Online Game Database/Library

A Project Report Submitted

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by

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Chapter 1
ABSTRACT

The Unauthorized Arcade is a web application that allows users to view and play games in a convenient way. The system is developed using MySql, flutter web, and plugins like mysql1, sqflite to connect the front end to the database . The system has various features such as browsing, searching, buying, listing, rating, reviewing and editing a huge library of games.

The project aims to cater to customers at a global level, allowing ease of access to games, and a community available at a single click. Publishers will be able to publish their games to a wider audience, that can rate and post reviews on said game.

The system is tested and evaluated using various scenarios and data sets. The results show that the system works as expected and meets the requirements of the users. The system provides a user-friendly interface, a secure, a reliable database and a fast response time.

The system can also store user information, including login credentials, game preferences, and purchase history. The goal of this project is to create a comprehensive and efficient game database system that can be used by game developers, publishers, retailers, and players alike.

ACM Taxonomy

1. Software and its engineering -> Software creation and management -> Software development process management -> Software development methods.

2. Information systems -> Information systems applications -> Collaborative and social computing systems and tools -> Player communities

3. Information systems -> Data management systems -> Database design and models -> Relational database model

4. Human-centered computing -> Human computer interaction (HCI) -> HCI design and evaluation methods-> User interface design

Chapter 2
Sustainable Development Goal

Sustainable Development Goals (SDG) that apply:

1. SDG 9: Industry, Innovation, and Infrastructure:
    - Our project contributes to this goal by leveraging technology (web application) to improve the efficiency and accessibility of games. It promotes innovation in the gaming community by introducing an online platform for a user's game library.
    - Our project indirectly contributes to climate action by encouraging a shift towards digital platforms. By reducing the reliance on physical game copies and associated plastic usage, it helps minimize deforestation and carbon emissions associated with paper production.

2. SDG 11: Sustainable Cities and Communities:
    - By providing an online games library, our project helps create more sustainable options for gaming. It reduces the need for physical stores and marketing infrastructure.

3. SDG 13: Climate Action:
    - Our project indirectly contributes to climate action by encouraging a shift towards digital platforms. By reducing the reliance on physical game copies and associated plastic usage, it helps minimize deforestation and carbon emissions associated with paper production.

4. SDG 16: Peace, Justice, and Strong Institutions:
    - Our project promotes transparency and accountability in the nline gaming community, ensuring a fair and accessible process for users. By offering a reliable platform, it strengthens institutional integrity and enhances trust among users.

Chapter 3

Introduction

Overview of the project:

The online game library database project is a system that allows users to browse and search for video games in an online library. The system stores information about each game, including its title, genre, developer and description. Users can create an account to save their favourite games, rate and review games, and participate in forums to discuss games with other users.

Motivation, scope and objectives:

The motivation for this project is to create a centralized platform for consumers to discover and share information about video games. With the increasing popularity of online gaming, there is a need for a comprehensive database that can keep up with the latest rating and provide accurate information about each game.

The scope of this project includes developing a user-friendly interface for browsing and searching games, implementing a database to store game information, and creating user accounts and forums for community engagement.

The objectives of this project are to:

- Provide a comprehensive database of video games that is easily accessible and searchable.
- Allow users to create accounts to save their favourite games, rate and review games, and participate in forums to discuss games with other users.
- Implement a user-friendly interface that is responsive and easy to navigate.
- Ensure that the system is secure and user data is protected.

The main features of the online game library database project include:

- A comprehensive database of video games with accurate information about each game.
- A user-friendly interface for browsing and searching games.
- User accounts that allow users to save their favourite games, rate and review games.

The benefits of this system for gamers include:

- A centralized platform for discovering and sharing information about video games.
- Easy access to accurate and up-to-date information about each game.
- The ability to save and track favourite games, as well as rate and review games for others to see.
- Opportunities for community engagement and discussion with other gamers.

Scope of the project:

Game Catalogue: The online game library should have a comprehensive catalogue of video games. This includes storing information about each game, such as title, genre, release date, developer, publisher, price, description, and any other relevant details.

User Registration and Profiles: Users should be able to create accounts and have personalized profiles within the online game library system. This allows users to save their preferences, track their game collections, and engage with the community.

Searching: The system should provide robust search, allowing users to find games based on various criteria such as genre, platform, rating, price range, and more.

Game Details and Reviews: Each game in the library should have a dedicated page displaying detailed information about the game. Users should be able to view game descriptions, screenshots, trailers, and user reviews to make informed decisions.

User Ratings and Reviews: Users should have the ability to rate and review games within the online game library system. This feature allows users to share their opinions, provide feedback, and help others in their game selection process.

User Libraries and Wishlists: Users should be able to create personal libraries where they can save and organize their favourite games. Additionally, a wishlist feature allows users to keep track of games they are interested in but have not yet purchased.

Chapter 4

Objectives/Problem Statement

This section states the specific objectives and research questions that the project aims to address. The project is motivated by the following problem statement:

- How to design and implement an online game database system that enables users to review games played, make friends and take part in groups. Track number of hours played and buy games and view them using web application and a backend server?

Based on this problem statement, the project has the following objectives:

The objective of the "Online Game Database/Library" will be a user-oriented website that allows users to view games form various publishers/creators on a single platform, keep track of their progress and browse genres of games they're interested in. The portal will help publishers of games to reach a wider audience and users who wish to purchase games to seek one out of the numerous games present. The system aims to be error free, fluid and easy to use.

