

# Database Design Project

## Database System for a Social Media Site

25.03.2023

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CO226-Database Systems

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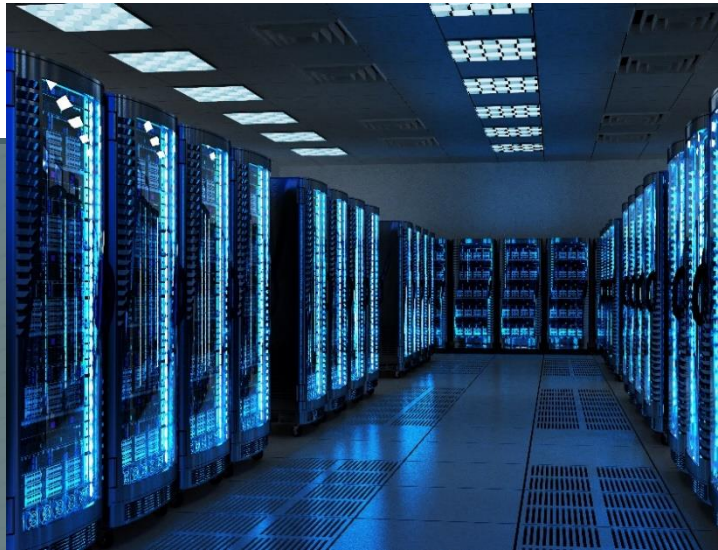
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## 1. Project Overview

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In this project it is intended to design and implement a database. A database simply refers to a set of related data organized in a way that it can be easily stored, changed, and accessed at any time. We have chosen to design a “Database System for a Social Media Site” as our suitable application.

social media management also involves the management of big data from multiple sources. There is no other way to manage this amount of information without a reliable database.

Database is needed to:

1. Keep track of user data
2. Authenticate user data (signup and create a profile)
3. Collaborate with multiple users at a time.
4. Link between profiles (add other profiles as friends , relationships.)
5. Store an abundance of user information used to recommend friends, businesses, products, and topics to the end user.
6. add posts that have photos text videos.
7. Add reactions and comments.

By creating a reliable database, it is easy to manage all these requirements with less resources and less complications.

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## 2. Problem Definition

### Problem statement:

Considering a social media site, it is required to have a proper mechanism to retrieve, manipulate and store users' data in order to build and maintain a smooth flow between user interactions and server-side services. Using a traditional file system or an unorganized database might not be well suited for this application, and in fact it might create a rather messy and hard to maintain data system as well as many other problems.

Here are some problems occurring when maintaining a social media site and why keeping a database is important to solve them than having any other application such as spreadsheets.

1. Excessive amount of data.

Gigabytes of data will be added each day to the social media platform. It is very inconvenient and sometimes impossible to keep all these data in a spreadsheet. Even though it is quite large, there is a limit for spreadsheets. On the other hand, by keeping a database all these data can be easily stored and accessed.

2. Dynamicity

In a social media platform added data are constantly changing. Sometimes it is needed to add entirely new fields and new features to the platform. This can be easily achieved by keeping a database. Also, we can expand a field which is already there in a database without any problem.

3. Reliability of data

In a social media platform added data are constantly changing. Sometimes it is needed to add entirely new fields and new features to the platform. This can be easily archived by keeping a database. Also, we can expand a field which is already there in a database without any problem.

### 3. Proposed System and Database Description

#### 3.1 Proposed Database (Database Description)

##### 3.1.1 Objects/entities

1. User
2. Post
3. Comment
4. Like

##### 3.1.2 Fields/attributes of each entity

###### 1. User

- I. User id (Primary Key)
- II. Username
- III. Password
- IV. First name
- V. Last name
- VI. Email
- VII. Date of Birth
- VIII. Profile Picture
- IX. Bio
- X. Location

###### 2. Post

- I. Post id (Primary Key)
- II. User id (Foreign Key)
- III. Date and time
- IV. Content
- V. Likes no.
- VI. Comments no.

