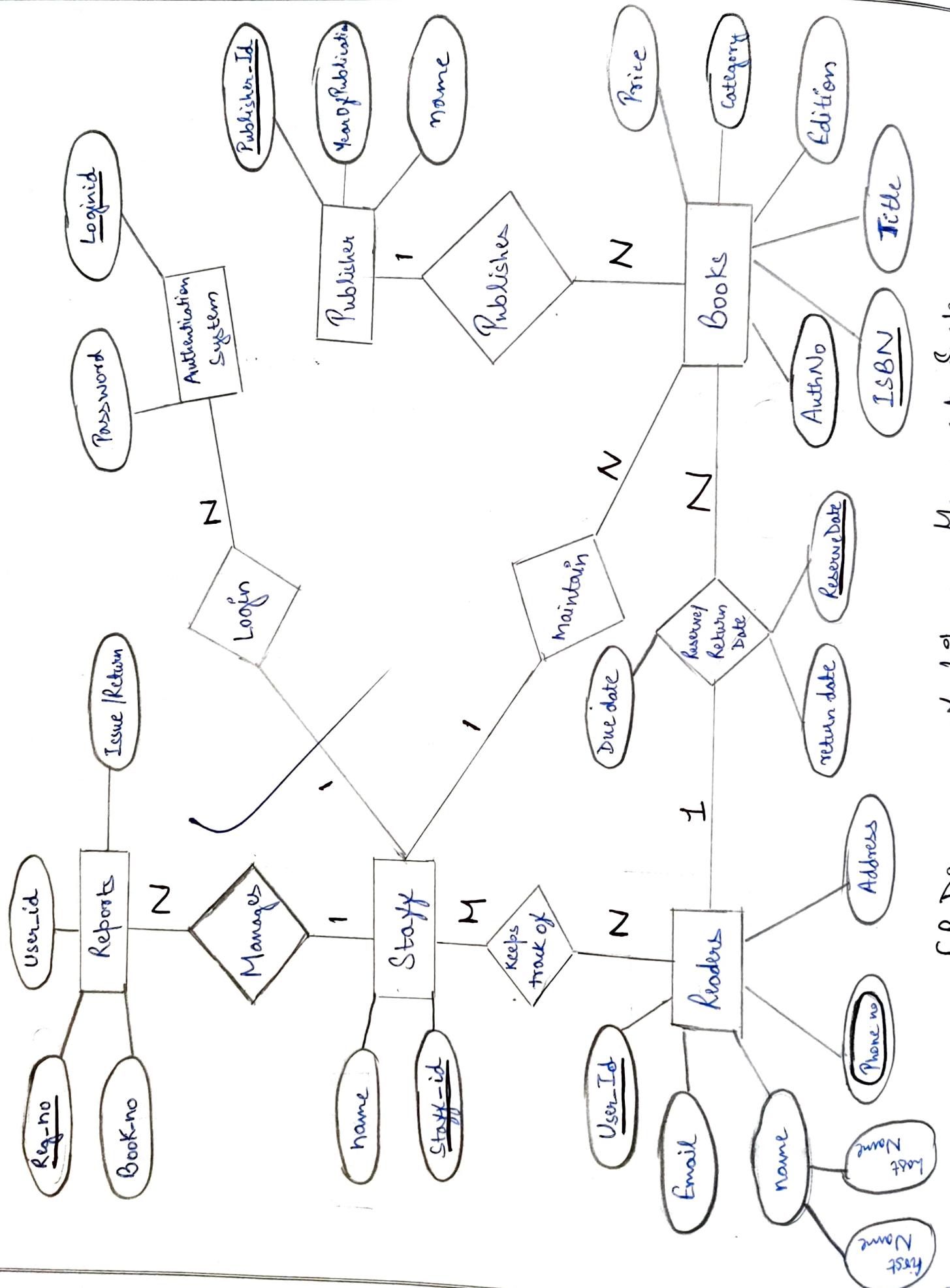


ER Diagram of Library Management System



Experiment - I

ER Diagram of library Management System

The ER Diagram for a library illustrates key information about the library, including entities such as staff, readers, books, publishers, reports & authentication system.

- Primary Keys in the ER Diagram:
- ① ISBN in Book Entity
 - ② User_Id in Reader Entity
 - ③ PublisherId in Publisher Entity
 - ④ LoginId in Authentication System
 - ⑤ Reg-no in Reports Entity
 - ⑥ Staff_id in Staff Entity

- * Name is a Composite attribute of firstName & lastName.
- * Phone no is a Multi valued attribute.

Experiment - 2

Details About Project

Project Name: cb-Network

Members: Pancham Mehta
Dhrum Srivastava
Jayant Maurya
Usman Zafar

Specific Requirements: Hardware Requirements - System

Software Requirements - Internet Connectivity

Browser

React JS

CSS

Reset Router

Web Sockets

Firebase] BackEnd

Frontend

Software Development Life Cycle Model Used: Rapid Application Development (RAD)

Problem Statement: We are developing a platform which gives competitive programmers round the globe an opportunity to interact, compete and share their knowledge/Experiences.

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Design of our Project : The design of the cp-Network is -

1) Login : The user can log in using two methods i.e.-
Google Auth or Email with OTP

2) Profile : The profile page will include his main rating and
group rating. His/Her display Name (userName)
graph represents his growth over time and the
number of questions solved.

3) Main Page : The main page will include the latest
programming trends and technologies in the
form of blogs written by experienced
programmers around the world.

4) World Chat : This enables us to interact with various
programmer around the World, share and
gather knowledge from them.

5) Group Chat : Our site enables us to make groups among
peers and compete with other groups as a
team.

6) Coding Battles : Our site allows individual programmers to
compete amongst themselves and provides
a rating to measure their performance and

Teacher's Signature : _____

progress as a team.

7) Team Clash: Our site enables groups to compete among themselves. Groups also have their ratings, which measures their performance & progress as a team.

8) leaderboard: In this part of the site, users and groups can see their rating and rank according to their performance respectively.

