Department of Software Engineering and Information Technology

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Chinese learning Application

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Abstract

The Chinese Learning Application encompasses comprehensive and interactive lesson plans, real-time communication tools, and culturally contextualized content. Emphasis is placed on the utilization of multimedia resources, integrating audiovisual materials and cultural insights, echoing the recommendations of Jiang and Ma [4] for immersive language learning experiences.

Drawing from seminal research papers in the field of language acquisition and educational technology, the CLA integrates state-of-the-art language learning techniques. Research by Li and Zhao [1] emphasizes the efficacy of speech recognition technologies in language learning applications, citing improved pronunciation, and speaking skills through interactive feedback systems. This paper serves as a cornerstone for the integration of speech recognition modules within the CLA, allowing learners to practice and refine their pronunciation skills with real-time feedback.

The project also leverages the findings of Wang, Xu. [2] on gamification in language learning, showcasing its positive impact on engagement and motivation. The CLA adopts gamified modules to enhance user interaction, transforming language acquisition into an enjoyable and immersive experience. The incorporation of interactive quizzes and reward-based systems aligns with this research, aiming to augment learner engagement and retention.

Furthermore, insights from Chen, Wu. [3] regarding adaptive learning and personalized education are instrumental in guiding the development of the CLA's adaptive learning pathways. This approach enables learners to tailor their learning experiences based on their proficiency levels, preferences, and learning objectives, thereby optimizing learning outcomes.

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1. Introduction

1.1 Problem Definition

The advent of globalization and the increasing interconnectedness of cultures and economies have elevated the significance of Mandarin Chinese as a global language. However, traditional methods of learning Chinese often fail to address the diverse needs and learning preferences of individuals, posing several challenges to effective language acquisition.

- **Personalization Gap:** Existing platforms lack adaptive learning features to cater to individual learner needs. Current language learning platforms often employ a one-size-fits-all approach, neglecting individual learner differences in proficiency levels, learning styles, and interests. Jiang & Ma [4]. Underscored the importance of personalized education using AI and ML algorithms, revealing the potential for tailored learning paths to enhance language acquisition.

- **Cultural Context Deficiency:** Inadequate provision of immersive cultural experiences inhibits comprehensive language learning. The absence of immersive cultural experiences inhibits holistic language acquisition. Li, Zhang J. [5] emphasized the effectiveness of AR/VR technologies in language learning, indicating the necessity for immersive cultural experiences to develop a deeper understanding of the Chinese language and culture.

- **Social Engagement Limitations:** Insufficient opportunities for social interaction hinder collaborative learning and cultural exchange. Most language learning applications lack platforms for meaningful social interaction and collaborative learning. Chen and Liu [3] highlighted the significance of social interaction in language acquisition, emphasizing the need for collaborative learning environments to facilitate language practice and cultural exchange.

- **Grading Precision:** Existing automated grading systems lack accuracy in assessing complex language skills in Chinese. The accurate assessment of a learner's performance, encompassing various language skills (listening, speaking, reading, writing) in Chinese, remains a challenge. Existing automated grading systems often lack precision in evaluating complex language constructs, as discussed by Zhang & Wang. [6], limiting their effectiveness in providing accurate and detailed feedback to learners.

- **Real-time Speech Recognition:** Technical complexities hinder accurate real-time assessment of spoken Chinese. Assessing and grading spoken language in real-time presents

significant technical challenges. Zhang & Wang [6] highlighted the complexities involved in real-time speech recognition systems, particularly in accurately capturing tonal nuances and subtle variations in pronunciation, both essential aspects of mastering Chinese.

- **Delayed Feedback:** Current platforms provide delayed or static feedback, limiting immediate learning and correction opportunities. The delay in providing feedback and adaptation in language learning platforms inhibits effective skill development. Current systems often provide delayed or static feedback, limiting the opportunity for immediate correction and improvement. Wang & Liu [7] stressed the importance of timely and personalized feedback in language learning for enhanced skill acquisition.

1.2 Design Thinking

The development of the Chinese Language Learning Mobile Application (CLLMA) has been guided by the principles of design thinking. This iterative and user-centered approach emphasizes empathy, ideation, prototyping, and testing to create solutions that meet users' needs effectively [8].