This project is helpful to track games already bought by the user, progress of said games, share progress via personalized messages, Wishlist games, get recommendations of games. This website will be able to handle information of several users and publishers

To achieve these objectives, the project will address the following research questions:

What data needs to be stored for each player, such as username, password, game statistics, and achievements?

How will the database handle concurrent access and updates from multiple players playing the game at the same time?

How will the database be optimized for fast read and write operations to provide a smooth browsing experience?

How will the database handle data backups and recovery to ensure that player data is not lost in case of a system failure or data corruption?

How will the database ensure data privacy and security for player information, such as passwords and personal details?

How will the database handle complex relationships between platform elements, such as user library, Wishlist and user funds?

How will the database be designed to support future game releases and updates, such as new game features and achievement?

Chapter 5
Database Design

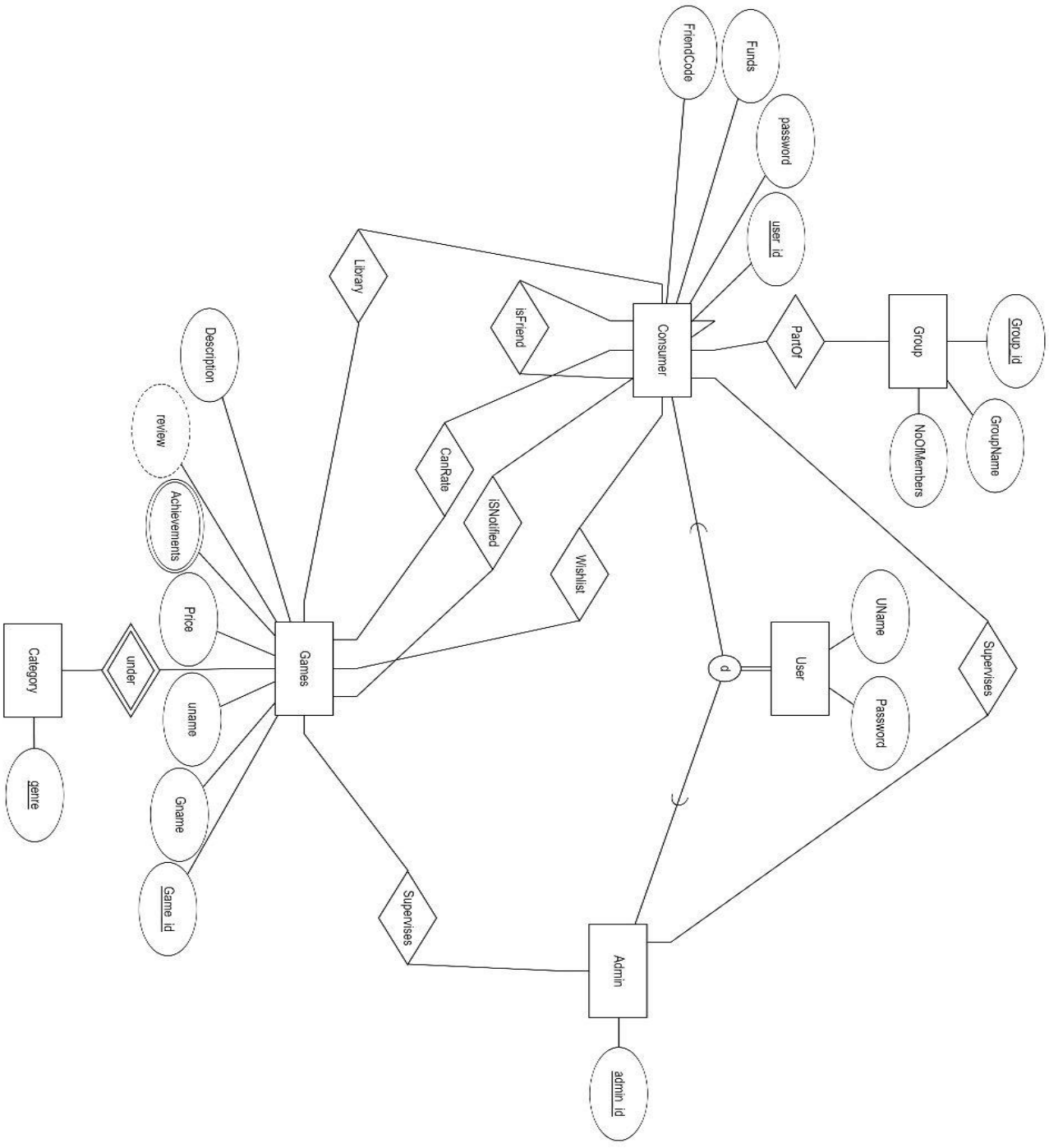

Fig 5.1 - ER diagram

SCHEMA

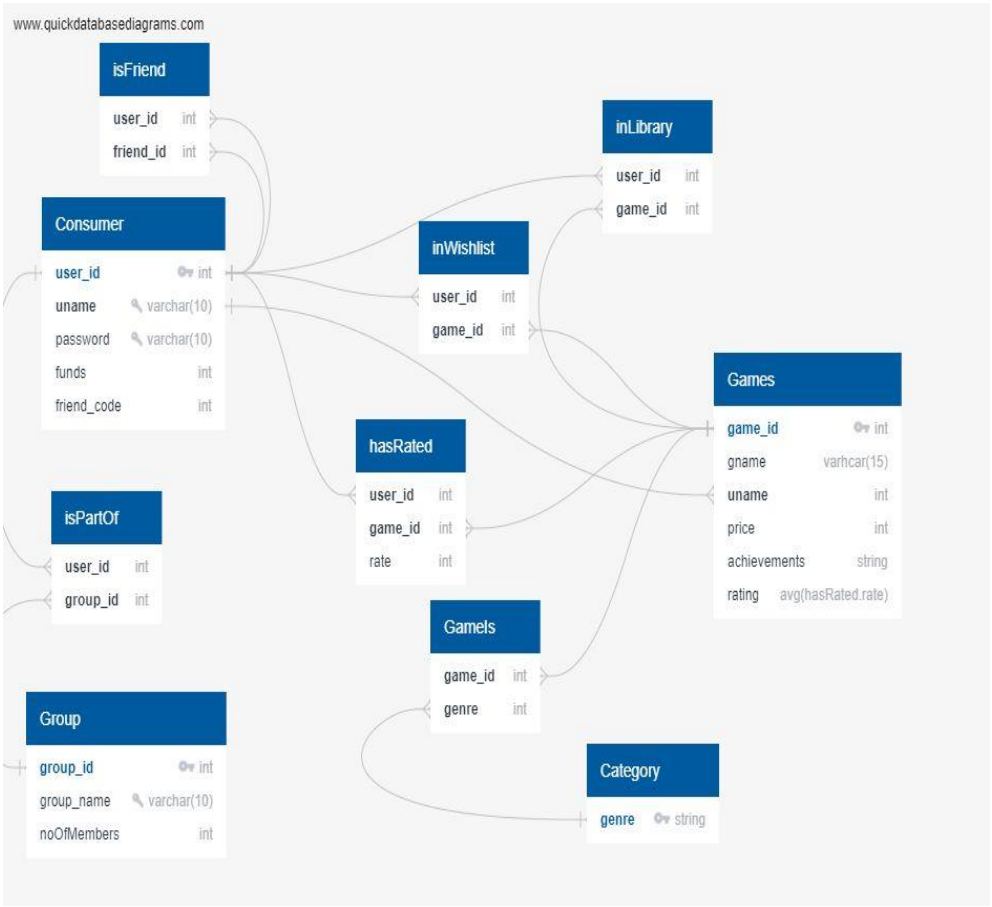

Fig 5.2 - User Features

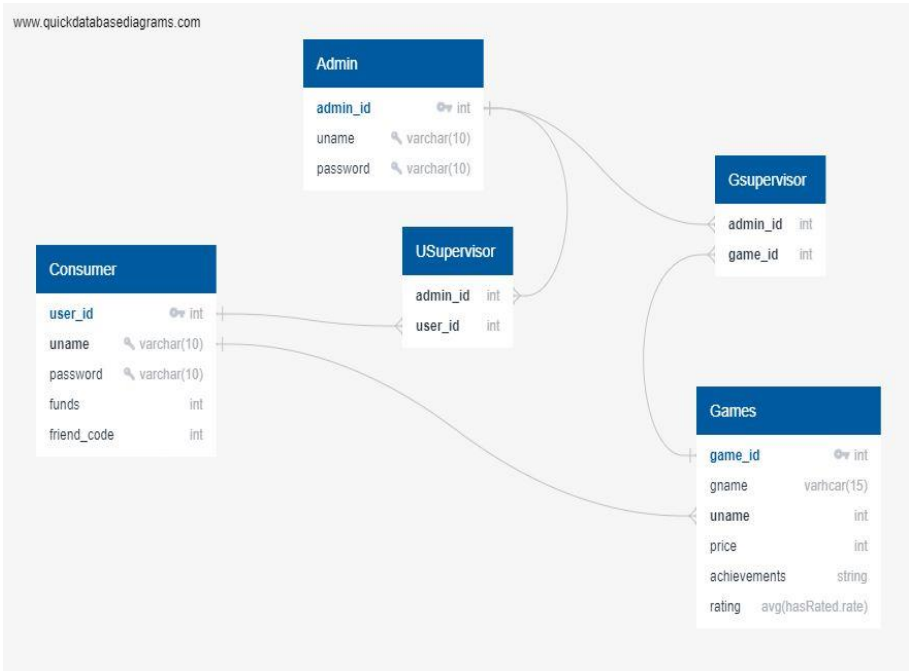