### 3. Comment

- I. Comment id (Primary Key)
- II. User id (Foreign Key)
- III. Post id (Foreign Key)
- IV. Date and time
- V. Content

### 4. Like

- I. Like id (Primary Key)
- II. User id (Foreign Key)
- III. Post id (Foreign Key)
- IV. Date and time
- V. Like type (heart,care,haha,wow,sad,angry)

## 3.2 Assumptions and Dependencies

- It is assumed that all the proposed hardware and software are legal, up to date and functioning properly.
- It is assumed that the client (social media Company) only requires a database to store user profile info, posts, comments and likes info. No further and more complex functionalities are required.
- It is assumed that, in case of a temporary or permanent breakdown; the backup server automatically replaces the main server.
- It is assumed that power and internet connection for the servers remain constant without any failures.



## 4. System Requirement Specifications

### 4.1 Hardware Specification (Proposed):

- Main Server: (As the web server and active database)
  - Processor - 4 Cores, 3.0-3.5 GHz each
  - 4GB RAM per core (Total 16GB)
  - SDD Hard drive 256GB
  - Network Connectivity
- Backup Server: (In case of temporary and permanent breakdowns)
  - Processor - 4 Cores, 2.8.0-3.0 GHz each
  - 2GB RAM per core (Total 8GB)
  - SDD Hard drive 128GB
  - Network Connectivity
- Switch: 8 port layer 2 GE switch
- Router: Wired Gigabit Router (small business edition)

### 4.2 Software Specification (Proposed):

- Backend:
  - Ubuntu Linux 18.04.6 LTS (server version) – operating system
  - XAMPP Package
    - MySQL database (V 5.0.37) - database server
    - phpMyAdmin (V 5.2.0) - database administration over web
  - Apache Tomcat (V 9.0) - web server

✓ Languages to be used for the backend:

  - php
  - Linux shell scripts
- Frontend:
  - vue.js - framework
  - Git/GitHub - version control
  - Visual StudioCode - IDE

✓ Languages to be used for the frontend:

  - html
  - css
  - javascript

## 5. Feasibility Study

Testing the likelihood that the system will be useful and practically possible to implement and able to maintain for a considerable period of time for the social media company and its users.

### 4.1 Economical Feasibility

- ✓ Free and open-source software are used such as Linux servers and XAMPP tool.
- ✓ Given hardware requirements for the server must be satisfied otherwise there will be often temporary breakdowns in the server due to excessive number of user requests. So above requirements are feasible for the social media site to keep the user attraction.
- ✓ By providing above requirements when starting, we can save the cost of constant system upgrades in future when expanding the system.

### 4.2 Technical Feasibility

- ✓ The server must be able to manage all the user requests that are coming to it at a time. Given RAM and bandwidth can provide those requirements.