- ### Design Thinking Approach and User Insights

1- The development of the Chinese language learning mobile application adopts a design thinking approach, centered around empathizing with end-users, defining their needs, ideating innovative solutions, prototyping, and testing iteratively [9]. This user-centric approach aims to create a solution tailored to meet the diverse needs and preferences of learners in an engaging and effective manner.

2- The project team conducted interviews with language learners and Undergraduates from different backgrounds. These interviews aimed to gain deeper insights into the language learning challenges faced by Students, the relevance of language skills in their careers, and the preferences for mobile-based language learning tools [10].

- ### Summary of User Insights

1. **Preference for Mobile-based Learning:** Students expressed a preference for mobile applications that provide on-the-go learning opportunities, aligning with their demanding schedules and learning requirements.

2. **Emphasis on Real-world Application:** Learners value applications that offer practical language learning experiences relevant to their professional contexts, aiding them in applying acquired language skills in their work environments.

1.3 Objectives

- **Curate Diverse and Contextually Relevant Datasets**

  The primary objective is to gather and curate comprehensive datasets encompassing Mandarin Chinese language resources. This includes a vast repository of vocabulary, phrases, audiovisual materials, cultural insights, and contextualized content to offer a well-rounded learning experience. The dataset will cover various proficiency levels, from beginners to advanced learners, catering to diverse learning needs.

- **Employ Cutting-edge Technologies for Language Learning**

  Utilize advanced technologies and frameworks such as Natural Language Processing (NLP), Machine Learning (ML), and Artificial Intelligence (AI) to develop personalized learning paths. These technologies will adapt to user behavior, analyze learning patterns, and offer tailored recommendations to optimize learning outcomes

- **Incorporate Multimedia and Interactive Elements**

  Leverage multimedia elements such as audio, visual cues, animations, and interactive exercises to gamify the learning process effectively. These elements will be seamlessly integrated into games, quizzes, and challenges to create an immersive and enjoyable language learning environment.

1.4 Product Scope

1. Overview

The Chinese Learning Application (CLA) is a mobile-based platform aimed at providing an interactive and comprehensive learning experience for individuals seeking to acquire proficiency in Mandarin Chinese. The application caters to learners at various proficiency levels, offering a range of features and functionalities to facilitate effective language acquisition.

2. Learning Modules

- **Structured Language Lessons:** A progressive curriculum covering vocabulary, grammar, reading, writing, listening, and speaking skills.
- **Interactive Exercises:** Engaging exercises and quizzes to reinforce learning and assess progress.

- **Cultural Insights:** Contextualized content offering insights into Chinese culture, customs, and traditions.

3. Gamified Learning

- **Gamification Elements:** Incorporation of game design principles, levels, badges, points, and challenges to enhance user engagement and motivation.
- **Interactive Games:** Games and challenges tailored for language learning, offering a playful approach to mastering vocabulary, grammar, and cultural knowledge.

4. Personalization and Adaptation

- **Adaptive Learning Paths:** Tailored learning experiences based on learner proficiency, preferences, and learning objectives.
- **Progress Tracking:** Monitoring and analysis of user performance to provide personalized recommendations and track learning progress.

5. Social interaction

- **Build Learning Streaks:** Learners will have the chance to compete on a weekly basis and have a dashboard viewing their achievements and top performers.

6. Constraints

- **Device Compatibility:** The application supports Android mobile devices (smartphones and tablets) running specific minimum operating system versions.
- **Language Support:** The primary language of instruction is English, supporting learners proficient in English as the language of instruction for Chinese learning.

7. Assumptions and Dependencies

- **Internet Connectivity:** The application assumes consistent access to the internet for real-time features, content updates, and social interaction functionalities.
- **User Engagement:** The success of gamified elements relies on user engagement and participation in interactive learning modules and games.

8. Exclusions

- **Translation Services:** The application does not focus on automated translation features but emphasizes language acquisition through immersive learning experiences.
- **Advanced NLP-based Translation:** While aiding language learning, the application does not offer advanced natural language processing-based translation services.

