Database Design Document

for

College Social Media Management System

Prepared by

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1 Purpose

1.1 Document Objectives

Objectives of this Database design document are as follows

1. To explain the design of the database through Entity-Relational mapping in which the data is stored
2. This document will serve as basis while implementing the database and it will provide all the necessary details required for implementing it.

1.2 Intended Audience and Document Overview

This document is intended for the following audience

1. Developers - who are going to implement the software meeting the required functional requirements.
2. Technical reviewers - Professors who must evaluate the quality of the overall document and product.

1.3 Definitions, Acronyms and Abbreviations

DBMS - Database Management System
1NF - First Normal Form
2NF - Second Normal Form
3NF - Third Normal Form
BCNF - Boyce-Codd Normal Form

2 Assumptions and Constraints

2.1 Assumptions

The following assumptions are made while developing this product:

- The system administrators will be able to delete posts or send user warnings.
- To view Posts and Discussion threads users need to register on the web application.
- Since it is a web based application the users are required to have a decent internet connection.
- The system administrators are the only responsible ones for maintaining the database and will be ensuring the consistency of the database.

2.2 Constraints

The following design and implementation constraints are employed in the system:

- System Administrator will have fixed login details.
- Each student or a club will be registered into the platform as a single user.
- This user will have credentials like UserID, Password, emailID and userType depending upon whether the user is an individual student or a club.
- Users have access to every post or event created or thread generated.
- However, the messages are private and end-to-end encrypted.
- Each login session of the user will be stored in Database along with essential attributes like userID,sessionID,expiresAt,createdAt,updatedAt.
- The users can see only the count of reactions on the specific post/thread/event.
- The upvote or downvote is an irreversible Reaction.
- Users can comment into the comment box provided below the post.
- The software is designed, delivered and maintained.

3 Database - Wide Design Decisions

3.1 Behaviour

Signup Page:
Initially the users will have a feature to signup using their College Email ID and other personal details like (Fullname, Dept , DoB , PassingYear, Gender etc). If they have already created an Account they can login using their registered Email ID and password which will be generated during registration and will be sent to their registered Email ID.

Students/Clubs:
Once the students & Clubs have created their account they will be able to use the following features

- Post a Query
- Manage their own social media profile
- Add/Remove events
- Create a discussion thread
- Upvote/Downvote , Comment on a thread
- Send message to other users
- Report a post

System Administrator:
System admin will be able to delete/suspend a user , delete a post if the report count on a post has exceeded some count and will be able to send a user warning . System admin will be able to release updates .

3.2 DBMS Platform

Users will interact with the system via a web app that provides a simple and intuitive interface. It is expected to work on all web browsers. The web app allows user entry to their respective landing pages after providing login credentials. Depending on the user role, the functionality differs.

3.3 Security Requirements

Authentication
Database security measures include authentication, the process of verifying if a user's

credentials match those stored in the database, and permits only authenticated users access to the data, networks, and database platform. Email Authentication makes sures that no one can create an account on another student's email ID.

Students/Clubs:
The users will be able to edit only their own details/posts/queries and won't be able to edit any of the admin details.

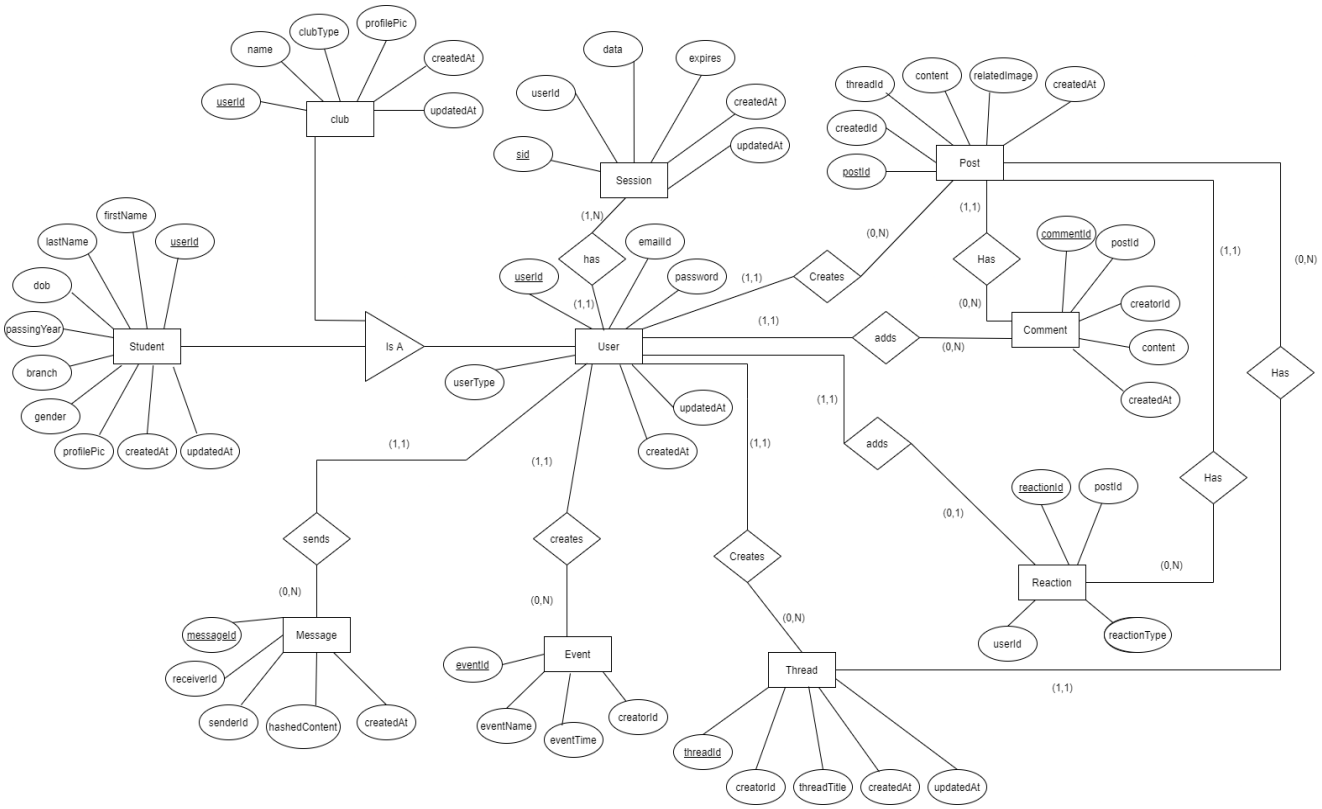
Administrator:
The system administrator will be able to delete/suspend user accounts ,send user warnings , and delete posts . He can view the reports and bugs identified by users across the platform and will be able to release updates.

