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Project Link - <https://ryanadjapong.shinyapps.io/SMUCampusConnect/>

ITOM 6265 Database Design for Business Project Final Report

Introduction of the Organization

Our team at Bartek, a Dallas-based development firm specializing in campus-oriented dating apps, has designed a database for the "SMU Campus Connect" application. This innovative platform exclusively caters to students at Southern Methodist University (SMU), providing a secure and interactive environment for building meaningful relationships. With Bartek's mission to create tailored relationship experiences for campus communities, SMU Campus Connect exemplifies our commitment to fostering unique social interactions.

Scope of the Project

The database design for SMU Campus Connect encompasses the following core functionalities and entities:

- **User Authentication and Verification:** Secure authentication with SMU ID ensures access is restricted to students. Personal information such as names, ages, genders, photos, and preferences is securely stored.
- **Matching and Preferences:** Users can set filters based on criteria like race, age range, and academic level. A matching algorithm pairs users based on shared preferences and interaction history, storing matches in the "Matches" table.
- **Messaging Management:** After matching with someone, users can send messages to each other. All message interactions are tracked and stored securely, with privacy settings in place to ensure user safety.
- **Content Management for Dating Tips:** A dedicated table for dating tips provides curated advice to enhance user experience, allowing easy categorization, addition, and updates.
- **LLM Integration:** The integration allows users to ask database-related questions or general dating questions in plain English, which the LLM converts into SQL queries and executes on the database.

The database includes seven main entities as outlined in the ERD: **Users**, **Preferences**, **Matches**, **Message Permissions**, **Messages**, **Dating Tips**, and **User Verification**

Goals of the Project

The database serves two key user groups:

1. **Internal Stakeholders:**
 - The **development team** benefits from a robust structure enabling efficient app performance and scaling.
 - The **marketing team** can analyze app activity to improve engagement and drive adoption.
2. **External Users:**
 - SMU students enjoy a seamless, secure platform for meaningful connections and a respectful environment, facilitated by selective messaging and tailored matches.

- The integrated tips enhance relationship-building skills, enriching the user experience.

By implementing this database design, SMU Campus Connect will not only deliver a safe and engaging platform for students but also provide actionable insights for internal teams, ensuring continuous improvements and user satisfaction.

Entity-Relationship Diagram Design

The database for the **SMU Campus Connect** application is designed to support a secure and engaging platform for SMU students to connect with potential matches. The following tables were designed based on the ERD and the ERD diagram (**see Exhibit 1** in appendix table)

1. Users:

- **Attributes:** `user_id`, `smu_id`, `name`, `gender`, `age`, `race`, `photo_path`, `academic_level`, `password`, `bio_details`
- **Primary Key:** `user_id`
- Stores user-specific information, ensuring unique identification for every student.

2. Preferences:

- **Attributes:** `preference_id`, `user_id`, `pref_gender`, `pref_age_min`, `pref_age_max`, `pref_race`, `pref_academic_level`
- **Primary Key:** `preference_id`
- **Foreign Key:** `user_id` (links to **Users**)
- Allows users to set preferences for finding matches based on gender, age range, and race.

3. Matches:

- **Attributes:** `id`, `smu_id`, `matched_user_id`, `matched_at`
- **Primary Key:** `id`
- **Foreign Keys:** `smu_id`
- Captures potential matches and their mutual status based on user preferences and interactions.

4. Messages:

- **Attributes:** `message_id`, `sender_id`, `receiver_id`, `message_content`, `sent_at`, `status`
- **Primary Key:** `message_id`
- **Foreign Keys:** `sender_id`, `receiver_id` (both link to **Users**)
- Tracks user-to-user communication and stores message content securely.

5. Dating Tips:

- **Attributes:** `tip_id`, `category`, `content`, `updated_at`
- **Primary Key:** `tip_id`
- Provides curated dating tips for users to enhance their experience on the app.

6. Message Permissions:

- **Attributes:** `permission_id`, `user_id`, `liked_by_user_id`, `can_message`
- **Primary Key:** `permission_id`
- **Foreign Keys:** `user_id`, `liked_by_user_id` (both link to **Users**)

- Restricts messaging permissions based on user interactions, ensuring privacy and fostering respectful communication.

7. User Verification:

- **Attributes:** `verification_id`, `user_id`, `verified`, `verification_date`
- **Primary Key:** `verification_id`
- **Foreign Key:** `user_id` (links to `Users`)
- Ensures users authenticate using their SMU IDs, maintaining platform security.