Testing of Our Project: The testing of our project was conducted in multiple phases -

a) Phase 1: Tested among the Developers

Result: Smooth functionality, No bugs were encountered.

b) Phase 2: Tested among a group of 10 people

Result: Satisfactory functionality, Bug encountered in the Team Clash segment (server connection issue i.e. teams cannot find a competitor over the server).

The bug was rectified by the Developer team.

c) Phase 3: Tested with a batch of 100 people.

Result: Satisfactory functionality, Positive feedback, Bug was faced with group creation when the group exceeded a particular no. of members, this bug was resolved by the Developer Team.

d) further phases are planned in Teacher's Signature: _____
future.

Experiment - 1ER Diagram of Institute Management System

* Primary Keys: 1) dept-name in department

2) course-id in Course

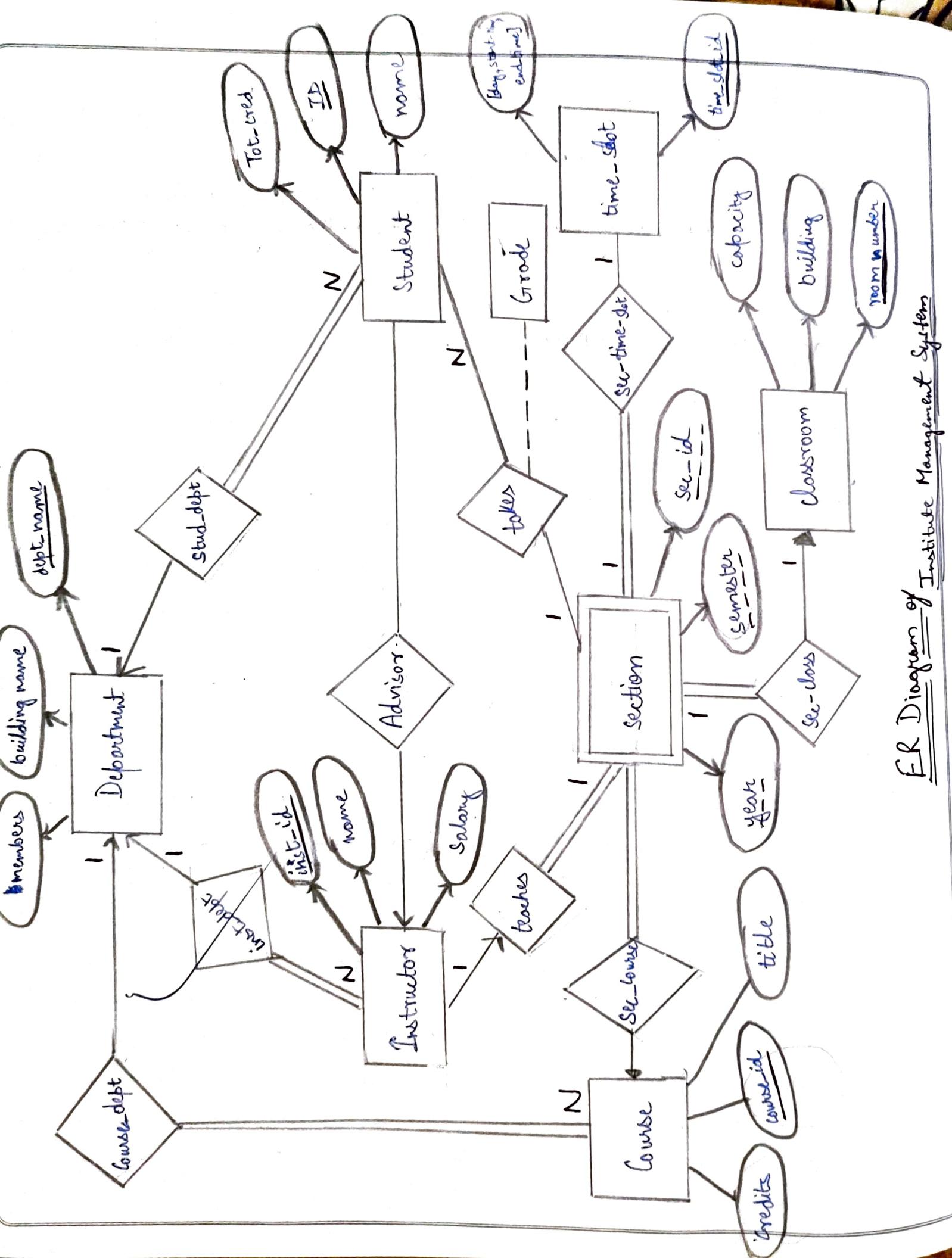
3) ID in Student

4) inst-id in Institute

5) time-slot-id in Time Slot

6) room-number in Classroom

ER Diagram of Institute Management System



Experiment - 4

Functional Requirements Of Our Project: cp-Network

Our platform cp-Network serves as a multipurpose project platform for a user where they can see their progress in the competitive programming domain with the help of Graphs, Rating which serves as a motivation for their further development in this field with the help of Profile functionality on our website, along with this the user can also see his Rank and Rating using the leaderboard functionality of the website. Cp-Network also provides its users an opportunity to connect with fellow competitive programmers around the globe sharing their experiences and competing with them using the World Chat functionality and Coding Battles functionality respectively. They can also create groups among their peers where they can chat amongst themselves using the Group Chat functionality as well as compete as a Team in the Team Chat functionality domain of the website. They can also get to know about the new technologies and trends in the competitive programming domain using the Resources functionality of our website.