3.4 Performance and Availability Decisions

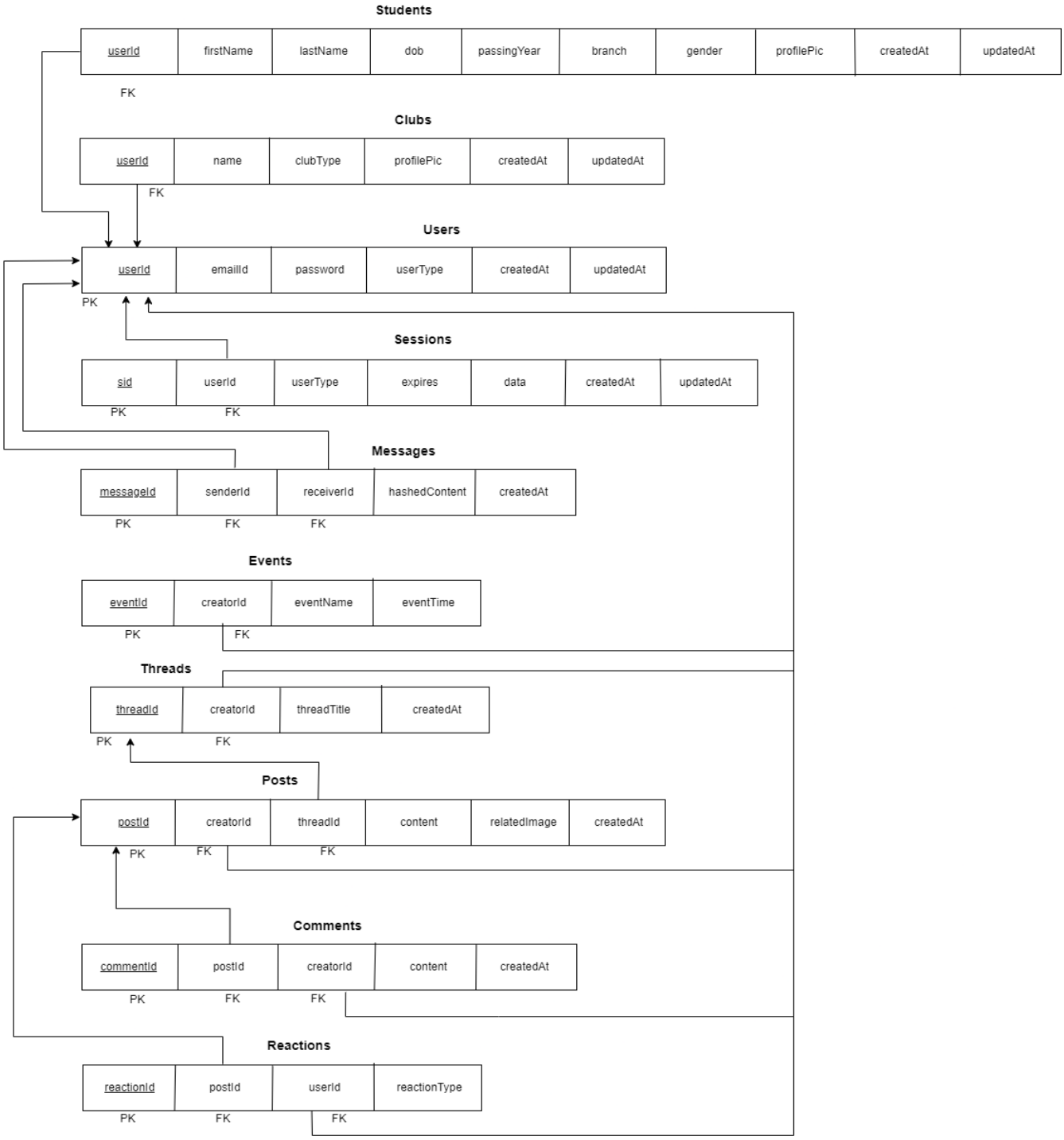
The response times of the various interfaces and capacity of the system is entirely dependent on the available memory space as well as the software's capability of performance