Normalization

All entities have been normalized to **Third Normal Form (3NF)** to eliminate redundancy and ensure data integrity. Attributes within tables are functionally dependent on their primary keys, ensuring an optimized database structure.

Shiny User Interface for SMU Campus Connect App

The SMU Campus Connect App is designed using Shiny in RStudio, with a dashboard layout provided by the `shinydashboard` package. The UI is organized into multiple tabs, each catering to different functionalities required for user interaction, profile management, match-making, and data analytics.

1. Dashboard Header

- The header includes the app's title: "SMU Campus Connect".
- The header is simple and designed to highlight the app's purpose.
- Help: Access thoughtful first-date tips covering communication, safety, and respect to ensure a positive and enjoyable experience.

2. Top Panel

- The top panel provides navigation options through various menu items, each leading to a specific tab in the app:
 - Welcome: A brief welcome message and an introduction to the app.
 - Hyperlink for sign up: For easier navigation to sign up page
 - Login: A form for users to input their SMU ID and password to log in.
 - Sign Up: A form for new users to create an account by providing their SMU ID, personal details, and dating preferences.
 - Profile: Displays the user's profile and allows for further actions like finding matches.
 - Matches: Displays the list of matches based on user preferences and interactions.
 - Preferences: A page where users can edit their preferences for gender, age, race, and academic level.
 - Dating Buddy (ChatGPT): An interactive feature where users can ask questions, either for general dating tips/advice or to generate SQL queries related to the app's database.
 - Dashboard: For advanced analytics on user demographics, age distribution, and preference analysis.

- Logout: A logout option to end the user's session.

LLM Integration with SQL Chat in SMU Campus Connect

In the SMU Campus Connect app, the integration of Large Language Models (LLM), specifically ChatGPT, with SQL chat functionality significantly enhances the user experience by enabling dynamic, real-time queries in natural language. This integration allows users to ask database-related questions in plain English, which the LLM converts into SQL queries and executes on the database. The results of these queries are then displayed to the user in an intuitive, user-friendly format.

This interaction is useful in scenarios where users need to access specific data, such as viewing matches, checking preferences, or analyzing user demographics, without needing to understand SQL syntax or complex database structures. The chat interface is designed to make the process effortless, offering a conversational approach to querying the database. Users can simply ask questions like "Show me all matches for students in the 25-30 age range" or "Find users who prefer Asian race," and receive instant results.

Additionally, the system can provide real-time suggestions based on the user's query context, offering personalized dating tips, profile recommendations, and insights about user behavior. This powerful LLM-SQL integration creates a seamless and engaging experience, making it easy for users to interact with data while improving the overall app functionality.

See (**Exhibit 3 Tab 7 LLM integration** in Appendix)for a visual representation of the LLM with SQL integration in the SMU Campus Connect app.