~~18 Nov 2023
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Expt. No. 5

Experiment - 5

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Data Flow DiagramLevel 0

Connections in the Level 0 DFD for CP-Network:

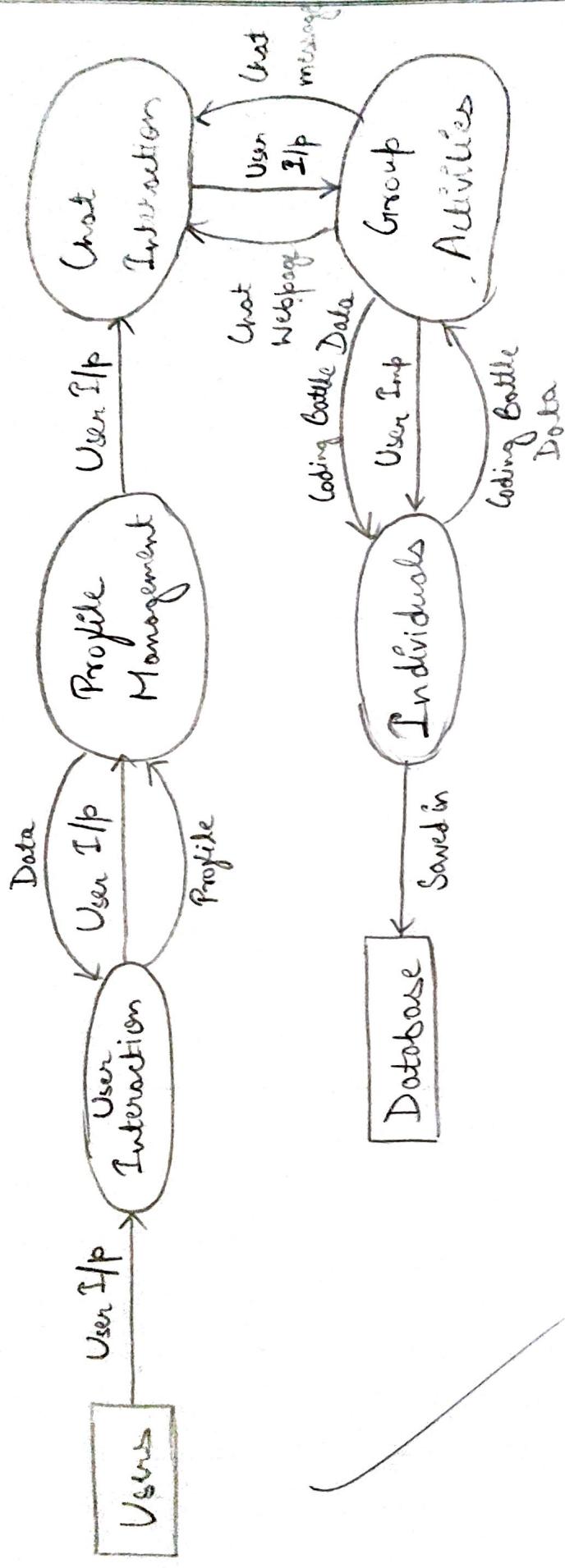
- * **Processes :-**
 - ① User Interaction Process
 - ② Profile Management Process
 - ③ Chat Interactions Process
 - ④ Group Activities Process
 - ⑤ Individual Coding Battle Process

- * **Data Flow Connections :-** Flows to all the main processes:
User Interaction, Profile Management,
Chat interactions, Group Activities &
Individual Coding Battles.

- **Profile Data :** Flows btwn profile management & user profile.
- **Chat messages :** Chat interactions & chats (Flow b/w)
- **Group Information :** Moves btwn Group Management & Group Activities
- **Coding Battle Data :** Coding battles & individual coding battle.

- * **Entities :**
 - Users
 - Database

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level 0
||

level 1

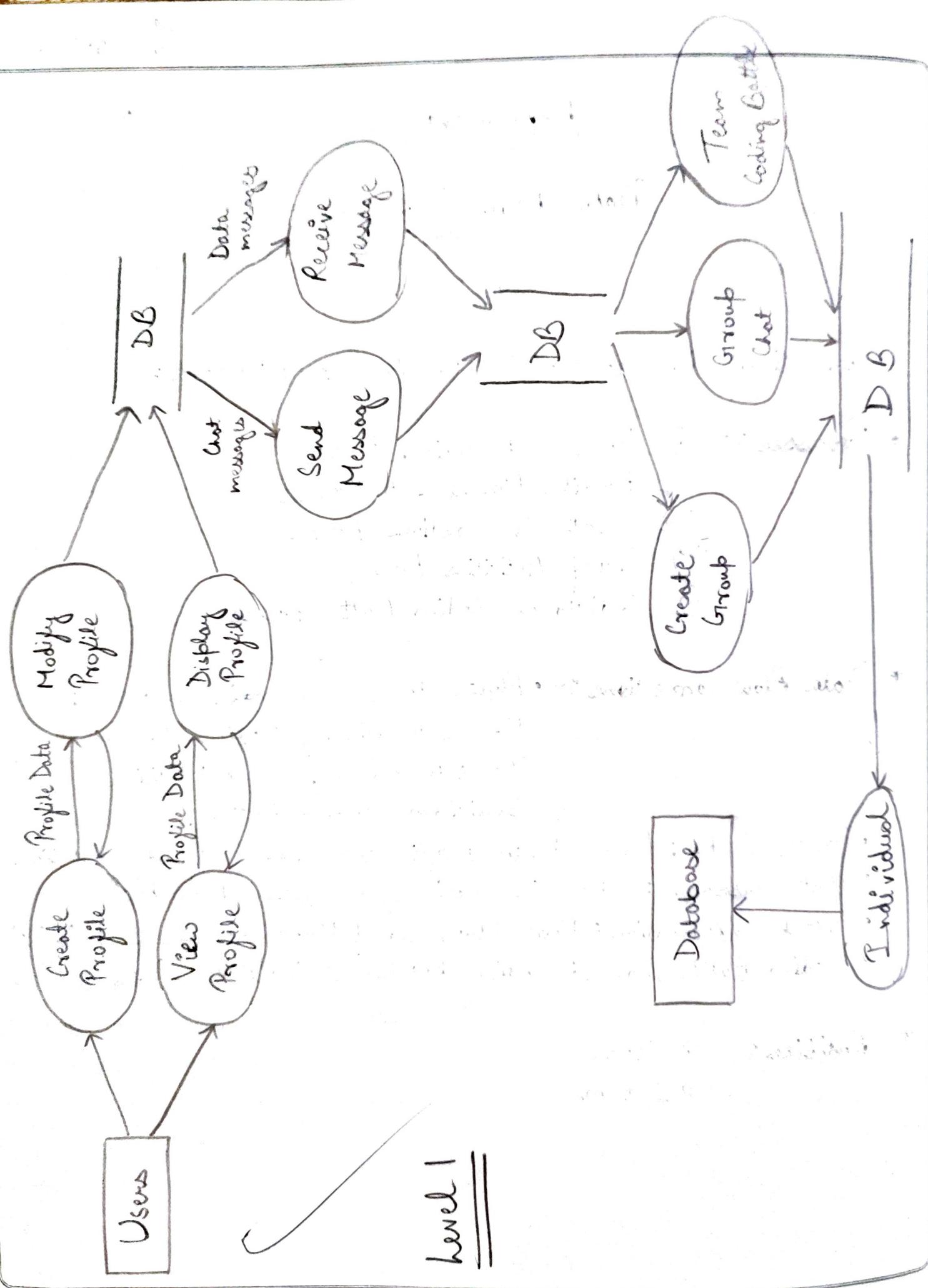
- * Profiles : → User Interaction Process
- Profile Management Process
- Chat Interaction Process.
- Group Activities Process
- Individual Coding Battle Process