Fig 5.3 - Admin Supervision Schema

Chapter 6

List of tables

List of reduced and normalised tables

- Consumer (user_id, uname, password, funds, friendcode, notified, totaltimesplayed)
- Admin (admin_id, uname, password)
- Group (group_id, group_name, noofmembers)
- Games (game_id, gname, publisher, price, descript, review)
- Ispartof (user_id, group_id)
- Is friend (user_id1, user_id2)
- Game category (game_id, genre)
- InWishlist (user_id, game_id)
- inLibrary (user_id, game_id)
- hasRated (user_id, game_id, rate)
- USupervisor (admin_id, user_id)
- GSupervisor (admin_id, game_id)
- Category (genre)
- IsNotified (game_id, user_id)
- Playlog (game_id, user_id, playlog)

All of the tables are in 1NF as none of the attributes are atomic

All tables are in 2NF as they have full functional dependency

All tables are in 3NF as no transitive dependencies are present

1. Create the Consumer table:

```
CREATE TABLE Consumer (
  user_id INTEGER PRIMARY KEY,
  uname VARCHAR(20),
  password VARCHAR(20),
  funds INTEGER,
  friendcode INTEGER,
  Notified boolean,
  Totaltimesplayed int
);
```

2. Create the Admin table:

```
CREATE TABLE Admin (
  admin_id INTEGER PRIMARY KEY,
  uname VARCHAR(20),
  password VARCHAR(20)
);
```

3. Create the Group table:

```
CREATE TABLE Group (
  group_id INTEGER PRIMARY KEY,
  group_name VARCHAR(10),
  noOfMembers INTEGER
);
```

