to the previous menu:
2
Adding friend wminet1f
New friend added succesfully. Here is your updated list of friends:
usert_handle: wambrozewicz0,  display_name: Warren Ambrozewicz,  email: wambrozewicz0@accuweather.com
usert_handle: kjanko1,  display_name: Kerrill Janko,  email: kjanko1@mediafire.com
usert_handle: hmckeighan2,  display_name: Hamish McKeighan,  email: hmckeighan2@wikispaces.com
usert_handle: dtolotti6,  display_name: Domingo Tolotti,  email: dtolotti6@webnode.com
usert_handle: abullente,  display_name: Ailsun Bullent,  email: abullente@yellowbook.com
usert_handle: plef,  display_name: Patience Le Barre,  email: plef@csmonitor.com
usert_handle: abaudichon13,  display_name: Allan Baudichon,  email: abaudichon13@ovh.net
usert_handle: bportchmouth1c,  display_name: Brit Portchmouth,  email: bportchmouth1c@house.gov
usert_handle: wminet1f,  display_name: Wyndham Minet,  email: wminet1f@businesswire.com
usert_handle: mdovydenas59,  display_name: Mylo Dovydenas,  email: mdovydenas59@homestead.com
usert_handle: PutinRF_Eng,  display_name: Vladimir Putin,  email: vladimir.putin@maga.com
```

Submenu: Walls:

Option 4: See the posts on your wall

```
---------- Twitbook ----------
Hello realDonaldTrump, here are five options that you can choose from to try our super cool app!!!
1 - Friends
2 - Walls
3 - Events
4 - Notification
0 - Quit the application
Just type the number of the option you want:
2
Do you want to:
1 - See the posts on your wall
2 - See the posts on a friend's wall
0 - Return to the previous menu
1
Post 1
Author: PutinRF_Eng
Likes: 5000
Text: No problem Donald! Keep in touch.
Post 2
Author: PutinRF_Eng
Likes: 9740
Text: Donald, our TwitPosts are public...
We found 2 posts on your wall.
```

Option 5: See posts on a friend's wall

```
---------- Twitbook ----------
Hello realDonaldTrump, here are five options that you can choose from to try our super cool app!!!
1 - Friends
2 - Walls
3 - Events
4 - Notification
0 - Quit the application
Just type the number of the option you want:
2
Do you want to:
1 - See the posts on your wall
2 - See the posts on a friend's wall
0 - Return to the previous menu
2
Which friend's wall do you want to see?
PutinRF_Eng
Here is Vladimir Putin's wall
Post 1
Author: realDonaldTrump
Likes: 10000
Text: Thanks for the help with the election!!!
Post 2
Author: realDonaldTrump
Likes: 7040
Text: Damn. Mueller is on to us. Do you think he will be able to subpoena our TwitPosts?
```

Submenu: Events

Option 6: Search for an Event

```
1 — Search for an Event
2 — Create an Event
3 — Subscribe to an Event
4 — Delete an Event
0 — Return to the previous menu
1
Please enter a search term...
Rally
EVENT ID    TITLE                                          LOCATION                    START TIME    END TIME

Enter 1 to make another search. Enter 0 to return to the previous menu.
0
Event Submenu
1 — Search for an Event
2 — Create an Event
3 — Subscribe to an Event
4 — Delete an Event
0 — Return to the previous menu
```

Option 7: Create an Event

```
Event Submenu
1 — Search for an Event
2 — Create an Event
3 — Subscribe to an Event
4 — Delete an Event
0 — Return to the previous menu
2
Create an event...
Please enter a title for the event
Make America Great Again Rally
Please enter a description for the event
Build That Wall! Make America Great Again!
Please enter a location for the event
Louisiana
Please enter a start time for the event (YYYY-MM-DD HH:MM:SS)
2018-03-12 20:00:00
Please enter a end time for the event (YYYY-MM-DD HH:MM:SS)
2018-03-12 22:00:00
Event Created!