2. Background

2.1 Project Terminologies

In this section we will clarify the important concepts used in this Project

2.1.1 Natural Language Processing (NLP):

NLP techniques are used for language understanding, processing, and analysis. In the app, NLP can be used for text parsing, sentiment analysis, and generating contextualized content, in a Chinese learning application, Natural Language Processing (NLP) plays a crucial role in enhancing various aspects of the learning experience. NLP technology can be used extensively to understand, process, and generate language-related content and interactions. Here's an in-depth technical overview of how NLP can be applied in a Chinese learning application, It includes a lot of technique and application like text analysis and processing (Character Segmentation: Chinese text doesn't have spaces between words, so NLP algorithms perform character segmentation to tokenize sentences into meaningful units for analysis, Part-of-Speech (POS) Tagging: Identifying the part of speech for each word (noun, verb, etc.) aids in grammar analysis and sentence understanding, Named Entity Recognition (NER): Identifying and extracting entities such as locations, names, or organizations helps in contextualizing content and providing relevant information.) [11]. Language understanding and generation including, Sentiment Analysis: Analyzing user-generated content to understand sentiments and emotional tones in user feedback or discussions related to learning materials. Chatbots/Conversational Agents: Implementing chatbots that engage users in conversational interactions, answer queries, and provide language assistance or explanations. Translation and language comprehension like, Machine Translation: Utilizing NLP models for accurate translation between Mandarin Chinese and other languages, aiding multilingual learners, Text Summarization: Creating concise summaries of lengthy articles, lessons, or documents to offer quick overviews of content [16].

2.1.2 Adaptive Learning Algorithm:

Machine Learning algorithms can personalize learning paths based on user behavior, preferences, and proficiency levels. Techniques such as reinforcement learning, or collaborative filtering can be applied for adaptive learning experiences. It can also enhance the feedback mechanism by Real-time Assessment: Provide immediate feedback on exercises, quizzes, or speech evaluations using NLP or speech recognition algorithms [12]. Progress Tracking: Track user progress, offering performance insights and suggesting areas for improvement. Also, Integration with user interface like UI/UX Adaptation: Present personalized content recommendations, progress tracking, and adaptive learning pathways through an intuitive and user-friendly interface [15]. Adaptive Displays:

Display content in a manner suited to the user's preferences (visual, auditory, interactive) for optimal engagement.

2.1.3 Gamification Frameworks:

Utilizing game design principles and gamification frameworks to enhance user engagement and motivation in the learning process like Points System including Technical Aspect: Implement a points-based system where users earn points by completing lessons, quizzes, or achieving milestones in the app [17]. Implementation: Use backend databases to store and update user points. Incorporate algorithms to calculate and assign points based on user actions and progress. Other features like Badges, Levels, and Leaderboards can be implemented from a Technical Aspect: Introduce badges for achievements, different levels to indicate proficiency, and leaderboards to showcase user rankings. Implementation: Utilize data structures and algorithms to manage badge assignments, track user progress through different levels, and maintain leaderboards in real-time. Challenges, Quests, and Rewards can be implemented from Technical Aspect: Offer challenges or quests related to language learning tasks and reward users upon completion [18]. Implementation: Employ event-driven programming to trigger challenges, manage quest progress, and deliver rewards dynamically.

2.1.4 API Integration:

Integrating APIs access to dictionaries, and other language-related resources examples on the API integration is Speech Recognition API in which its Purpose: Integrating a speech recognition API (e.g., Google Cloud Speech-to-Text) for accurate pronunciation assessment and real-time feedback on users' spoken Mandarin Chinese. Implementation: Utilize API endpoints to capture audio inputs, send them for processing, and receive transcriptions and analysis results back into the application for immediate feedback. Content management APIs also optional, Purpose: Access external content repositories or databases (e.g., Chinese dictionary APIs) to enrich the app's educational content with definitions, examples, or cultural insights. Implementation: Fetch relevant content through API calls, integrating it seamlessly into the app's lessons or cultural sections, but we must pay a great amount of attention to Cost and Scalability since Evaluating API usage limits, pricing models, and scalability for potential increases in user traffic.