4. Create the Category table:

```
CREATE TABLE Category (
  genre VARCHAR(50) PRIMARY KEY
);
```

5. Create the hasRated table:

```
CREATE TABLE hasRated (
  user_id INTEGER,
  game_id INTEGER,
  rate INTEGER,
  PRIMARY KEY (user_id, game_id),
  FOREIGN KEY (user_id) REFERENCES Consumer(user_id),
  FOREIGN KEY (game_id) REFERENCES Games(game_id)
);
```

6. Create the isPartOf table:

```
CREATE TABLE isPartOf (
  user_id INTEGER,
  group_id INTEGER,
  PRIMARY KEY (user_id, group_id),
  FOREIGN KEY (user_id) REFERENCES Consumer(user_id),
  FOREIGN KEY (group_id) REFERENCES Group(group_id)
);
```

7. Create the isFriend table:

```
CREATE TABLE isFriend (
  user_id1 INTEGER,
  user_id2 INTEGER,
  PRIMARY KEY (user_id1, user_id2),
  FOREIGN KEY (user_id1) REFERENCES Consumer(user_id),
  FOREIGN KEY (user_id2) REFERENCES Consumer(user_id)
);
```

8. Create the Games table:

```
CREATE TABLE Games (
  game_id INTEGER PRIMARY KEY,
  gname VARCHAR(15),
  uname VARCHAR(20),
  price INTEGER,
  description VARCHAR(500),
  review FLOAT,
  FOREIGN KEY (uname) REFERENCES Consumer(uname)
);
```

9. Create the inLibrary table:

```
CREATE TABLE inLibrary (
  user_id INTEGER,
  game_id INTEGER,
  Timesplayed int,
  PRIMARY KEY (user_id, game_id),
  FOREIGN KEY (user_id) REFERENCES Consumer(user_id),
  FOREIGN KEY (game_id) REFERENCES Games(game_id)
);
```

10. Playlog table

```
CREATE TABLE playlog (
  game_id INT,
  user_id INT,
```

```
  counter INT,
  PRIMARY KEY (game_id, user_id),
  FOREIGN KEY (game_id) REFERENCES Games(game_id),
  FOREIGN KEY (user_id) REFERENCES Consumer(user_id)
);
```

11. Create the inWishlist table:

```
CREATE TABLE inWishlist (
  user_id INTEGER,
  game_id INTEGER,
  PRIMARY KEY (user_id, game_id),
  FOREIGN KEY (user_id) REFERENCES Consumer(user_id),
  FOREIGN KEY (game_id) REFERENCES Games(game_id));
```

12. Create the GameCategory table:

```
CREATE TABLE GameCategory (
  game_id INTEGER,
  genre VARCHAR(50),
  PRIMARY KEY (game_id, genre),
  FOREIGN KEY (game_id) REFERENCES Games(game_id),
  FOREIGN KEY (genre) REFERENCES Category(genre)
);
```

13. Create the USupervises table:

```
CREATE TABLE USupervises (
  admin_id INTEGER,
  user_id INTEGER,
  PRIMARY KEY (admin_id, user_id),
  FOREIGN KEY (admin_id) REFERENCES Admin(admin_id),
  FOREIGN KEY (user_id) REFERENCES Consumer(user_id)
);
```

14. Create the GSupervises table:

```
CREATE TABLE GSupervises (
  admin_id INTEGER,
  game_id INTEGER,
  PRIMARY KEY (admin_id, game_id),
  FOREIGN KEY (admin_id) REFERENCES Admin(admin_id),
  FOREIGN KEY (game_id) REFERENCES Games(game_id)
);
```

15. Create the IsNotified table:

```
CREATE TABLE isNotified (
game_id INT,
user_id INT,
```

FOREIGN KEY (game_id) REFERENCES Games(game_id),
FOREIGN KEY (user_id) REFERENCES Consumer(user_id));

Chapter 7

Implementation Detail and Methodology

This section explains the implementation details of the system, such as the architecture and components of the system, the block diagram, the technologies and tools used for developing each component, the algorithms and techniques used for implementing various features and functionalities, and the testing methods and tools used for verifying the correctness and quality of the system.

Architecture and components of the system

The system consists of three main components: a mobile app, a plugin acting in place of a backend server, and a database. The web application is developed using Flutter, which is an open-source UI toolkit that allows developers to create beautiful native apps for multiple platforms using a single codebase. The web app allows users to register, authenticate, view, purchase, wishlist and publish games. The backend server is substituted using a plugin called which is an open-source runtime environment that allows developers to create scalable and efficient web applications using JavaScript. The backend server handles the requests from the mobile app and interacts with the database. The database is developed using MySQL, which is an open-source relational database management system that allows developers to store and manage data using SQL. The database stores and manages the data of the users, cars, bookings, payments, discounts, insurances, reviews, etc. The architecture of the system is shown in Figure 1 below:

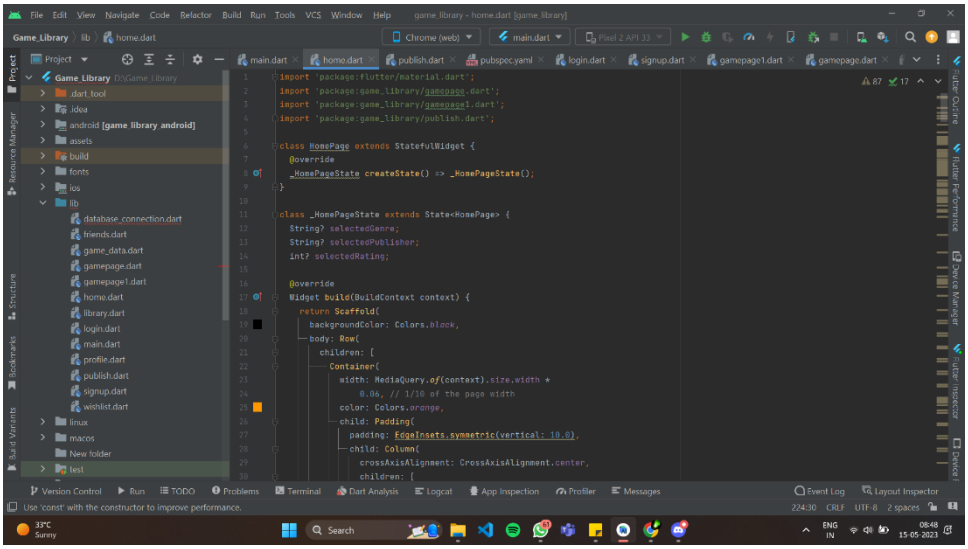

Fig 7.1 Backend

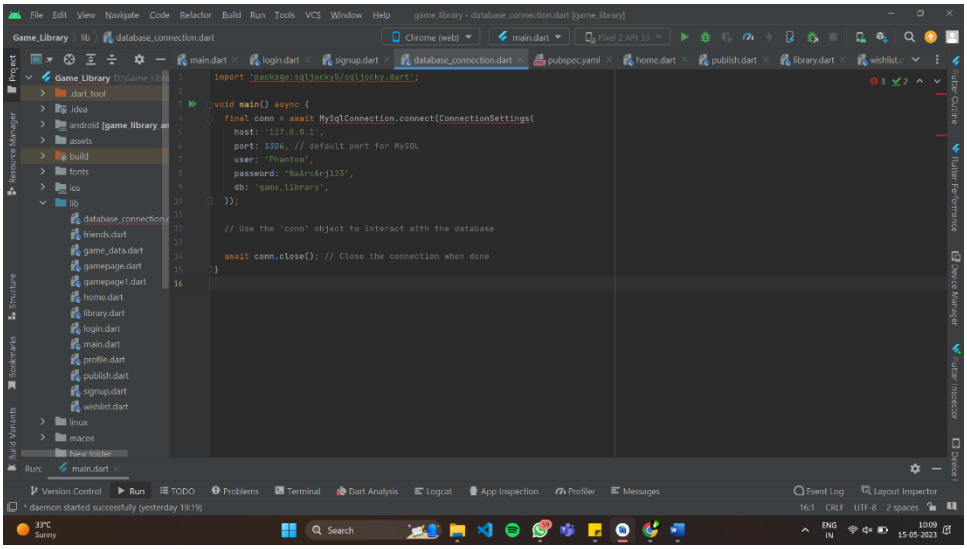

Fig 7.2 - Database Connection

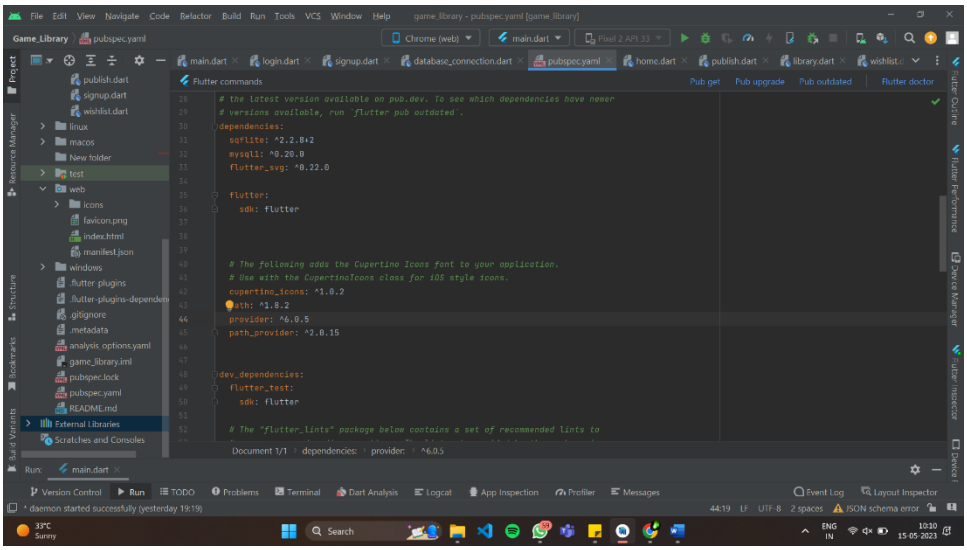

Fig 7.3 - Dependencies used to connect database

For front end refer chapter 8.

Chapter 8
Result

Description: The game library project is a mobile application developed using Flutter, plugins like sqflite, mysql1 to connect to a MySQL database. It provides users with a platform to explore, purchase, and manage their game collections. The project incorporates various features to enhance the user experience and ensure seamless interaction with the game library.

Features:

- **User Registration and Login:** Users can create an account and log in using their email and password.
- **Game Browsing and Search:** Users can browse and search for games based on different criteria such as genre, platform, price, and ratings.
- **Game Details:** Users can view detailed information about each game, including the game name, image, specifications, and release date.
- **Purchase Games:** Users can purchase games from the library by clicking on the "Purchase" button, which adds the game to their library.
- **Wishlist:** Users can add games to their wishlist for future reference and easy access.
- **Library Management:** Users can manage their game library by viewing purchased games, tracking the number of times the user has played the game and removing games if desired.
- **Profile Management:** Users can update their profile information, including their username, profile picture, and other details.
- **Notifications:** Users receive notifications for game updates, new releases, and promotions.