Appendix

Exhibit 1 - ER Diagram

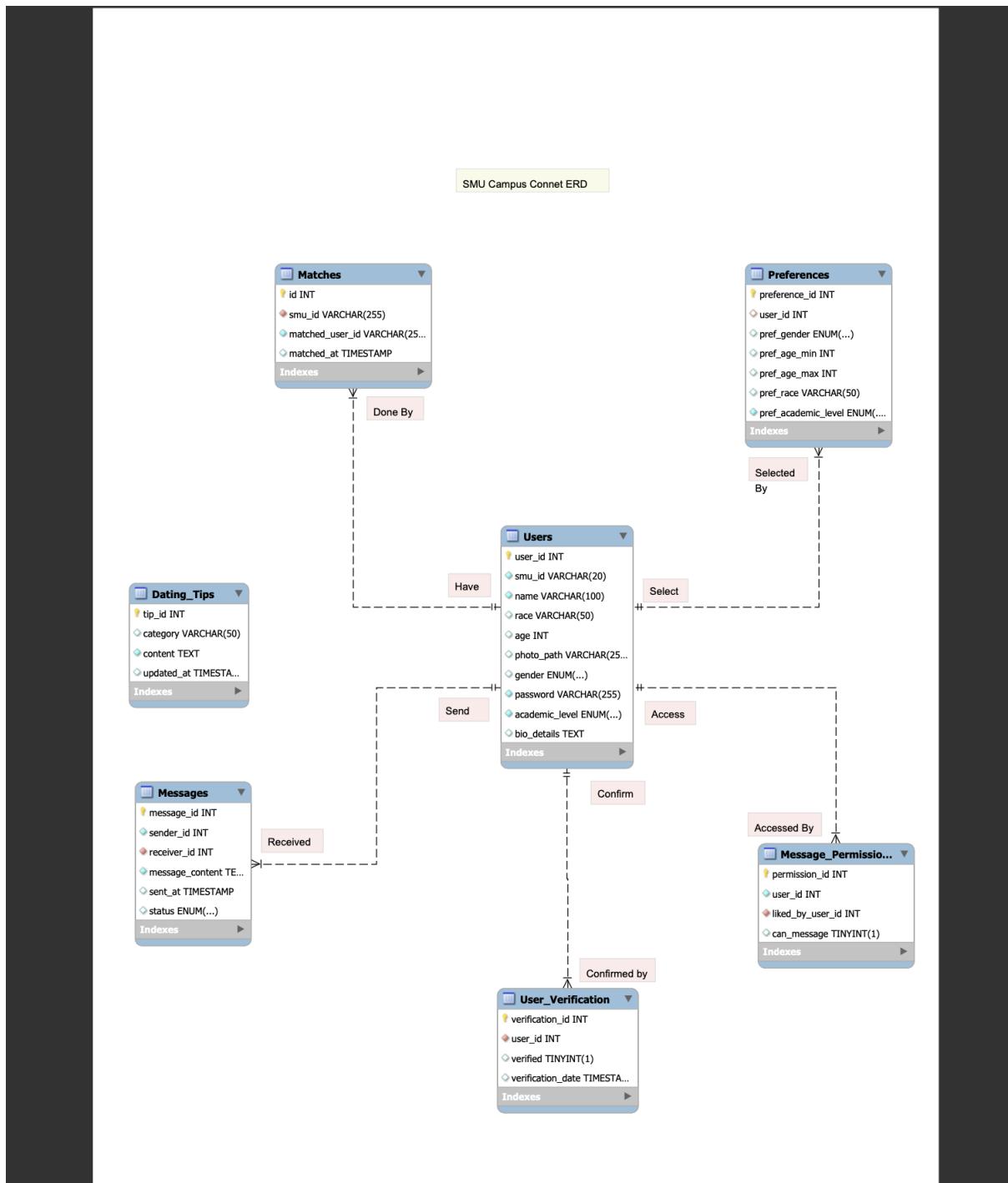


Exhibit 2. Entity Relationships In words

Three major relationships were identified and implemented:

1. One-to-Many Relationship:

- A user can set multiple preferences, but each preference belongs to only one user.
- This relationship is managed by including the `user_id` foreign key in the **Preferences** table.

2. Many-to-Many Relationship:

- Matches are mutual between users, enabling multiple potential connections for each user.
- The **Matches** table acts as an associative entity with `user_id` and `liked_user_id` as foreign keys, ensuring efficient storage and tracking of matches.

3. Many-to-Many Relationship:

- Messaging is allowed only after a “like” is reciprocated, ensuring mutual consent.
- The **Message Permissions** table captures messaging rights between users using `user_id` and `liked_by_user_id` as foreign keys.

4. Users and Preferences:

- Each user has one set of preferences stored in the **Preferences** table.
- Linked by the `user_id` field in both tables.

5. Users and Matches:

- A user can have multiple matches.
- The **Matches** table connects users through the `smu_id` and `matched_user_id` fields.

6. Users and Messages:

- A user can send and receive multiple messages.
- The **Messages** table uses `sender_id` and `receiver_id` fields to establish relationships.

7. Users and User Verification:

- User verification status is tracked in the **User_Verification** table.
- Linked by the `user_id` field.

8. Message Permissions:

- The **Message_Permissions** table defines communication permissions between users.

- Relationships are established through `user_id` and `liked_by_user_id`.

9. Users and Dating Tips:

- Dating tips are stored in the `Dating_Tips` table, categorized by `category` and `content`

Data Dictionary listing all the entities and their descriptions

Entity	Attributes	Description
Users	<code>user_id, smu_id, name, race, age, photo_path, gender, password, bio_details</code>	Stores user information.
Preferences	<code>preference_id, user_id, pref_gender, pref_age_min, pref_age_max, pref_race</code>	Stores user preferences for matches.
Matches	<code>id, smu_id, matched_user_id, matched_at</code>	Tracks user matches.
Messages	<code>message_id, sender_id, receiver_id, message_content, sent_at, status</code>	Tracks messages sent between users.
Message_Permissions	<code>permission_id, user_id, liked_by_user_id, can_message</code>	Manages permissions for user communication.
User_Verification	<code>verification_id, user_id, verified, verification_date</code>	Tracks user verification status.
Dating_Tips	<code>tip_id, category, content, updated_at</code>	Stores categorized dating tips.