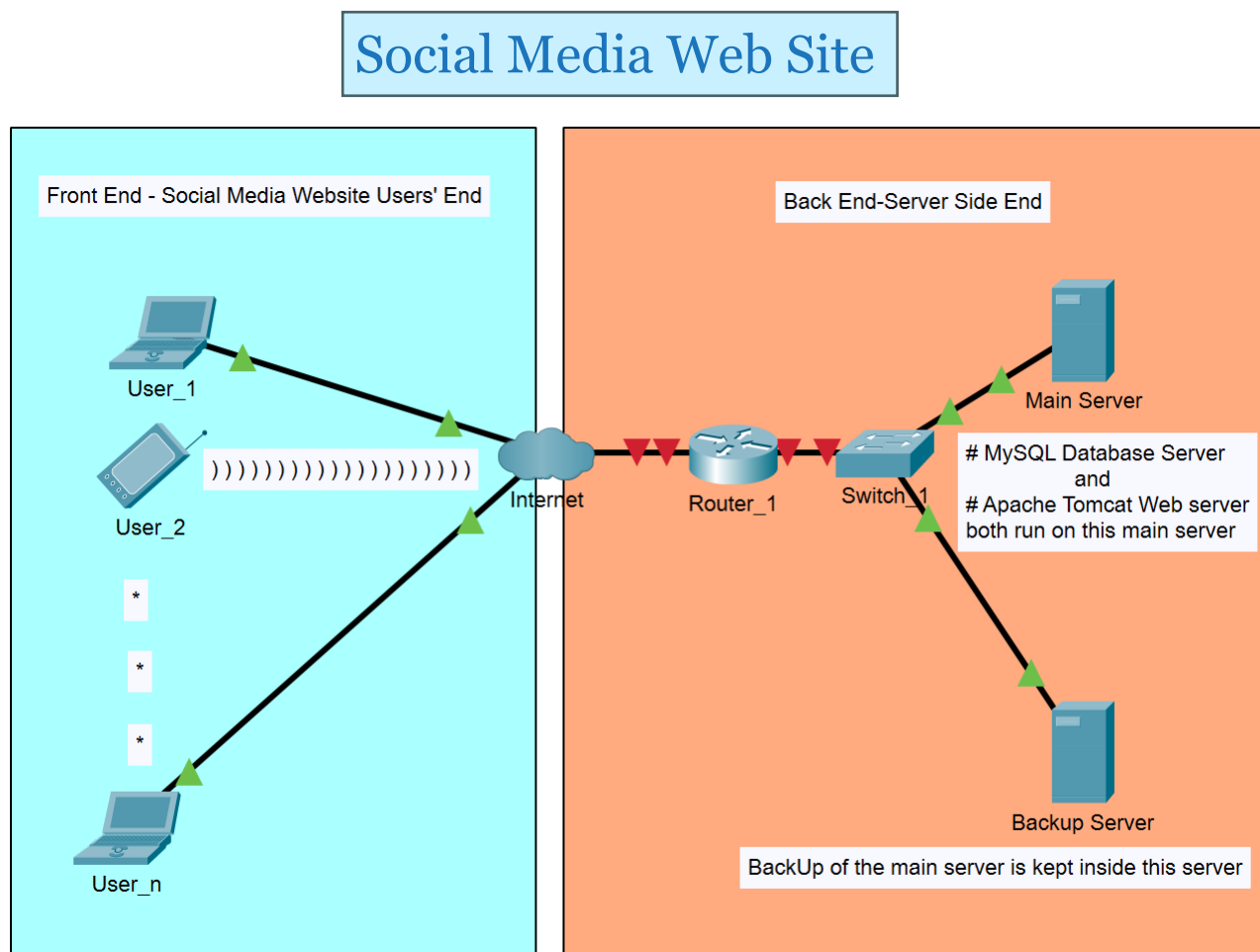
### 4.3 Operational Feasibility

- ✓ In case of a server failure backup server is also implanted to keep operating the network