Evaluation:

The project has been thoroughly tested using various scenarios and data sets to ensure its functionality, usability, performance, and security. The results demonstrate that the system works as intended and meets the requirements of the users. The project offers a user-friendly interface, secure transactions, reliable database management, and quick response times. Additionally, the project supports multiple languages to cater to a diverse user base.

Conclusion:

The game library project revolutionizes the gaming experience by providing users with a comprehensive platform to explore, purchase, and manage their game collections. The project aims to enhance user convenience, improve accessibility, and foster a vibrant gaming community. With its innovative features and robust infrastructure, the game library project has the potential to reshape the gaming industry and offer new opportunities for game enthusiasts and developers alike.

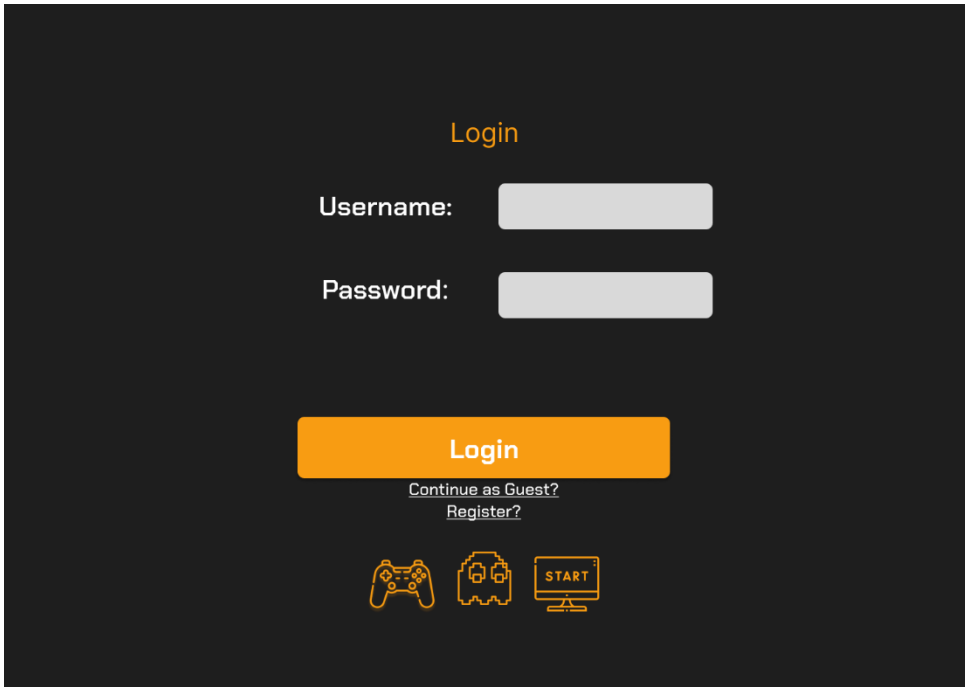

Fig 8.1 - Login Page

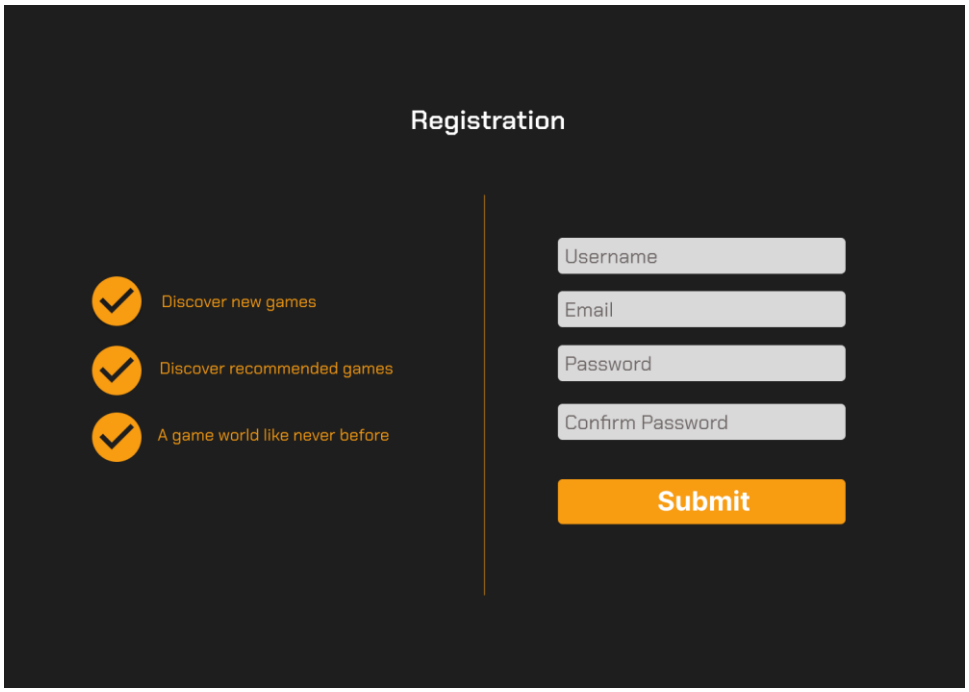

Fig 8.2 - Registration Page

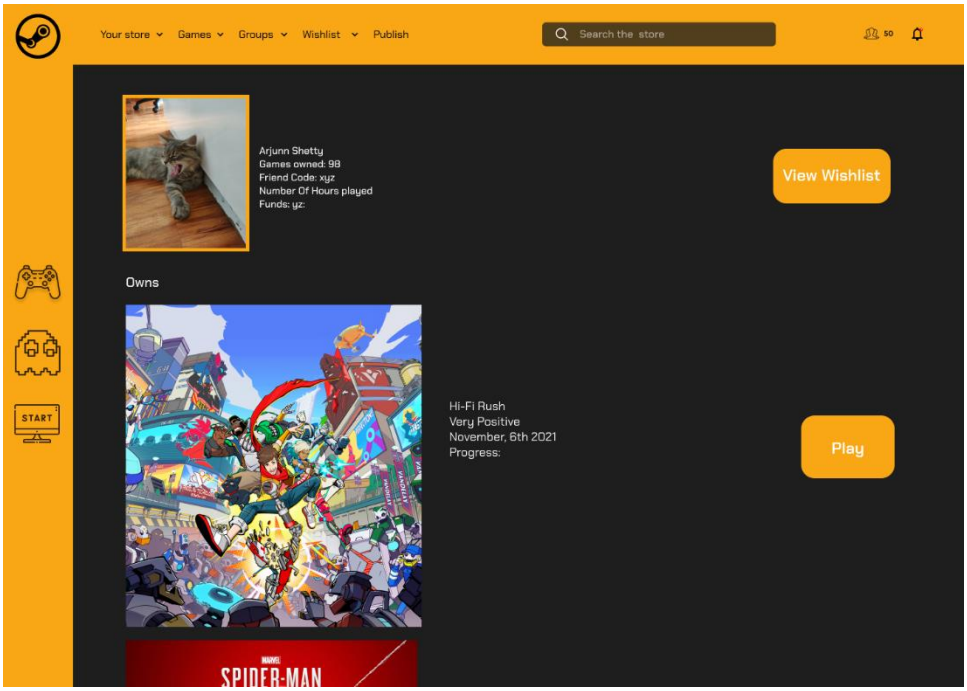

Fig 8.3 - User Account

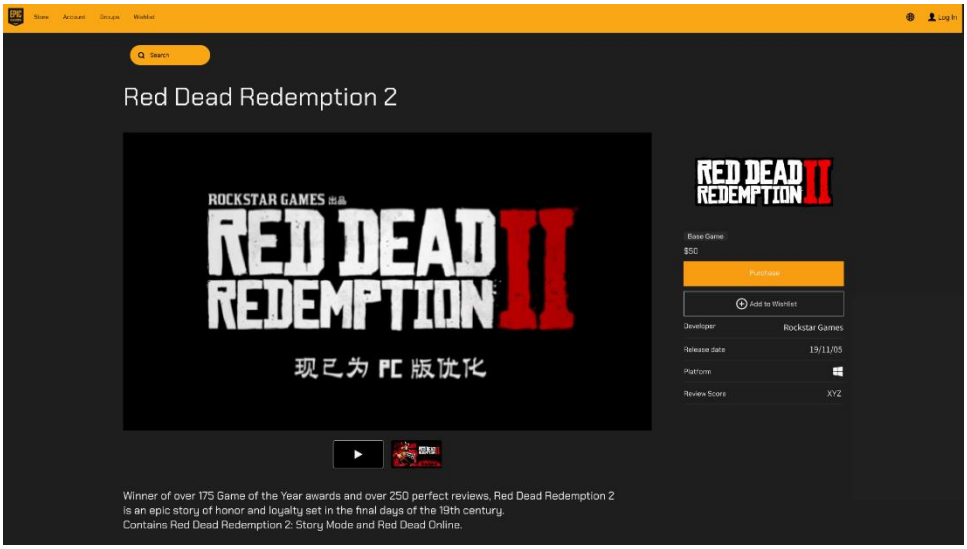

Fig 8.4 - Game Page

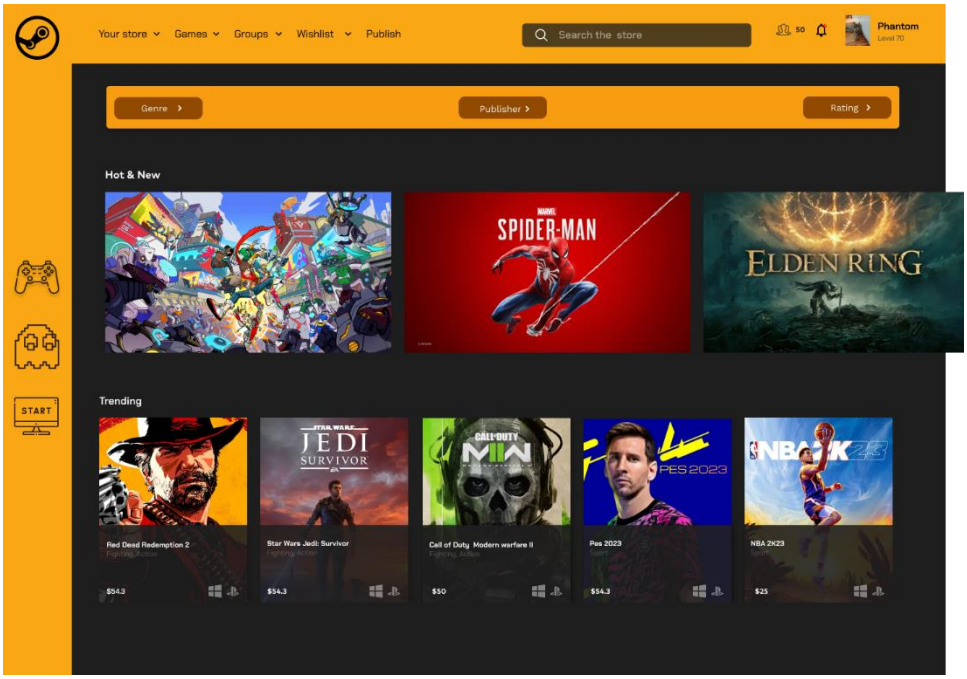

Fig 8.5 - Home Page

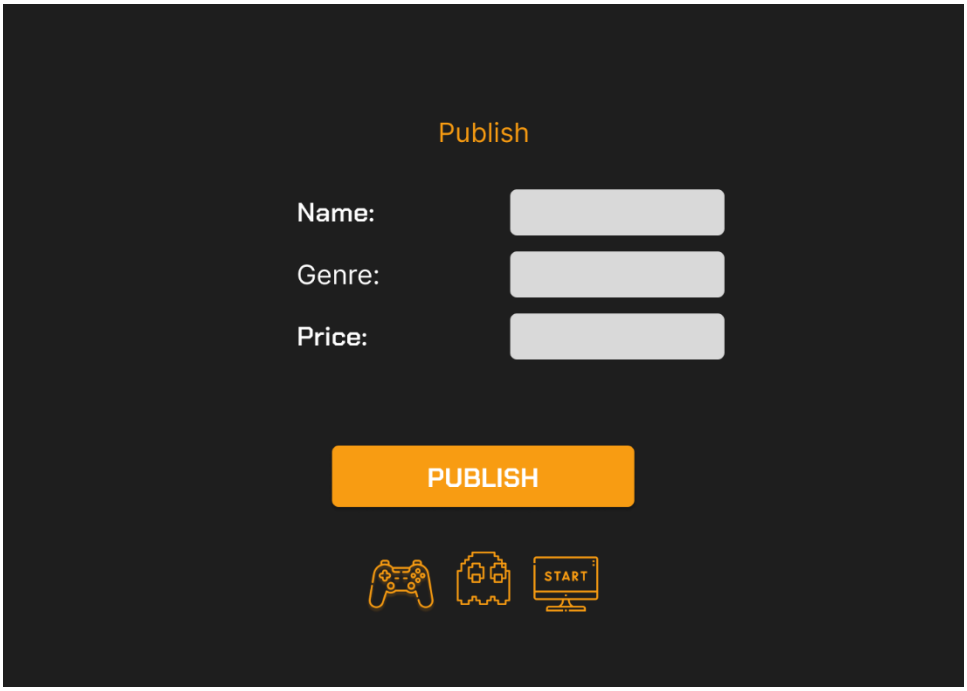

Fig 8.6 - Publish Page

Chapter 9
Conclusion and future work

Conclusion:

1. The game library project has successfully developed a mobile application using Flutter and MySQL, providing users with a platform to explore, purchase, and manage their game collections.