- * Data Stores :
 - User Profiles
 - Chat Logs
 - Group Information
 - Battle records
- } Databases (DB)

* Dataflows Directly Interacts:

- User Input: Each process by triggering specific subprocesses.
- Profile Data: Profile Management and user profiles.
- Chat messages: Chat Interaction processes & stored in chat logs.
- Group Information: Shared b/w processes involved in group activities & stored in the group information data store.
- Battle Data: Moves between individual coding battles processes and the battle records data store.

- * External Entities :
 - ① Users
 - ② Database.



Level 2

Note: DFD for Level 2 is drawn only for "Chat Interaction" Process.

* Process :- Chat interaction Process

- Send Message:
 - 3.1.1 : Input Message
 - 3.1.2 : Validates Message
 - 3.1.3 : Add message

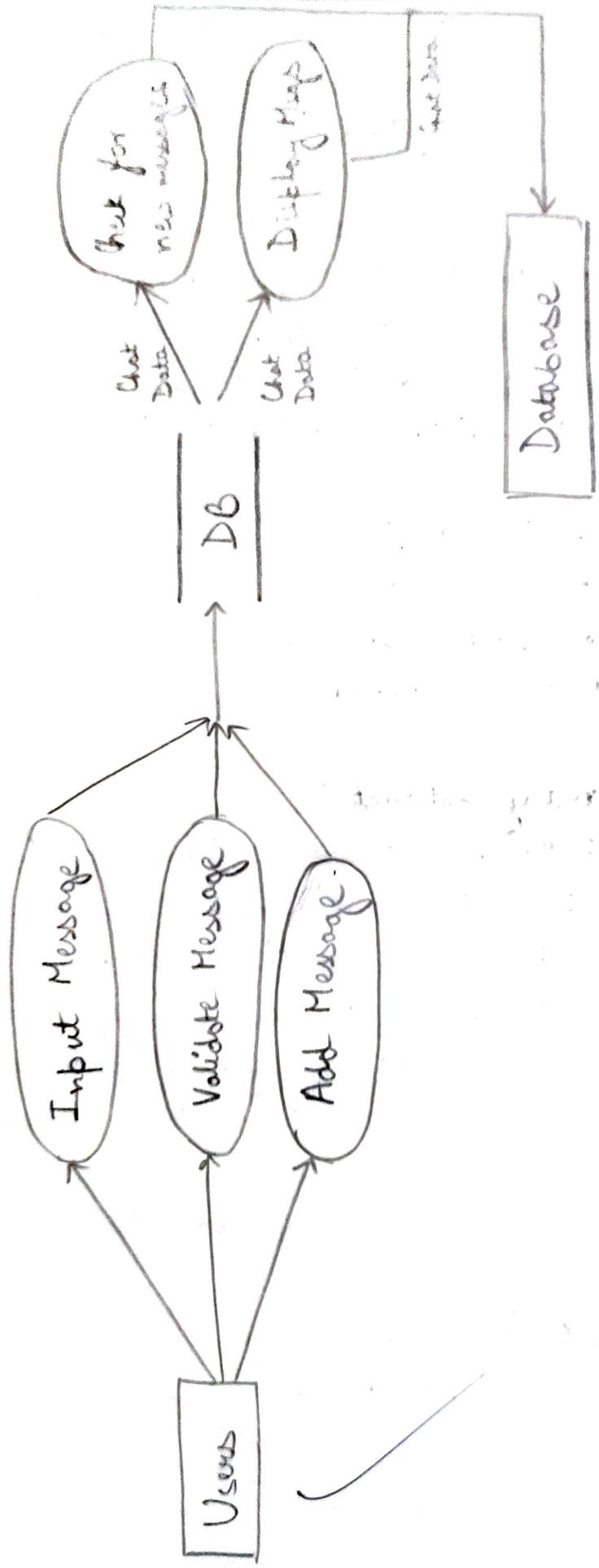
- Receive Message:
 - 3.2.1 : Check for new messages
 - 3.2.2 : Display new messages.

* Data Flow:-

- Chat flow: Each process by triggering specific subprocesses.