4 Database Administrative Functions

4.1 Entity-Relational Model



4.2 Relational Schema



4.3 Normalization

- **1NF** :- The tables are in 1NF, as each table contains atomic values and each record is unique.
- **2NF** :- The tables are in 1NF as stated above. Also, no partial dependencies are present i.e. no such non-prime key exists that solely depends on only one part of the primary key. Hence, the tables are in 2NF as well.
- **3NF** :- The tables are in 2NF as proved. No Transitive Functional Dependencies i.e. no non prime keys are dependent on other non-prime keys. Hence the tables are in 3NF.
- **BCNF** :- The tables are in 3NF. Also, for every Functional Dependency present in tables, the Left Hand Side is a Super Key. Hence all Tables are in BCNF also.

4.4 Schema Description & Data Formats

Students

Field	Type	Null	Key	Default	Extra
userId	int unsigned	NO	PRI	NULL	auto_increment
firstName	varchar(255)	NO		NULL	
lastName	varchar(255)	NO		NULL	
passingYear	int unsigned	NO		NULL	
branch	varchar(255)	NO		NULL	
dob	date	NO		NULL	
gender	varchar(10)	NO		NULL	
profilePic	varchar(255)	NO		NULL	
createdAt	datetime	NO		NULL	
updatedAt	datetime	NO		NULL	

Clubs

Field	Type	Null	Key	Default	Extra
userId	int unsigned	NO	PRI	NULL	auto_increment
name	varchar(255)	NO		NULL	
clubType	varchar(255)	NO		NULL	
profilePic	varchar(255)	NO		NULL	
createdAt	datetime	NO		NULL	
updatedAt	datetime	NO		NULL	

Users

Field	Type	Null	Key	Default	Extra
userId	int unsigned	NO	PRI	NULL	
emailId	varchar(255)	NO	UNI	NULL	
password	varchar(255)	NO		NULL	
userType	varchar(255)	NO		NULL	
createdAt	datetime	NO		NULL	
updatedAt	datetime	NO		NULL	

Sessions

Field	Type	Null	Key	Default	Extra
sid	int unsigned	NO	PRI	NULL	auto_increment
UserId	int unsigned	NO	MUL	NULL	
expires	datetime	YES		NULL	
data	text	YES		NULL	
createdAt	datetime	NO		NULL	
updatedAt	datetime	NO		NULL	

Messages

Field	Type	Null	Key	Default	Extra
messageId	int unsigned	NO	PRI	NULL	auto_increment
senderId	int unsigned	NO	MUL	NULL	
receiverId	int unsigned	NO	MUL	NULL	
hashedContent	text	NO		NULL	
createdAt	datetime	NO		NULL	

Threads

Field	Type	Null	Key	Default	Extra
threadId	int unsigned	NO	PRI	NULL	auto_increment
creatorId	int unsigned	NO	MUL	NULL	
threadTitle	varchar(255)	NO		NULL	
createdAt	datetime	NO		NULL	
updatedAt	datetime	NO		NULL	

Posts

Field	Type	Null	Key	Default	Extra
postId	int unsigned	NO	PRI	NULL	auto_increment
creatorId	int unsigned	NO	MUL	NULL	
content	varchar(255)	NO		NULL	
threadId	int unsigned	YES	MUL	NULL	
relatedImage	varchar(255)	YES		NULL	
createdAt	datetime	NO		NULL	

Reactions

Field	Type	Null	Key	Default	Extra
reactionId	int unsigned	NO	PRI	NULL	auto_increment
userId	int unsigned	NO	MUL	NULL	
postId	int unsigned	NO	MUL	NULL	
reactionType	enum(‘upvote’, ‘downvote’,'report')	NO		NULL	

Events

Field	Type	Null	Key	Default	Extra
eventId	int unsigned	NO	PRI	NULL	auto_increment
eventName	varchar(255)	NO		NULL	
eventTime	datetime	NO		NULL	
creatorId	int unsigned	NO	MUL	NULL	

Comments

Field	Type	Null	Key	Default	Extra
commentId	int unsigned	NO	PRI	NULL	auto_increment
content	varchar (255)	NO		NULL	
postId	int unsigned	NO	MUL	NULL	
creatorId	int unsigned	NO	MUL	NULL	
createdAt	datetime	NO		NULL	

5 References

DBMS Lectures
Online drawing tool - https://app.diagrams.net/