2.1.5 Speech Recognition:

Utilizing algorithms like Hidden Markov Models (HMM) or Deep Learning-based approaches (e.g., Convolutional Neural Networks - CNNs or Recurrent Neural Networks - RNNs) for accurate speech recognition to assess pronunciation and speaking skills [13]. Some technical implementation of the speech Recognition is Audio Input Processing in which Audio Capture: Utilize device microphones to capture spoken language inputs from users. Audio Preprocessing: Convert captured

audio into digital signals and preprocess for noise reduction and signal enhancement. Another implementation like Real-time Feedback and Assessment, Instant Feedback: Provide immediate evaluation of user pronunciation, tone accuracy, and speaking proficiency [14]. Feedback Mechanisms: Utilize visual cues, scorecards, or audio feedback to convey assessment results to users, and although it is a great feature, but it can also come with a lot of challenges and consideration like: Accuracy and Error Handling: Address challenges related to variations in accents, background noise, and handling recognition errors [23], Resource Intensiveness: Optimizing algorithms for efficient real-time processing without consuming excessive device resources.

2.2 Related Work

2.2.1 AI-Powered Personalized Chinese Learning Platform

- This application employs Artificial Intelligence (AI) algorithms to create personalized learning paths for Mandarin Chinese learners. It utilizes Machine Learning (ML) techniques to analyze user behavior and adaptively recommend learning materials. The platform offers interactive lessons, grammar exercises, and cultural insights tailored to individual proficiency levels. The primary objective of the study is to leverage deep learning techniques within educational technology to create personalized learning experiences for students studying the Chinese language [19]. The authors recognize the challenges in traditional classroom settings, where individual learning styles, paces, and needs might not be adequately addressed. To tackle these issues, the paper proposes the integration of AI and deep learning methodologies to tailor learning content and experiences for each student including:
- Deep Learning for Personalization: The authors delve into the application of deep learning algorithms, such as neural networks, in building personalized learning models. These models are designed to adapt to the unique learning preferences, proficiency levels, and learning styles of individual learners.
- Adaptive Learning Content: The paper discusses the importance of adaptive learning content, which adjusts based on the student's progress, strengths, and weaknesses. Using AI algorithms, the platform aims to offer personalized content recommendations, exercises, and materials tailored to each student's needs.
- Enhanced Learning Experience: By utilizing AI-powered systems, the platform aims to enhance the overall learning experience for students. This involves providing real-time feedback, interactive exercises, and adaptive challenges to keep learners engaged and motivated.

- Evaluation and Assessment: The paper discusses the role of AI in evaluating and assessing student performance. Through continuous monitoring and analysis of learner progress, the system aims to provide timely feedback and recommendations for improvement.
- Challenges and Future Directions: The authors address challenges in implementing AI-powered personalized learning systems, including issues related to data privacy, algorithmic biases, and the need for continuous improvement of AI models. They also suggest future directions for research and development in this field.

2.2.2 Interactive Gamified Mandarin Learning App

- A mobile app designed with gamification principles, offering a range of language games, challenges, and quizzes to engage users in Mandarin Chinese learning. The app includes interactive exercises for vocabulary, tones, and sentence construction, fostering an enjoyable and immersive learning experience [20]. It focuses on core principles like:
- Gamification Principles: The app employs various gamification techniques to motivate users and make learning Mandarin Chinese more enjoyable and interactive. This includes elements such as point systems, badges, levels, rewards, and progress tracking to incentivize consistent engagement and progress.
- User-Centered Design: The app's design is user-focused, ensuring an intuitive and user-friendly interface. It likely incorporates features like interactive lessons, multimedia content (audio, video), quizzes, and exercises to cater to diverse learning styles.
- Adaptive Learning: The app might utilize adaptive learning algorithms to personalize the learning experience for each user. This could involve assessing the user's proficiency level, learning pace, and preferred learning methods to deliver content that matches their needs.
- Feedback Mechanisms: Immediate feedback is crucial in language learning. The app likely incorporates instant feedback mechanisms for exercises, quizzes, and pronunciation practices to help users understand their mistakes and improve efficiently.
- Progress Tracking and Analytics: The app most likely includes tools for users to track their progress, view their achievements, and access analytics on their learning journey. This feature helps users understand their strengths and weaknesses, enabling targeted improvement.
- Cultural Context Integration: Learning a language involves understanding its cultural nuances. The app might integrate cultural elements of Mandarin Chinese, such as customs, traditions, and idiomatic expressions, to provide a holistic learning experience.
- Mobile Accessibility: Being a mobile app, it offers convenience and accessibility, allowing users to learn Mandarin Chinese anywhere and at any time using their smartphones or tablets.