Enter 1 to create another event. Enter 0 to go back to the previous menu
0
Event Submenu
1 — Search for an Event
2 — Create an Event
3 — Subscribe to an Event
4 — Delete an Event
0 — Return to the previous menu
1
Please enter a search term...
Rally
EVENT ID    TITLE                                          LOCATION        START TIME    END TIME
65          Make America Great Again Rally                 Louisiana       2018-03-12    2018-03-12

Enter 1 to make another search. Enter 0 to return to the previous menu.
```

Option 8: Subscribe to an Event

```
Please enter a search term...
Putin
EVENT ID   TITLE                                        LOCATION            START TIME      END TIME
66         Putin: America Election Strategy             Kremlin             2016-04-09      2016-04-10

Enter 1 to make another search. Enter 0 to return to the previous menu.
0
Event Submenu
1 - Search for an Event
2 - Create an Event
3 - Subscribe to an Event
4 - Delete an Event
0 - Return to the previous menu
3
Subscribe to an event...
Please enter the 'EVENT ID' of the event you wish to subscribe to
66
Please enter your RSVP status...
1 - Going
2 - Not Going
3 - Maybe
1
Subscribed!
```

Option 9: Delete an Event

```
Event Submenu
1 - Search for an Event
2 - Create an Event
3 - Subscribe to an Event
4 - Delete an Event
0 - Return to the previous menu
4
Delete an event (subscribers will be notified)...
Please enter the 'EVENT ID' of the event you wish to DESTROY
66
DESTRUCTION COMPLETE!

Enter 1 to DESTROY another event. Enter 0 to go back to the previous menu
0
Event Submenu
1 - Search for an Event
2 - Create an Event
3 - Subscribe to an Event
4 - Delete an Event
0 - Return to the previous menu
1
Please enter a search term...
Putin
EVENT ID   TITLE                                        LOCATION            START TIME      END TIME

Enter 1 to make another search. Enter 0 to return to the previous menu.
```

Submenu: Notifications

```
---------- Twitbook ----------
Hello realDonaldTrump, here are five options that you can choose from to try our super cool app!!!
1 - Friends
2 - Walls
3 - Events
4 - Notification
0 - Quit the application
Just type the number of the option you want:
4
1 - Unread Notifications
2 - Read Notifications
3 - Mark Unread Notifications as Read
```

Option 10: Unread Notifications

```
1 - Unread Notifications
2 - Read Notifications
3 - Mark Unread Notifications as Read
1
notif_text: Muller: The end of Vladimirs Rule?,  notif_time: 2018-03-25 14:07:26.592632
notif_text: President Bannon or President Putin? You decide!,  notif_time: 2018-03-25 14:07:57.872656
notif_text: David Duke: Trump built a HUGE empire! He will build a HUGE wall! He will make America Great Again!!!,  notif_time: 2018-03-25 14:10:45.8313
notif_text: The event with ID 66 has been cancelled,  notif_time: 2018-03-25 14:22:48.008249
```

Option 11: Read Notifications

```
1 - Unread Notifications
2 - Read Notifications
3 - Mark Unread Notifications as Read
2
notif_text: Vladimir Putin: The Next President of the United States. How Donald Trump can make it happen.,  notif_time: 2018-03-25 13:53:41.377331
```

Option 12: Mark Unread Notifications as Read

```
1 - Unread Notifications
2 - Read Notifications
3 - Mark Unread Notifications as Read
3
4 notifications set as read
---------- Twitbook ----------
Hello realDonaldTrump, here are five options that you can choose from to try our super cool app!!!
1 - Friends
2 - Walls
3 - Events
4 - Notification
0 - Quit the application
Just type the number of the option you want:
4
1 - Unread Notifications
2 - Read Notifications
3 - Mark Unread Notifications as Read
2
notif_text: Vladimir Putin: The Next President of the United States. How Donald Trump can make it happen.,  notif_time: 2018-03-25 13:53:41.377331
notif_text: Muller: The end of Vladimirs Rule?,  notif_time: 2018-03-25 14:07:26.592632
notif_text: President Bannon or President Putin? You decide!,  notif_time: 2018-03-25 14:07:57.872656
notif_text: David Duke: Trump built a HUGE empire! He will build a HUGE wall! He will make America Great Again!!!,  notif_time: 2018-03-25 14:10:45.8313
notif_text: The event with ID 66 has been cancelled,  notif_time: 2018-03-25 14:22:48.008249
```

3. Index

a. Clustered Index on creation_time