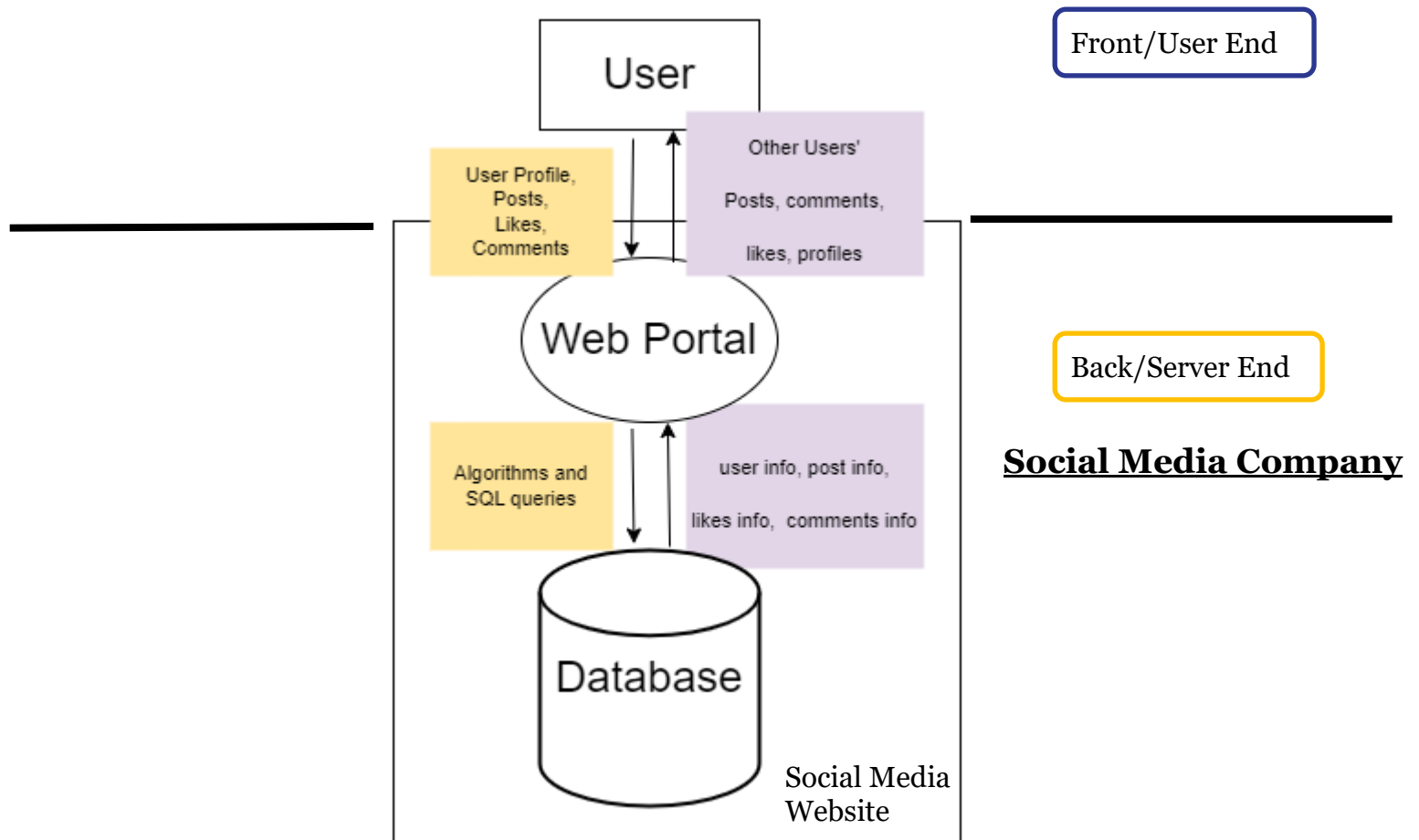


## 6. Data Flow Diagram

### 6.1 Network Diagram

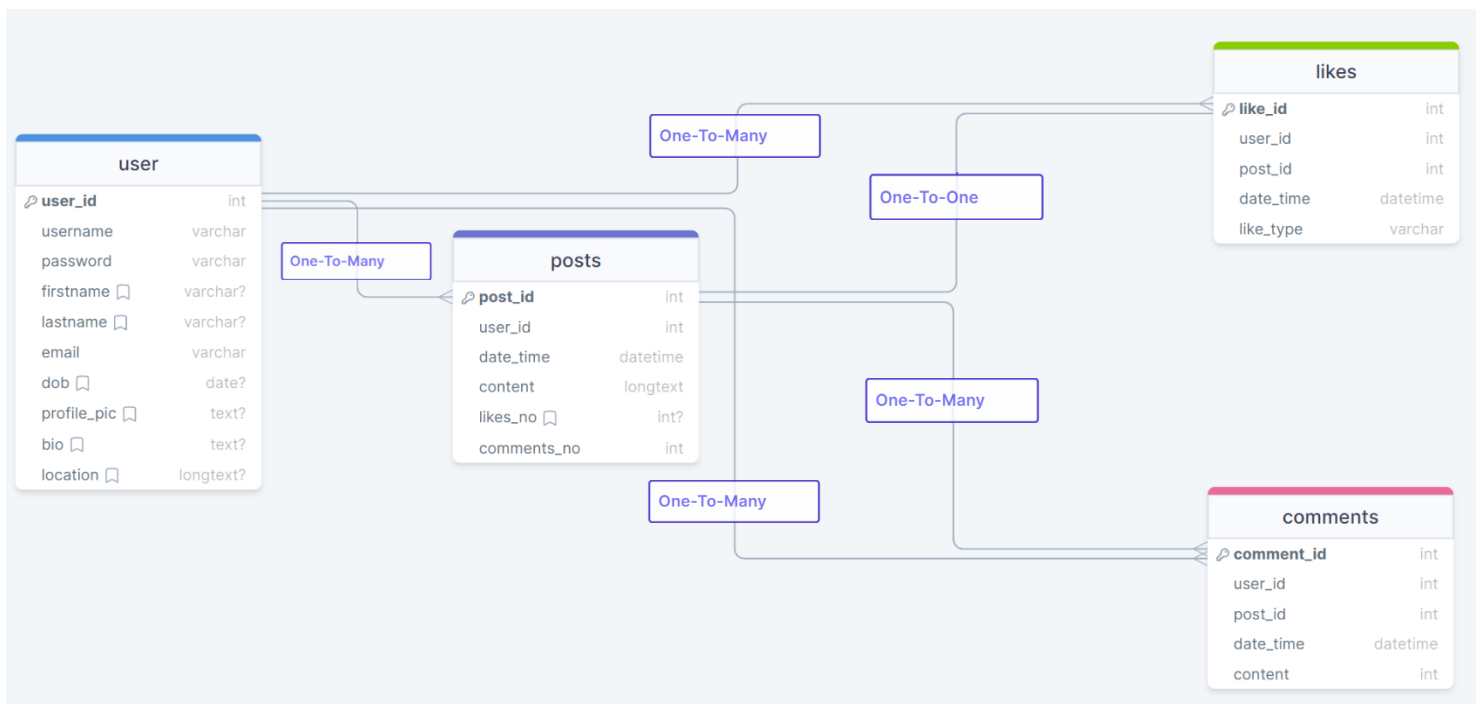


## 6.2 Data Flow Diagram



## 7. Database design

### 7.1 Relational Model





## 7.2 Table Structure

Table 01-User Profile Table:


	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
<input type="checkbox"/>	1	<b>user_id</b> 	int(11)			No	None		AUTO_INCREMENT
<input type="checkbox"/>	2	<b>username</b>	varchar(30)	latin1_swedish_ci		No	None		
<input type="checkbox"/>	3	<b>password</b>	varchar(30)	latin1_swedish_ci		No	None		
<input type="checkbox"/>	4	<b>firstname</b>	varchar(30)	latin1_swedish_ci		Yes	NULL		
<input type="checkbox"/>	5	<b>lastname</b>	varchar(30)	latin1_swedish_ci		Yes	NULL		
<input type="checkbox"/>	6	<b>email</b>	varchar(100)	latin1_swedish_ci		No	None		
<input type="checkbox"/>	7	<b>dob</b>	date			Yes	NULL	date of birth	
<input type="checkbox"/>	8	<b>profile_pic</b>	text	latin1_swedish_ci		Yes		image_link	
<input type="checkbox"/>	9	<b>bio</b>	text	latin1_swedish_ci		Yes			
<input type="checkbox"/>	10	<b>location</b>	longtext	utf8mb4_bin		Yes			

Table 02-Posts Table:


	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
<input type="checkbox"/>	1	<b>post_id</b> 	int(11)			No	None		AUTO_INCREMENT