Exhibit 3 Shiny User interface

Tab 1. Welcome

Welcome to SMU Campus Connect

Login Sign Up Profile Matches Preferences Dating Buddy Dashboard Logout

SMU CampusConnect
Get Who Gets You

Start **free** today
[Sign up and get connected](#)



Data Privacy Statement: This is the sole product of SMU. Your data will be used strictly for the purpose of signing up and matching with other users. We respect your privacy.

Tab 2. Login

Welcome to SMU Campus Connect

Login Sign Up Profile Matches Preferences Dating Buddy Dashboard Logout

SMU ID
49711968

Password
.....

Login

Tab 3. Sign up

Welcome to SMU Campus Connect

SMU

Welcome Login Sign Up Profile Matches Preferences Dating Buddy Dashboard Logout

SMU ID
778899

Name
Annie

Age
24

Academic Level
Undergraduate

Race
White

Bio
Love travelling and reading books

?

Logout

Welcome to SMU Campus Connect

SMU

Welcome Login Sign Up Profile Matches Preferences Dating Buddy Dashboard Logout

SMU ID
778899

Name
Annie

Age
24

Academic Level
Undergraduate

Race
White

Bio
Love travelling and reading books

?

Logout

Tab 4. Profile

Welcome to SMU Campus Connect

Name: Twinkle Lakhani

Age: 28

Race: Asian

Academic Level: Graduate

Gender: Female

Bio: "Curious mind, big dreams, and a love for meaningful conversations—let's make a great story together!"



Find Matches

Your Matches

Tab 5. Matches

Welcome to SMU Campus Connect

Name: 09876

Age: 29

Race: Asian

Academic level: Graduate

Gender: Male

Bio: Hello, Nice to meet you

Send a message:

Send

Tab 6. Preferences

Welcome to SMU Campus Connect

Logout

Welcome Login Sign Up Profile Matches Preferences Dating Buddy Dashboard Logout

Edit Your Preferences

Preferred Gender

Male
 Female

Preferred Age Range

20 32 80
18 25 32 59 60 67 74 81

Preferred Race

Asian

Preferred Academic Level

Graduate

Save Preferences

Preferences updated successfully!

Tab 7. LLM Integration

Welcome Login Sign Up Profile Matches Preferences Dating Buddy Dashboard Logout

How can I help you today?

Give me some advice on dating

Ask

Response Type: General Question

Answer:
The question is general.

When it comes to dating, here are a few pieces of advice:

1. Be yourself: Authenticity is attractive and creates a solid foundation for any relationship.
2. Communicate openly: Clear and honest communication helps avoid misunderstandings.
3. Listen actively: Pay attention to your partner's thoughts and feelings.
4. Be respectful: Respect each other's boundaries and preferences.
5. Have fun: Enjoy the process of getting to know someone and exploring new experiences together.

Welcome to SMU Campus Connect

Logout

Welcome Login Sign Up Profile Matches Preferences Dating Buddy Dashboard Logout

How can I help you today?

give me a list of female users in the app

Ask

Response Type: Database Query

Generated SQL Query:

```
SELECT * FROM Users WHERE gender = 'Female';
```

user_id	smu_id	name	race	age	photo_path	gender	password	academic_level	bio_details
6	SMU006	Sarah Wilson	Black	22	https://example.com/photos/sarah_wilson.jpg	Female	password123	Graduate	I am an animal lover and love exploring new things.
8	SMU008	Laura Garcia	Asian	24	https://example.com/photos/laura_garcia.jpg	Female	password123	Graduate	I am an animal lover and love exploring new things.
10	SMU010	Sophia Lee	Asian	23	https://example.com/photos/sophia_lee.jpg	Female	password123	Graduate	I am a plant parent and love exploring new things.
12	SMU012	Olivia Walker	White	21	https://example.com/photos/olivia_walker.jpg	Female	password123	Graduate	I am a sports fan and love exploring new things.
14	SMU014	Chloe Young	Asian	23	https://example.com/photos/chloe_young.jpg	Female	password123	Graduate	I am a caring friend and love exploring new things.
16	SMU016	Ava Scott	White	24	https://example.com/photos/ava_scott.jpg	Female	password123	Graduate	I am an avid traveler and love exploring

Tab 8. Analytics Dashboard

User Demographics

Welcome to SMU Campus Connect

Logout

Welcome Login Sign Up Profile Matches Preferences Dating Buddy Dashboard Logout

Select Analytics Type:

User Demographics

Run Analytics

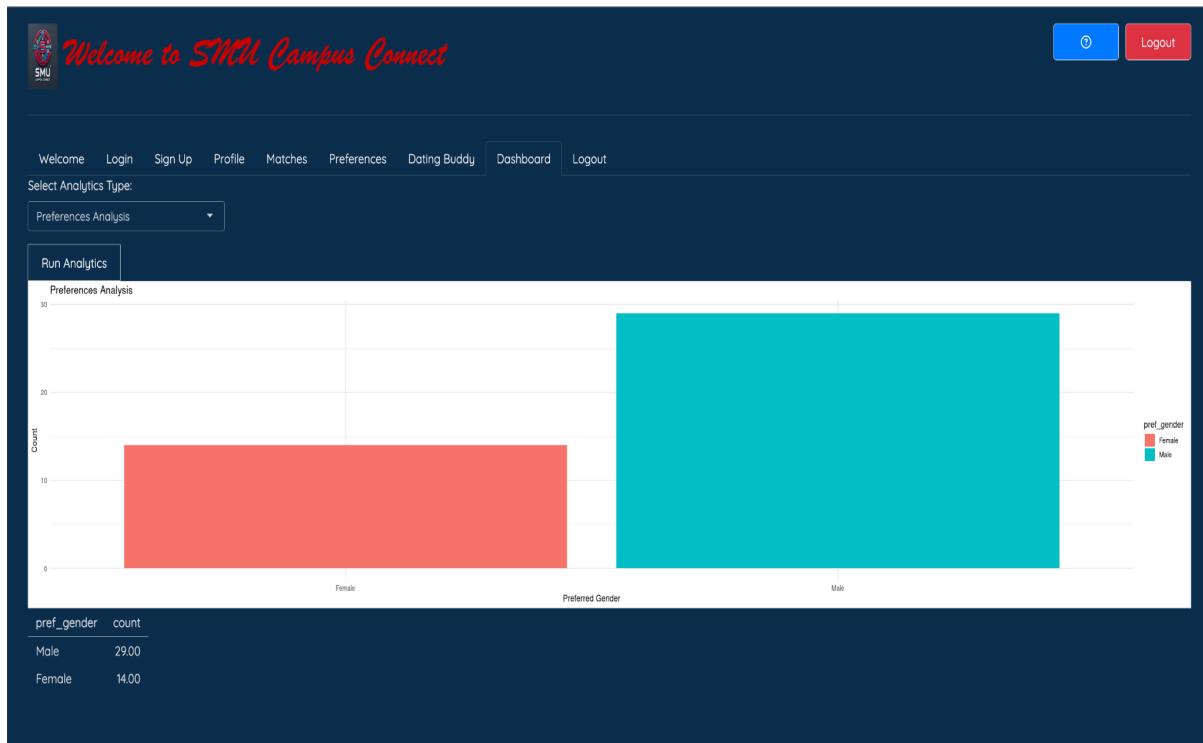
User Demographics

gender	count
Male	64.00
Female	38.00
NA	4.00

Age Distribution



Preference Analysis



Tab 8. Logout

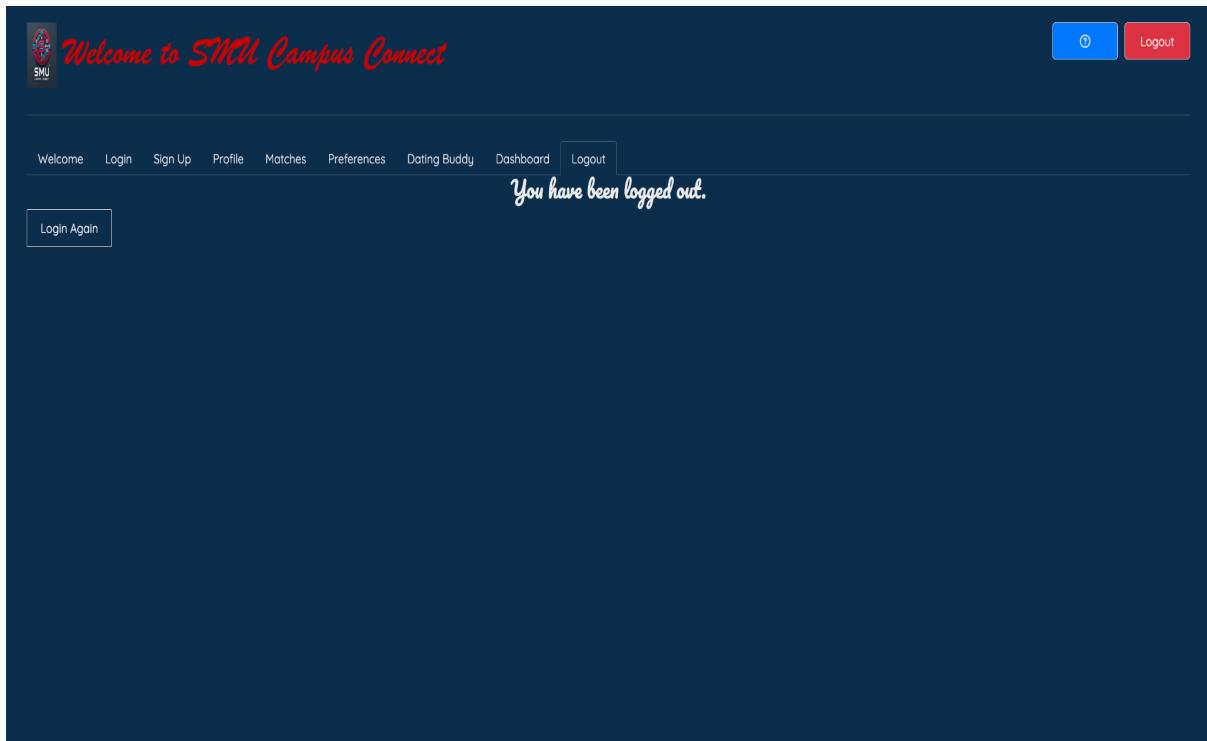


Exhibit 3 CRUD function in SQL

1) Create Query (Insert Data)

```
"INSERT INTO Users (smu_id, name, age, academic_level, race, photo_path, gender, password, bio_details)", "VALUES ("", input$signup_id, "", "", input$signup_name, "", "", input$signup_age, "", input$signup_academic_level, "", "", input$signup_race, "", "", photo_url, "", "", input$signup_gender, "", "", input$signup_password, "", "", input$signup_bio_details, "")"
```

The screenshot shows the MySQL Workbench interface. The left sidebar displays the 'SCHEMAS' tree, with 'smu_campus_connect' selected. The main area contains a query editor window titled 'Query 1' with the following code:

```
1 • INSERT INTO Users (smu_id, name, age, academic_level, race, gender, bio)
2 VALUES ('SMU12345', 'John Doe', 25, 'Undergraduate', 'Asian', 'Male', 'Hello, I am John!')
```

The result grid below shows the inserted data:

smu_id	user_id	password
NULL	103	Phani
89090	111	ibisbjbjvb
425	121	425
1212112	122	111
09876	140	09876
49711968	155	Twinkle@123
99999	158	99999
49725319	161	Texas@426
NULL	NULL	NULL

2) Read Query Fetch user data based on smu_id (e.g., when user logs in)

```
SELECT * FROM Users WHERE smu_id = "", input$login_id, "" AND password = "", input$login_password, """