* External Entities:-

- (1) Users
- (2) Database



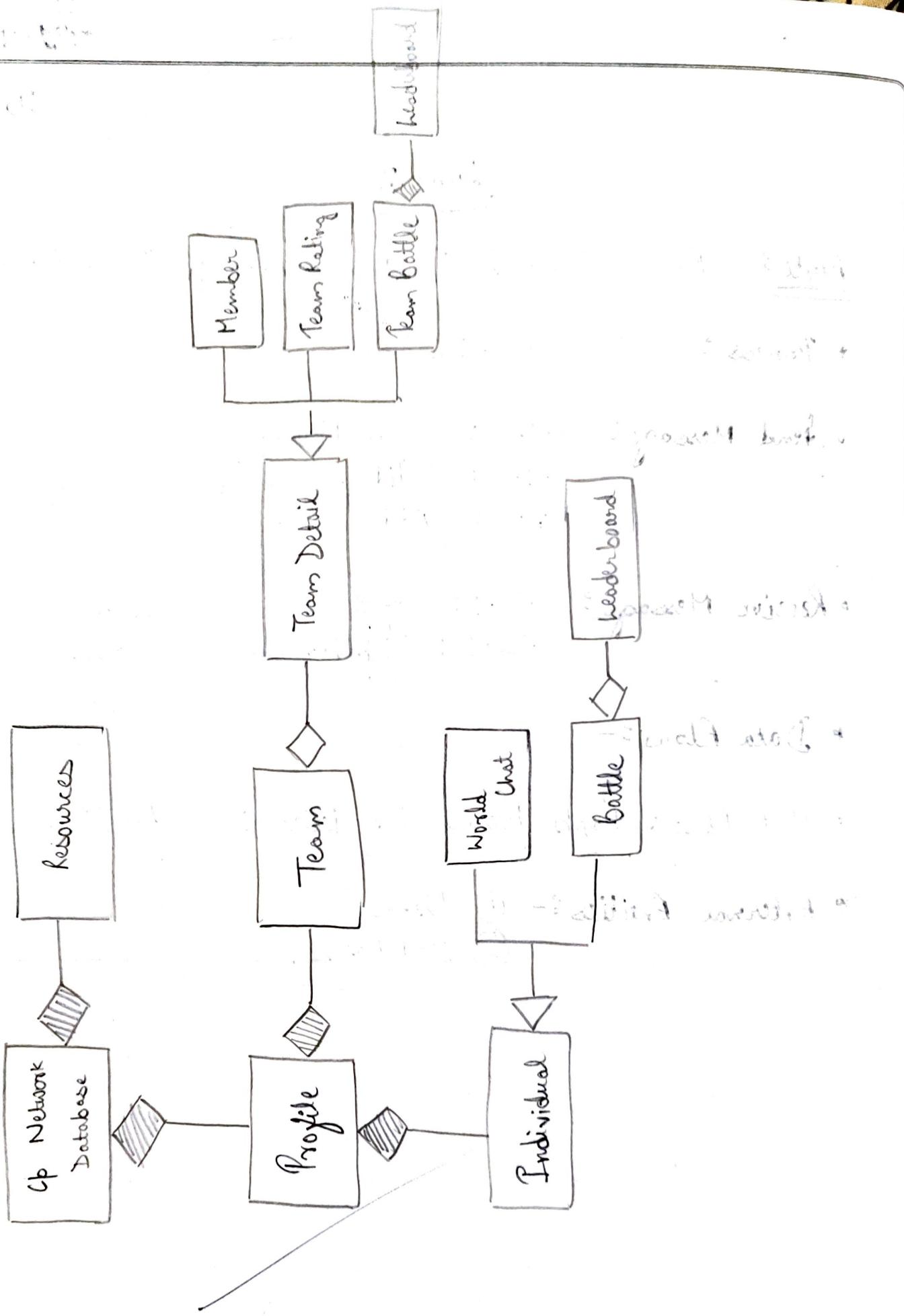
level 2

Experiment - 6Class Diagram

Class Diagram is a static diagram. It represents the static view of an application. The class diagram is not only used for visualizing, describing, and documenting different aspects of a system but also for constructing executable code of the software application.

* Relationships :-

- 1) Relationship btwn Member, Team Rating / Team Battle and Team Detail is "Generalization" in Nature.
- 2) Relationship btwn World Chat & Battle and Individual is "Generalization" in Nature.
- 3) Relation btwn Team and Team Detail is "Aggregation" in nature.
- 4) Relationship btwn Battle & Leaderboard is "Aggregation" in nature.
- 5) Relationship btwn Cp Network Database & Resources / Profile / Individual and Profile & Team is "Aggregation" in nature.