<input type="checkbox"/>	2	<b>user_id</b>	int(11)			No	None		
<input type="checkbox"/>	3	<b>date_time</b>	datetime			No	None		
<input type="checkbox"/>	4	<b>content</b>	longtext	utf8mb4_bin		No		as json object	
<input type="checkbox"/>	5	<b>likes_no</b>	int(11)			Yes	NULL		
<input type="checkbox"/>	6	<b>comments_no</b>	int(11)			No	None		

Table 03-Likes Table:



#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
<input type="checkbox"/> 1	<b>like_id</b> 	int(11)			No	None		AUTO_INCREMENT
<input type="checkbox"/> 2	<b>user_id</b>	int(11)			No	None		
<input type="checkbox"/> 3	<b>post_id</b>	int(11)			No	None		
<input type="checkbox"/> 4	<b>date_time</b>	datetime			No	None		
<input type="checkbox"/> 5	<b>like_type</b>	varchar(10)	latin1_swedish_ci		No	None	heart, care, haha, wow, sad, angry	

Table 04-Comments Table:

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
<input type="checkbox"/> 1	<b>comment_id</b> 	int(11)			No	None		AUTO_INCREMENT
<input type="checkbox"/> 2	<b>user_id</b>	int(11)			No	None		
<input type="checkbox"/> 3	<b>post_id</b>	int(11)			No	None		
<input type="checkbox"/> 4	<b>date_time</b>	datetime			No	None		
<input type="checkbox"/> 5	<b>content</b>	int(11)			No	None		

## 8. References

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