```

The screenshot shows the MySQL Workbench interface. The left sidebar displays the 'SCHEMAS' tree, with 'smu_campus_connect' selected. The main area contains a query editor window titled 'Query 1' with the following code:

```
1 • SELECT * FROM Users WHERE smu_id = '49725319' AND password = 'Texas@426'
```

The result grid below shows the fetched data:

user_id	smu_id	name	race	age	photo_path	gender	password	academic_level	bio_details
161	49725319	Swetha Naga Venkata	Asian	28	https://smucampusconnect.s3.us-east-2.amazonaws.com/	Female	Texas@426	Graduate	I am a passion

3) Update : Update a user's preferences

```
"UPDATE Preferences SET pref_gender = "", input$edit_pref_gender, "", "  
"pref_age_min = ", input$edit_pref_age[1], "", "  
"pref_age_max = ", input$edit_pref_age[2], "", "  
"pref_race = "", input$edit_pref_race, "", "  
"pref_academic_level = "", input$edit_pref_academic_level, "" "  
"WHERE user_id = ", user_data$data$user_id
```

The screenshot shows the MySQL Workbench interface. On the left, the 'Schemas' tree view is open, showing the 'smu_campus_connect' schema with tables like 'eBayCollectibles', 'Views', 'Stored Procedures', and 'Functions'. The main area is titled 'Query 1' and contains the following SQL code:

```
1 • UPDATE Preferences  
2 SET  
3     pref_gender = 'Female',  
4     pref_age_min = 25,  
5     pref_age_max = 35,  
6     pref_race = 'Asian',  
7     pref_academic_level = 'Postgraduate'  
8 WHERE  
9     user_id = 123;
```