2.2.3 AR-enhanced Cultural Immersion Tool for Chinese Language

- This application leverages Augmented Reality (AR) technology to immerse learners in Chinese culture. Users engage in virtual tours, cultural simulations, and real-world scenarios, enhancing language learning through interactive experiences embedded in Chinese cultural contexts. The research employs a case study approach to investigate the effectiveness of an AR-enhanced cultural immersion tool for Mandarin Chinese learners. The tool, presumably designed by the authors or in collaboration with others, likely utilizes AR technology to overlay digital content such as images, videos, or textual information onto the real-world environment [21]. This would allow learners to engage with and explore cultural elements associated with the Mandarin Chinese language in a more interactive and immersive manner.
- Introduction to AR Technology: Explanation of AR and its potential in language learning. This section might cover how AR can augment the learning experience by superimposing digital content onto the physical world.
- Rationale for Cultural Immersion: Discussion on the importance of cultural immersion in language learning, especially for a language like Mandarin Chinese, which has deep cultural roots and contexts embedded within its linguistic structures.
- Design and Development of the AR Tool: Details on the creation and design of the AR tool used in the study. This could involve descriptions of the software used, development methodologies, and the content incorporated into the AR application to facilitate cultural immersion.
- Methodology: Explanation of the case study approach adopted for the research, including participant selection, data collection methods (which could involve surveys, interviews, or observation), and the duration of the study.
- Findings and Results: Analysis of the data collected during the case study. This section may present the impact of the AR-enhanced tool on learners' cultural understanding, language acquisition, motivation, and engagement.
- Discussion and Implications: Interpretation of the findings and their implications for language learning pedagogy. This could include recommendations for educators, insights into the potential broader applications of AR in language education, and areas for future research.

2.2.4 Real-time Speech Evaluation System for Chinese Pronunciation

- An application utilizing Speech Recognition technology for real-time assessment of Mandarin Chinese pronunciation. It provides instant feedback on tones, pronunciation accuracy, and speaking proficiency, aiding learners in improving their oral language skills.

Objective of the System: The primary aim of the system is to provide learners with immediate feedback on their pronunciation accuracy while speaking Mandarin Chinese [22]. This real-time evaluation is crucial for learners to make corrections instantly, enhancing their learning process some of its core points are:

- Technology and Methodology: The authors detail the technological framework and methodologies employed in developing the real-time evaluation system. This likely involves the use of speech recognition algorithms, signal processing techniques, and machine learning models trained on Mandarin phonetics to assess and analyze pronunciation accuracy.
- Features of the System: The paper discusses the specific features incorporated into the system to evaluate pronunciation. This could involve assessing tone accuracy, phoneme articulation, rhythm, intonation, and other linguistic elements crucial for mastering Mandarin Chinese pronunciation.
- Evaluation and Validation: The system's effectiveness is likely evaluated through experiments and validation methodologies. This could include testing the system on a sample of Mandarin Chinese learners, comparing their pronunciation evaluations by the system against human experts' assessments to validate accuracy and reliability.
- Applications and Implications: The paper may discuss potential applications of the system, such as integration into language learning software, mobile applications, or educational platforms. Additionally, it might highlight the implications of such technology in improving Mandarin Chinese language learning outcomes.
- Challenges and Future Directions: The authors might address the limitations of the system and potential challenges faced during its development and deployment. They could also suggest avenues for future research or enhancements to improve the system's performance and usability.

2.3 Dataset Description

The dataset is a comprehensive collection of diverse data points gathered from a Chinese learning application, designed to facilitate the training of machine learning models aimed at enhancing the application's functionalities and user experience. The data encompasses various aspects of language learning, including vocabulary, grammar, pronunciation, user interactions, and proficiency assessments.

- **Data Sources**:
    - **Vocabulary and Grammar:** Information on vocabulary lists, grammar rules, and learning materials used in the application's curriculum.

    - **Speech Data:** Audio recordings and corresponding transcriptions capturing user pronunciation attempts and assessments.
    - **User Profiles:** Demographic information, language proficiency levels, and learning goals provided by the users.