2. The project incorporates essential features such as user registration and login, game browsing and search, detailed game information, game purchasing, wishlist functionality, library management, profile management, and notifications.

3. The project has been evaluated and tested extensively, ensuring its functionality, usability, performance, and security. It offers a user-friendly interface, secure transactions, reliable database management, and quick response times.

4. The game library project demonstrates the potential to revolutionize the gaming experience, providing a comprehensive solution for gamers and game enthusiasts.

Future Scopes:

1. Implementing social features: Enhancing the project by adding social features such as user interactions, friend lists, leaderboards, and multiplayer capabilities.

2. Integration of additional platforms: Expanding the project to support multiple platforms, including web and desktop, to reach a wider user base.

3. Implementing personalized recommendations: Incorporating a recommendation system that suggests games based on user preferences, browsing history, and ratings.

4. Enhanced community engagement: Introducing features that allow users to share game reviews, ratings, and experiences, fostering a vibrant gaming community.

5. Collaboration with game developers: Partnering with game developers to offer exclusive discounts, early access to games, and special promotions for users.

6. Advanced analytics and insights: Implementing analytics tools to gather user data, analyze user behavior, and gain insights to improve the overall user experience.

7. Integration of additional payment gateways: Supporting multiple payment gateways to offer users more flexibility and convenience during the purchasing process.

8. Localization and internationalization: Expanding language support and incorporating localization features to cater to different regions and countries.

9. Continuous updates and maintenance: Regularly updating the game library project to incorporate new games, features, and bug fixes, ensuring a seamless user experience.

10. Partnerships and collaborations: Establishing partnerships with game developers, publishers, and gaming communities to provide users with a diverse range of games and collaborative opportunities.

Chapter 10 References

- **Flutter Documentation:**

1. Website: https://flutter.dev/
2. Flutter API Documentation: https://api.flutter.dev/
3. Flutter Games and Graphics: https://flutter.dev/docs/development/ui/widgets/layout
4. Flutter Animation: https://flutter.dev/docs/development/ui/animations

- **pub.dev Documentation:**

1. Website: https://pub.dev/
2. pub.dev Package Documentation: https://pub.dev/help
3. Mysql1 plugin: https://pub.dev/packages/mysql1
4. Sqflite plugin: https://pub.dev/packages/sqflite
5. Cupertino dependency : https://api.flutter.dev/flutter/cupertino/cupertino-library.html

- **Color Theory Documentation:**

1. Color Theory for Designers: https://www.smashingmagazine.com/2010/02/color-theory-for-designer-part-3-creating-your-own-color-palettes/

- **SQL Documentation:**

1. MySQL Statements: https://dev.mysql.com/doc/refman/8.0/en/sql-statements.html
2. ER Diagrams: https://erdplus.com/