Below the code, the 'Result Grid' shows the updated data in the 'Preferences' table:

smu_id	user_id	password
NULL	103	Phani
89090	111	ibisbjyjb
425	121	425
9012112	122	111
09876	140	09876
49711988	155	Twinkle@123
99999	158	99999
49725319	161	Texas@426
NULL	NULL	NULL

4) Delete user data from all tables

```
DELETE FROM Preferences WHERE user_id = (SELECT user_id FROM Users WHERE  
smu_id = "", smu_id, "")")  
DELETE FROM Users WHERE smu_id = "", smu_id, """
```

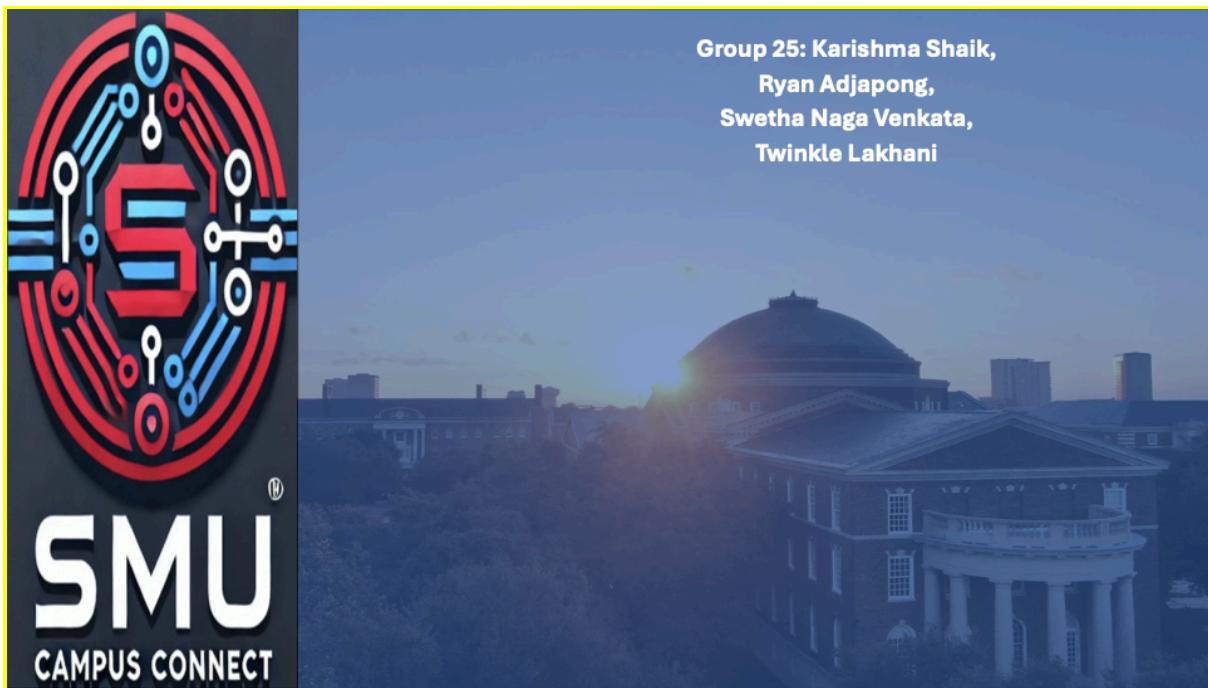
The screenshot shows the MySQL Workbench interface. On the left, the 'Schemas' tree view is open, showing the 'smu_campus_connect' schema with tables like 'eBayCollectibles', 'Views', 'Stored Procedures', and 'Functions'. The main area is titled 'Query 1' and contains the following SQL code:

```
1 • DELETE  
2   FROM Preferences  
3   WHERE user_id = (SELECT user_id FROM Users WHERE smu_id = '0000');  
4  
5 • DELETE FROM Users WHERE smu_id = '<49725319>'  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17
```

Below the code, the 'Action Output' table shows the execution details:

Action	Time	Response	Duration / Fetch Time
68 10:27:06 DELETE FROM Preferences WHERE user_id = (SELECT user_id FROM Users WHERE smu_id = '49725319')	10:27:06	0 row(s) affected	0.042 sec
69 10:27:38 DELETE FROM Preferences WHERE user_id = (SELECT user_id FROM Users WHERE smu_id = '0000')	10:27:38	0 row(s) affected	0.040 sec
70 10:28:06 DELETE FROM Preferences WHERE user_id = (SELECT user_id FROM Users WHERE smu_id = '0000')	10:28:06	0 row(s) affected	0.041 sec
71 10:28:06 DELETE FROM Users WHERE smu_id = '<49725319>'	10:28:06	0 row(s) affected	0.051 sec