- **Key Features**:

    - **Vocabulary and Grammar:** Includes datasets with word lists, character frequency, grammar structures, and exercises categorized by difficulty levels.
    - **Speech Data:** Audio files with corresponding phonetic transcriptions or pronunciation ratings for various words and phrases.
    - **User Profiles and Preferences:** Information about user demographics, preferred learning styles, and self-reported proficiency levels.

- **Potential Use Cases**:

    - **Model Training:** Utilizing the dataset to train machine learning models for speech recognition, language proficiency assessment, and personalized learning paths.
    - **Performance Evaluation:** Assessing user progress, engagement, and the effectiveness of different teaching methodologies or exercises.
    - **Adaptive Learning:** Implementing adaptive learning algorithms to adjust content difficulty based on individual user performance.

2.4 Functional Requirements

- If a user wants to register, he can do so by creating a new account using his email and entered password.
- User can sign in if he already has an account.
- User can take a placement Test exam in order to determine his level of proficiency and take the suitable course for his current level and get his results.
- User can Enroll himself in the courses he desires according to his language proficiency level.
- User can Unenroll himself in the courses he doesn’t want to be part of it according to his language proficiency level.
- User can switch between light and dark mode of the application.
- User can rely on the chatbot for help during any inconvenience he might face with the application.
- User will have the opportunity to receive feedback on his performance.

- User will have the option to download a lesson to practice whether online or offline for better learning process.
- User will have recommendations to access cultural insights, tip and tricks when communicating in Chinese.
- The User will be able to bookmark his favorite courses or notes for future references.
- User can browse the upcoming course or even courses he wants to get enrolled or unenrolled from in his current level.
- User can edit and change his Avatar.
- User can edit and change his current username.
- User can reset his password.

2.5 Non-Functional Requirements

- **Performance (Responsiveness):** The application must respond promptly to user interactions, ensuring minimal latency during lesson loading, quiz submissions, or content navigation. High responsiveness ensures an engaging and seamless user experience.

- **Usability (Intuitive User Interface):** The app should feature an intuitive and user-friendly interface, ensuring ease of navigation, clear instructions, and straightforward access to learning modules. A visually appealing and user-centric design fosters user engagement and enhances usability.

- **Reliability (Stability and Availability):** The app should maintain a high level of stability, minimizing downtime and ensuring availability. Reliable access to learning resources, quizzes, and cultural insights is essential for consistent learning experiences.

- **Security and Privacy (Data Protection):** Ensure robust data encryption and security measures to safeguard user information, learning progress, and personal data. Compliance with data protection regulations ensures user trust and confidentiality.

- **Scalability:** Design the app with a scalable architecture to accommodate growing user bases and increased usage without compromising performance. Scalability allows for seamless addition of new features and content.

- **Compatibility and Interoperability:** Ensure compatibility with various Android versions and screen sizes to provide a consistent user experience across different phones and tablets. Interoperability with other systems or APIs facilitates seamless integration with external resources.

- **Multilingual Support:** Provide multilingual support beyond Mandarin Chinese to cater to users from diverse linguistic backgrounds. Localization enables a wider user base.

2.6 System Users

- **Learners/Students:** They are our primary users seeking to learn Mandarin Chinese, including beginners, intermediate learners, and advanced students, their role is to Engage with lessons, quizzes, cultural insights, games, and interactive exercises to improve language skills.
- **Language Instructors/Tutors:** They are responsible for creating new content, answering questions, and enhancing the learning journey of the learners.
- **Developers/Technical Support:** They will Maintain and support the technical aspects of the application, including updates, bug fixes, and enhancements and resolve technical issues, implement new features, and maintain app performance.
- **Administrators/Moderators:** Manage and administer the application, oversee content, user accounts, and overall functionality, Curate content, ensure platform integrity, manage user accounts, and address technical issues.

3. Analysis and Design

3.1 System Overview

In this section we will discuss a high-level description of the system through – diagrams.