Date. 09.11.23

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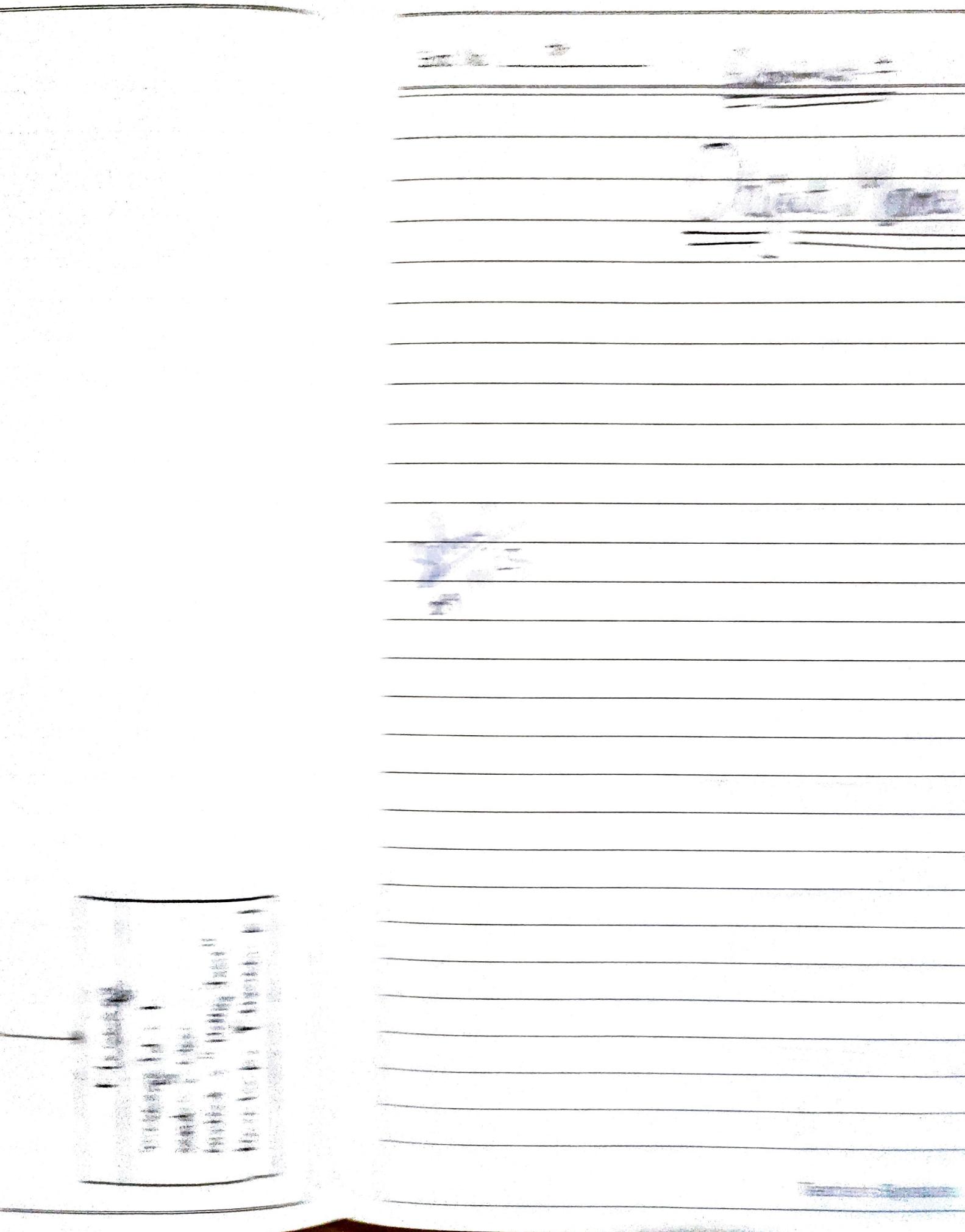
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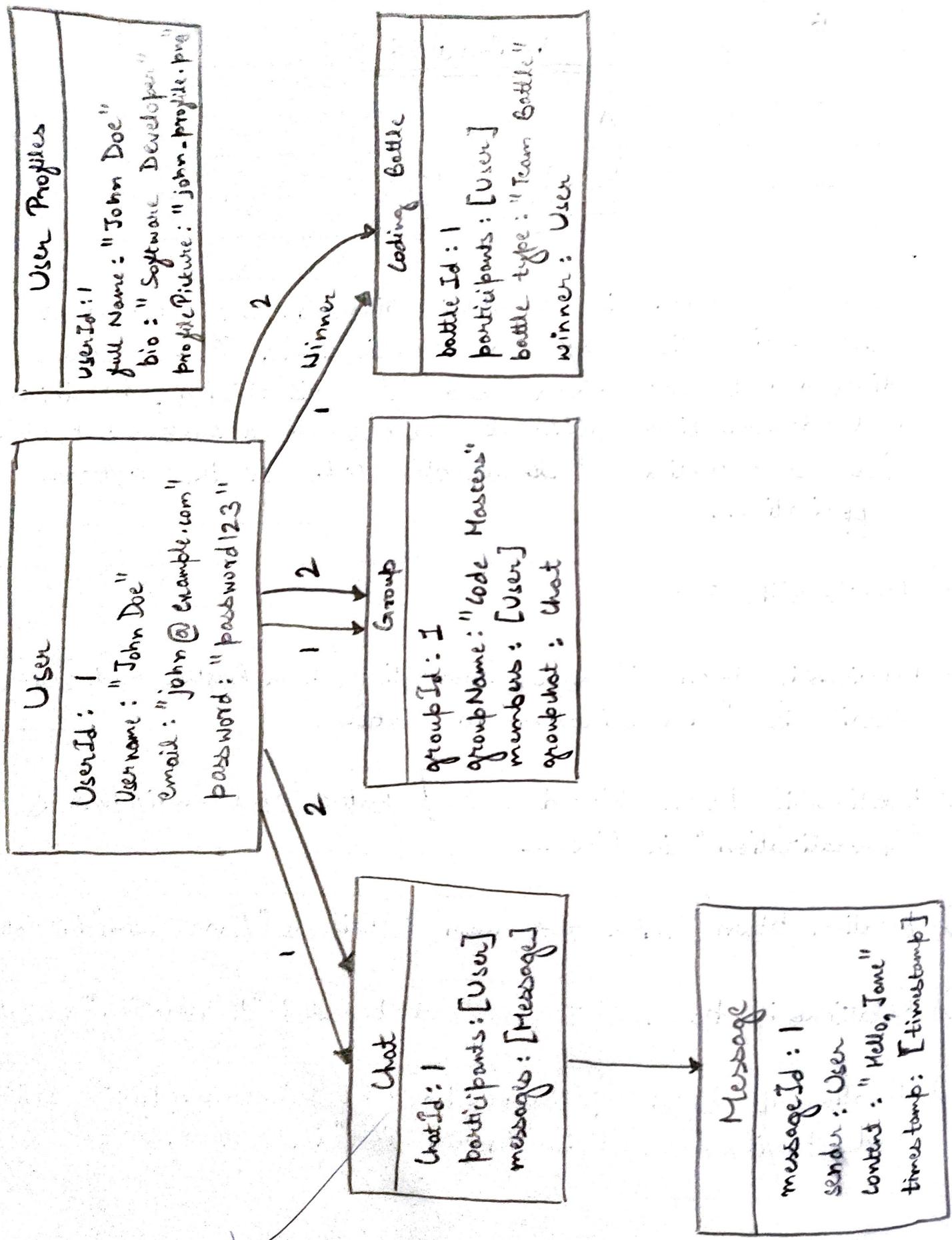
Experiment - 7

Object Model

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Teacher's Signature :





Experiment - 8CPM Diagram

The Earliest Start Time (ES Time), Earliest Finish Time (EF Time), Latest Start Time (LS Time), latest End Time (LF Time) for each activity:

Forward Pass (ES & EF):

$$\text{User Registration (A)} \rightarrow ES = 0 \text{ (start of Project)}$$

$$EF = ES + \text{Duration} = 2$$

$$\text{Profile Setup (B)} \rightarrow ES = \text{EF of A} = 2$$

$$EF = ES + \text{Duration} = 2 + 3 = 5$$

$$\text{Chat Functionality (C)} \rightarrow ES = EF of B = 5$$

$$EF = ES + \text{Duration} = 5 + 4 = 9$$

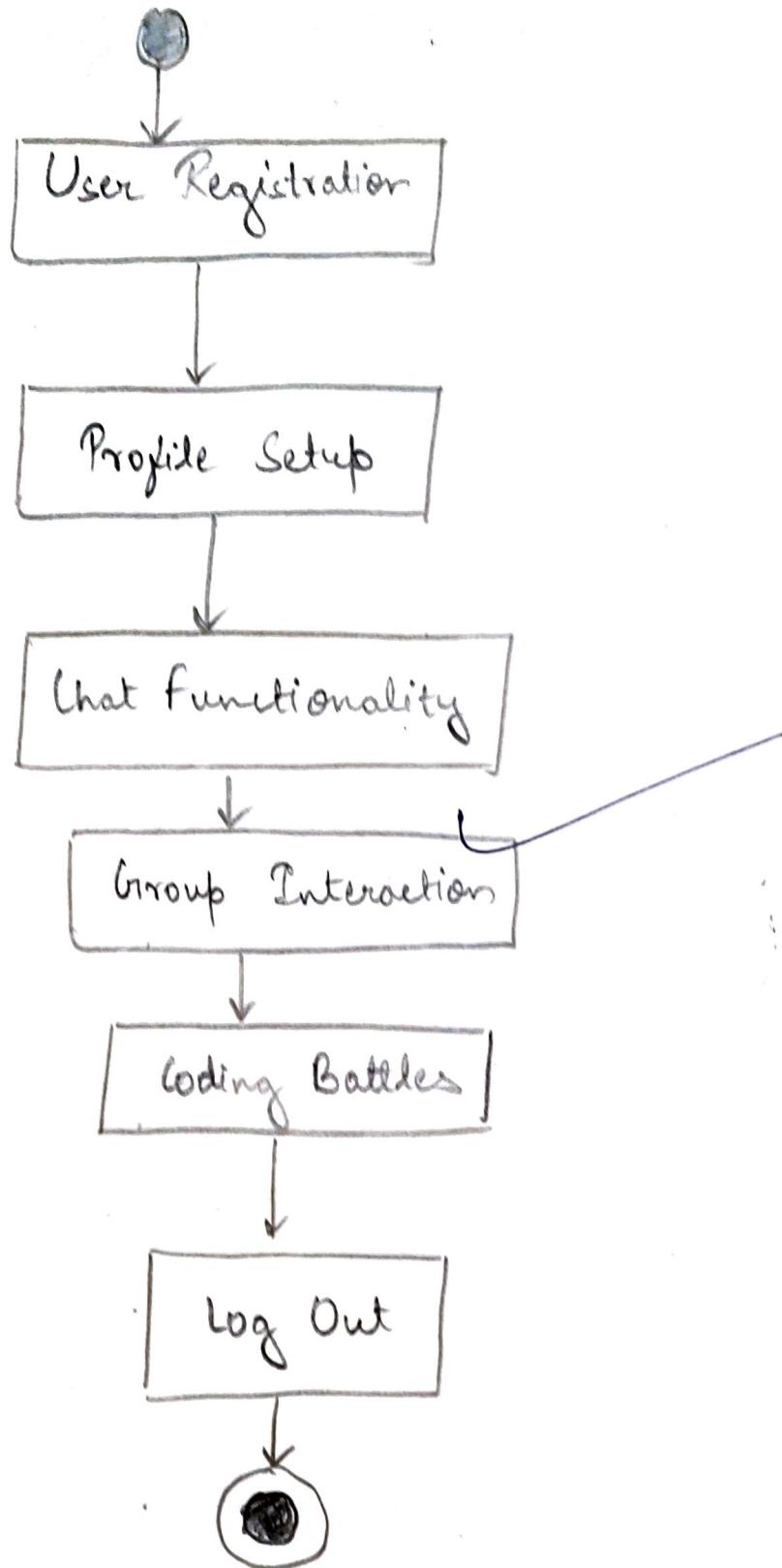
$$\text{Group Interaction (D)} \rightarrow ES = EF of B = 5$$

$$EF = ES + \frac{\text{Duration}}{DF} = 5 + 5 = 10$$

$$\text{Coding Battles (E)} \rightarrow ES = \max(EF of C, EF of D) \equiv$$

$$\equiv \max(9, 10) = 10$$

$$EF = ES + \text{Duration} = 10 + 3 = 13$$



Log Out (F) \rightarrow $ES = EF \text{ of } E = 13$

$$EF = ES + \text{Duration} = 13 + 1 = 14$$

Backward Pass ~~→~~ (LS and LF) \rightarrow

Log Out (F) \rightarrow $LF = EF \text{ of } F = 14$

$$LS = LF - \text{Duration} = 14 - 1 = 13$$

Coding Battles (E) \rightarrow $LF = LS \text{ of } F = 13$

$$LS = LF - \text{Duration} = 13 - 3 = 10$$

Group Interaction (D) \rightarrow $LF = \underset{\min}{(LS \text{ of } E)} = \min(10) = 10$

$$LS = LF - \text{Duration} = 10 - 5 = 5$$

Chat Functionality (C) \rightarrow $LF = \min(LS \text{ of } E) = \min(10) = 10$

$$LS = LF - \text{Duration} = 10 - 4 = 6$$

Profile Setup (B) \rightarrow $LF = \min(LS \text{ of } C, LS \text{ of } D) = \min(6, 5)$

$$= 5$$

$$LS = LF - \text{Duration} = 5 - 3 = 2$$

User Registration (A) \rightarrow $LF = \min(LS \text{ of } B) = \min(2) = 2$

$$LS = LF - \text{Duration}$$

$$= 2 - 2 = 0 \text{ (start of the project)}$$

Total Float \longrightarrow $TF = LS - ES$
 (TF)