Exhibit 4 PPT slides

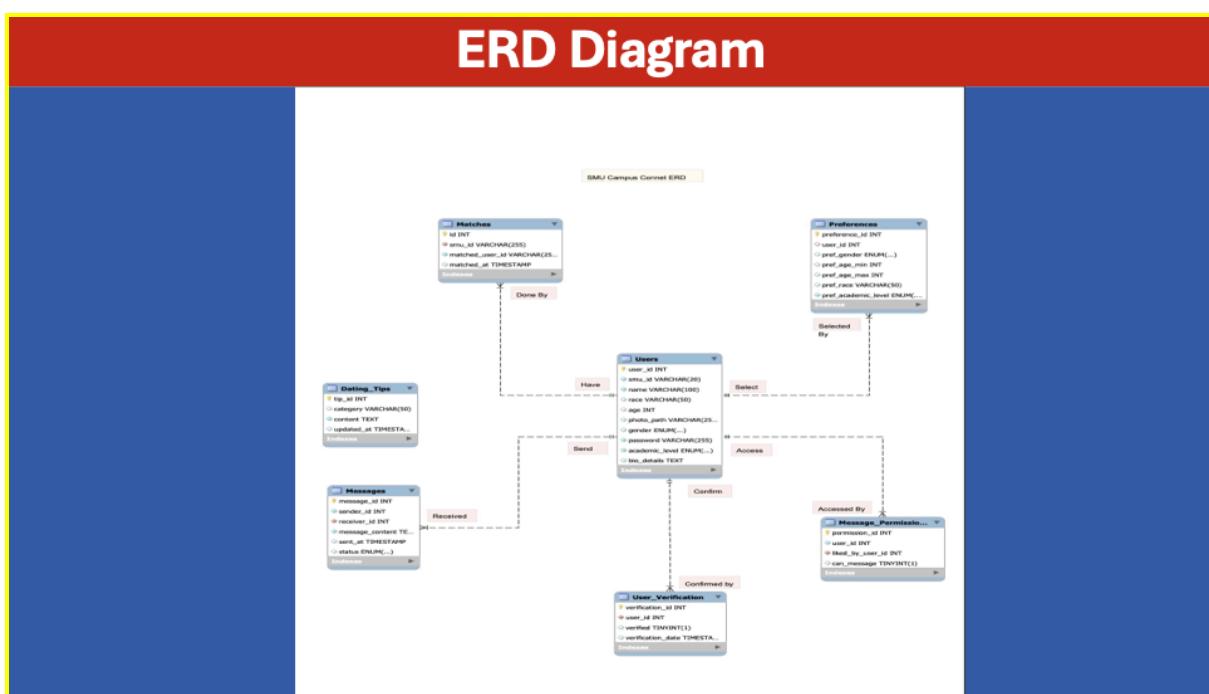


GOALS

Create a Secure and Innovative Dating Platform for SMU Students with SMU ID verification	Facilitate matching based on Personalized preferences
Enable controlled messaging, allowing students to initiate conversations after a "like."	Integrate LLM with SQL to display used queries and provide personalized dating tips based on interactions and preferences

SMU

ERD Diagram



DEMO



"Lets explore the app's features: SMU ID verification, message-first system, and personalized matching."

[Click here](#)
to open SMU CAMPUS CONNECT APP

CRUD FUNCTION

CREATE

- Login with SMU ID
- Profile setup (name, bio, photos)
- Preferences (age, gender, etc.)
- Account creation in the system

READ

- Search for potential matches
- Filter by preferences
- Browse profiles
- View match suggestions

UPDATE

- Edit profile details
- Adjust preferences
- Change Age range or interests

DELETE

- User clicks “Unsubscribe” to initiate account deletion.
- Remove profile
- A confirmation prompt appears and account gets deleted once clicked on yes

Future Vision for Campus Connect



Feature Expansion

Voice Calls and potential video chat functionality for more interactive connections.

Enhance Security Features

Implement encryption for user passwords in the database to enhance security Continuously improve privacy settings.

User Feedback Loop

Regularly collect Students feedback to continuously improve app features and ensure the app evolves based on student needs.

Questions?????

Thank you