```
CREATE INDEX creation_time_index ON submission(creation_time);
CLUSTER submission USING creation_time_index;
```

An index on creation_time is useful because it sorts the submissions on a user's feed by the date it was created. This will help execute SELECT statements based on creation_time of submission faster (specially statements which specify a range of creation_time) as the matching tuples for that SELECT statement will be clustered on a few data pages.

b. Unclustered Index on (usert_handle, post_id)

```
CREATE INDEX user_commentt_index ON commentt(usert_handle, post_id);
```

An unclustered index on usert_handle and post_id of a commentt will help to find out all the comments of a specific user on a post faster as most probably the number of comments a user has on a post will be quite low.

We did not choose a clustered index on usert_handle or post_id for this case because:
- A clustered index on usert_handle would sort all the comments by the usert_handle, but if a user has a lot of comments, it would be harder to find that users comments on one specific post.
- A clustered index on post_id will sort all the comments by post_id, but if a post has a lot of comments it would cost more to find all the comments a specific user has made on a post.
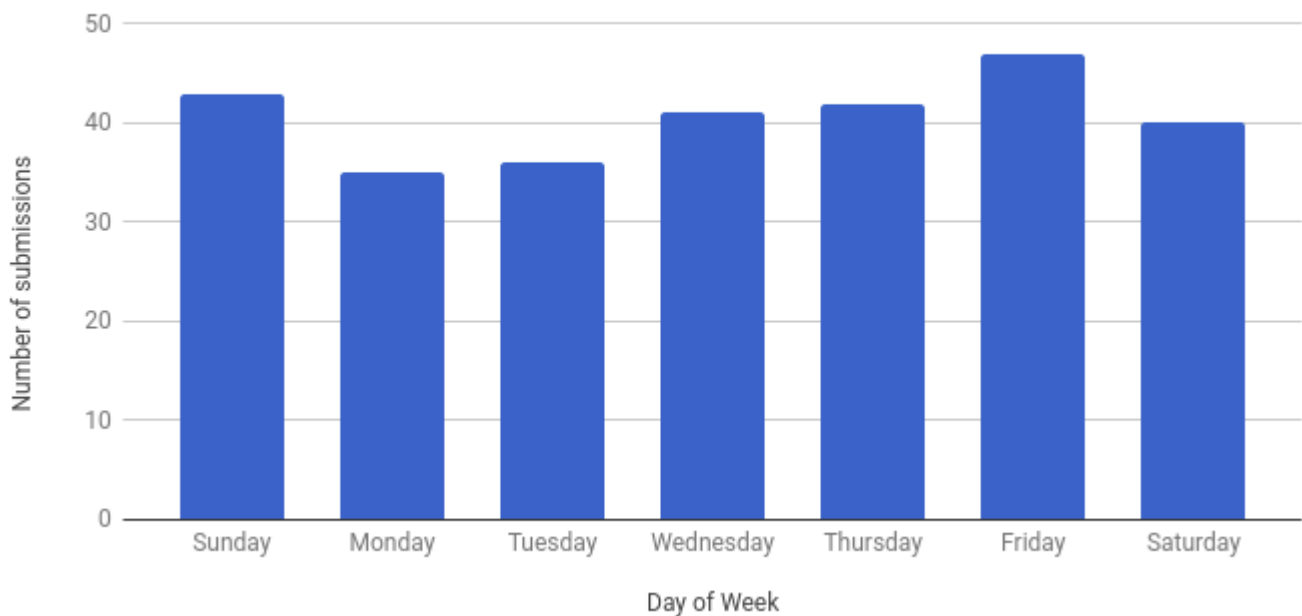
4. Visualization

Visualization 1:

Number of posts per day of the week. This data is useful in determining trends in when users are using Twitbook. Based on the visualization we can see that the lowest use is on Monday and then steadily increases through the week until saturday when there is a slight drop.

We used that sql command inside a copy command to export in a csv the data for the graph:

```sql
WITH submissions_by_day AS (
    SELECT date_part('dow', creation_time) sday, COUNT(*)
    FROM submission
    GROUP BY sday
    ORDER BY sday
)
SELECT
CASE
    when sday = 0 then 'Sunday'
    when sday = 1 then 'Monday'
    when sday = 2 then 'Tuesday'
    when sday = 3 then 'Wednesday'
    when sday = 4 then 'Thursday'
    when sday = 5 then 'Friday'
    when sday = 6 then 'Saturday'
END AS submission_day, count
FROM submissions_by_day;
```

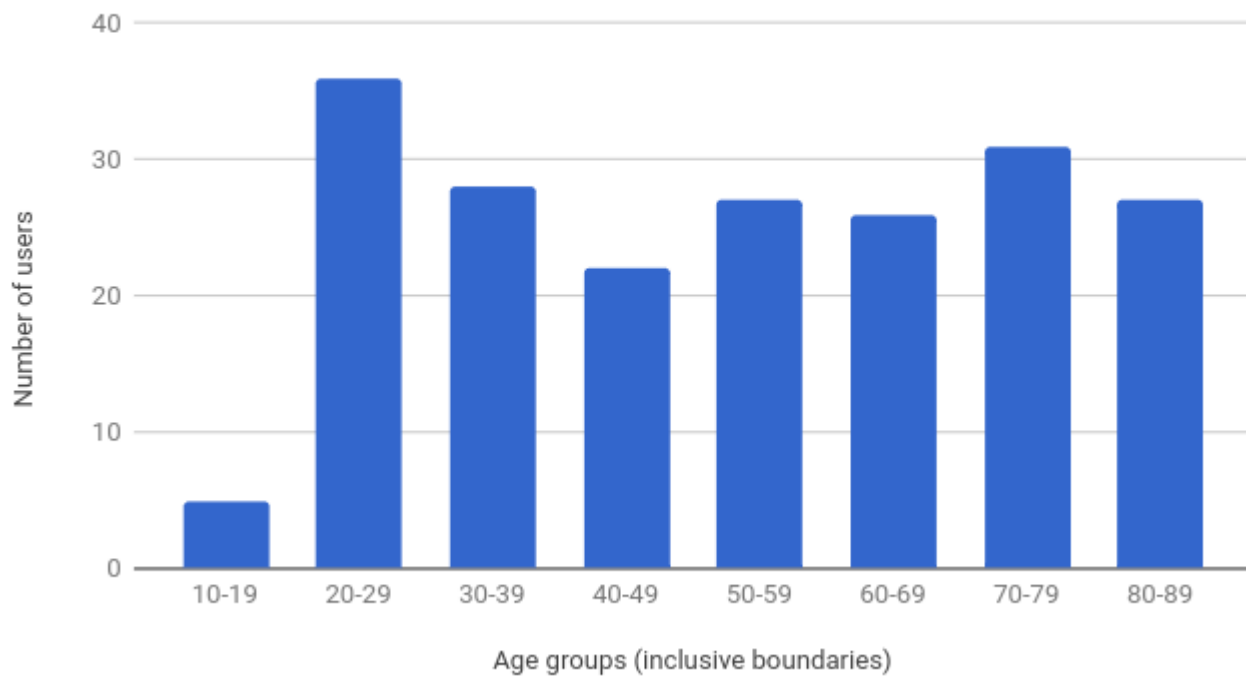Here is a graph showing the number of submissions made each day of the week:

Visualization 2:
Number of users per age group. This data is useful in determining trends in user age demographics. Based on the visualization we can see that there are very few users under 20 with the largest user base being between 20-29 and then there is a drop over the 30-39 and 40-49 age group after which there is a small uptick and relatively even distribution from 50-100.

```sql
WITH usert_ages AS
(
      SELECT date_part('year', age(birth_date)) age, COUNT(*)
      FROM usert
)
SELECT
CASE
    when age < 10 then '<10'
    when age between 10 and 19 then '10-19'
    when age between 20 and 29 then '20-29'
    when age between 30 and 39 then '30-39'
    when age between 40 and 49 then '40-49'
    when age between 50 and 59 then '50-59'
    when age between 60 and 69 then '60-69'
    when age between 70 and 79 then '70-79'
    when age between 80 and 89 then '80-89'
    when age between 90 and 99 then '90-99'
    else '>=100'
END AS u_agerange, COUNT(*)
FROM usert_ages
GROUP BY u_agerange
ORDER BY u_agerange;
```

Number of users per age groups

5. Creativity

You can see the demonstration of our creativity in the content of the different posts we used to showcase our application. realDonaldTrump and PutinRF_Eng say hi.

A mock conversation between Vladimir Putin (President of the United States) and Donald Trump is demonstrated.