Free float \longrightarrow $FF = ES_{\text{of next activity}} - EF_{\text{of current activity}}$

float calculations \longrightarrow

User Registration (A): $TF = 2 - 0 = 2 \text{ days}$
 $FF = ES_{\text{of B (2)}} - EF_{\text{of A (2)}} = 0 \text{ days}$

Profile setup (B): $TF = 5 - 2 = 3 \text{ days}$
 $FF = ES_{\text{of C (5)}} - EF_{\text{of B (5)}} = 0 \text{ days}$

Chat functionality (C): $TF = 4 - 5 = 4 \text{ days}$
 $FF = ES_{\text{of D (10)}} - EF_{\text{of C (9)}} = 1 \text{ day}$

Group Interaction (D): $TF = 10 - 5 = 5 \text{ days}$
 $FF = ES_{\text{of E (10)}} - EF_{\text{of D (10)}} = 0 \text{ days}$

Coding Battles (E): $TF = 13 - 10 \text{ days} = 3 \text{ days}$
 $FF = ES_{\text{of F (14)}} - EF_{\text{of E (13)}} = 1 \text{ day}$.

Log Out (F) $\Leftarrow TF = 14 - 13 = 1 \text{ day}$
 $FF = \text{No succeeding activity so FF}$
 $\text{is not applicable.}$

Date. 16.11.23

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Critical Path: $A \rightarrow B \rightarrow D \rightarrow E \rightarrow F$ (Longest Duration Path)

Critical Path Activities: A, B, D, E, F

Non-Critical Path Activities: C

Project Completion Time: 14 days.

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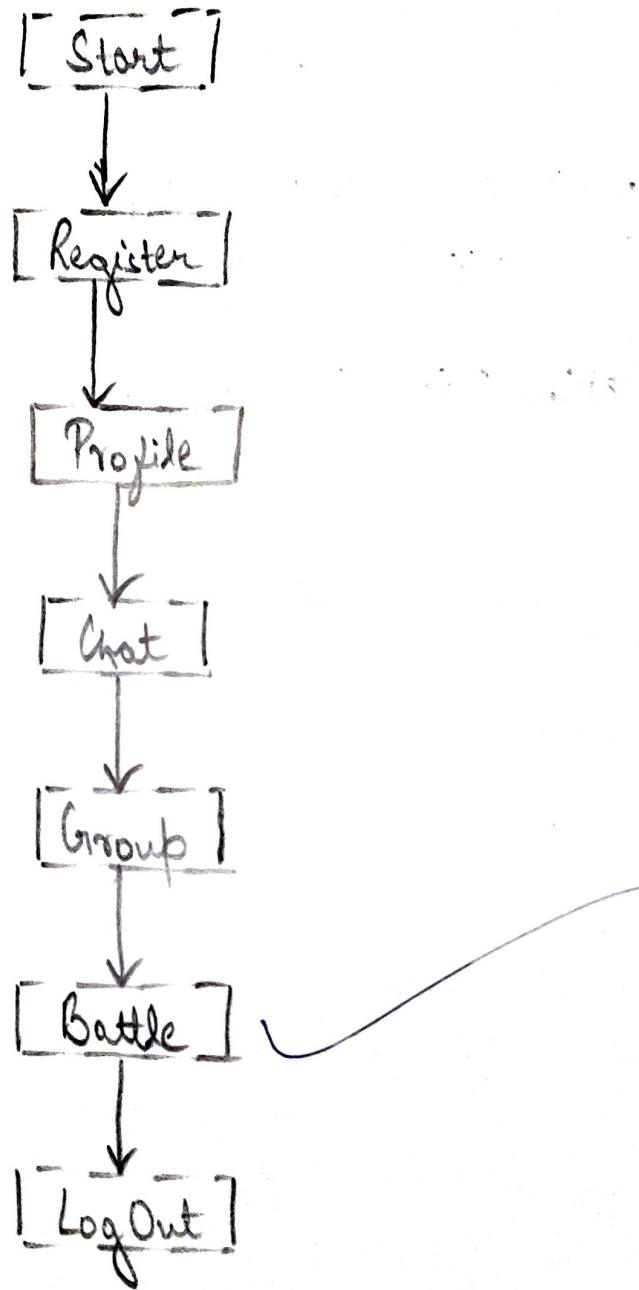
Experiment - 9

Test Suite

- * Features of Project : User Registration
Profile Setup
Chat Functionality
Group Interaction
Coding Battles
Log Out.

- * Components : User Management
Profile Management
Chat Module
Group Module
Coding Battle Module.

- * Programs : Registration Program
Profile Setup Program
Chat Program
Group Program
Coding Battle Program
Log Out Program.



Flow Graph

* Identify Possible Paths :

(1) Start → Register → Profile → Chat
↓

Log Out ← Battle ← Group

(2) Start → Register → Profile → Chat
↓

Log Out ← Group

(3) Start → Register → Profile → Chat
↓

Log Out ← Battle

(4) Start → Register → Profile → Log Out.

* Test Cases :

Test Case 1 → Input : Valid User Registration Details.

Expected Output : Successful user registration, profile setup, chat participation, group interaction, adding battle participation, Log Out.

Test Case 2 : Input → Valid User Registration Details
Expected Output → Successful User Registration,
Profile Setup, Chat
participation, Group
Interaction & Log Out.

Test Case 3 : Input → Valid User Registration Details.
Expected Output → Successful User Registration,
Profile Setup, Chat participation,
coding battle participation
& Log Out.

Test Case 4 : Input → Invalid User Registration Details
Expected Output → Successful User Registration,
Profile Setup, & Log Out.

* Conclusion : These test cases cover all possible paths
in the flow graph.