3.1.1 Use Case Diagram

The following figure represents the actions that the user can directly perform on the system namely:

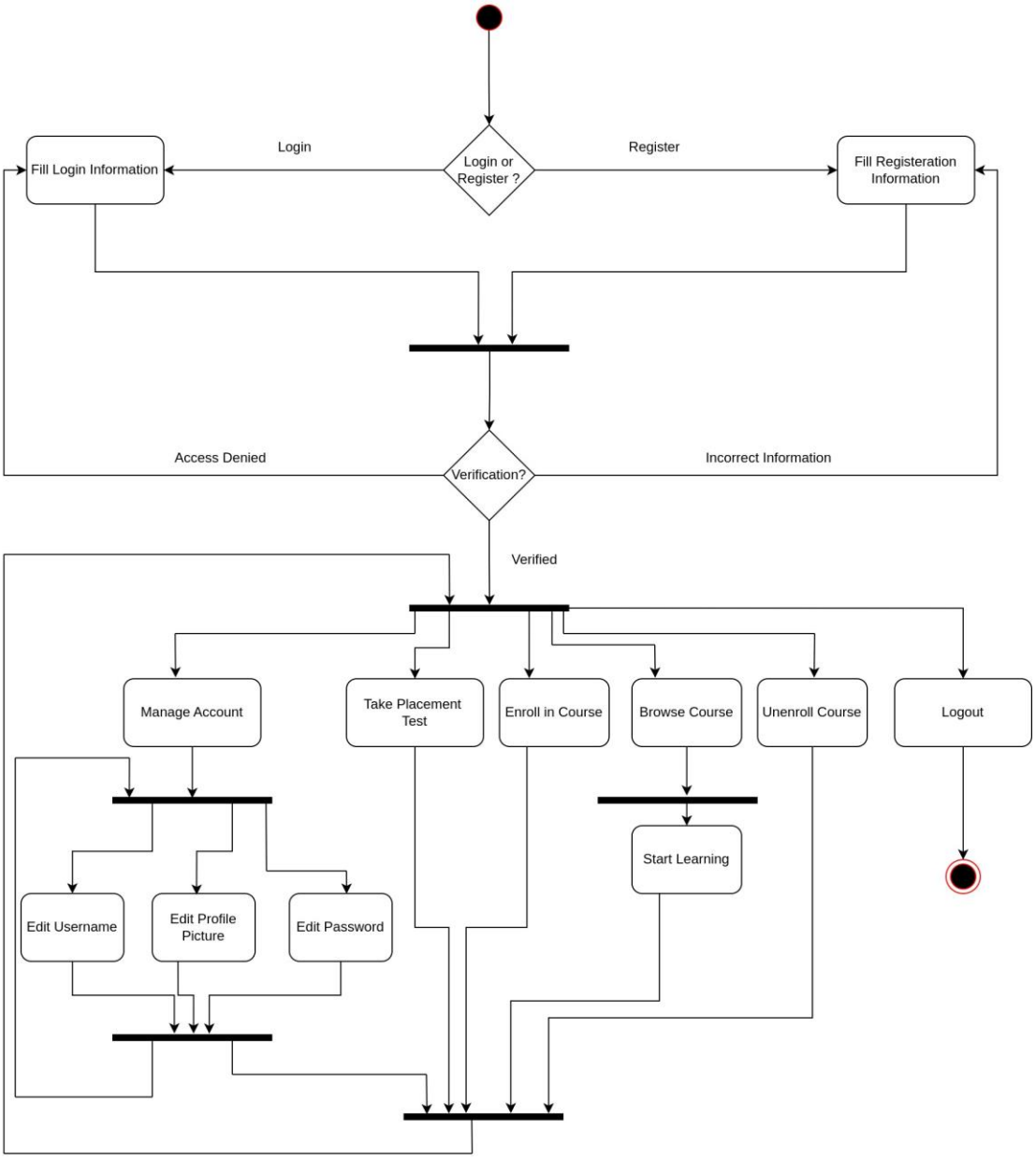
- Registering if he has no account.
- Logging in if he already has an account.
- Viewing his current Progress.
- Taking Quizzes and Test placement exams.
- Managing his own account and profile (username, passwords, avatar).
- Viewing his learning streak since the beginning of his learning journey.
- Managing his own Courses whether browsing his courses or other courses, enrolling in a new course, unenrolling from a specific course according to his level of proficiency.
- Logging out of his account.

3.1.2 Activity Diagram

The Following figure represents the flow of activities that the user can do:

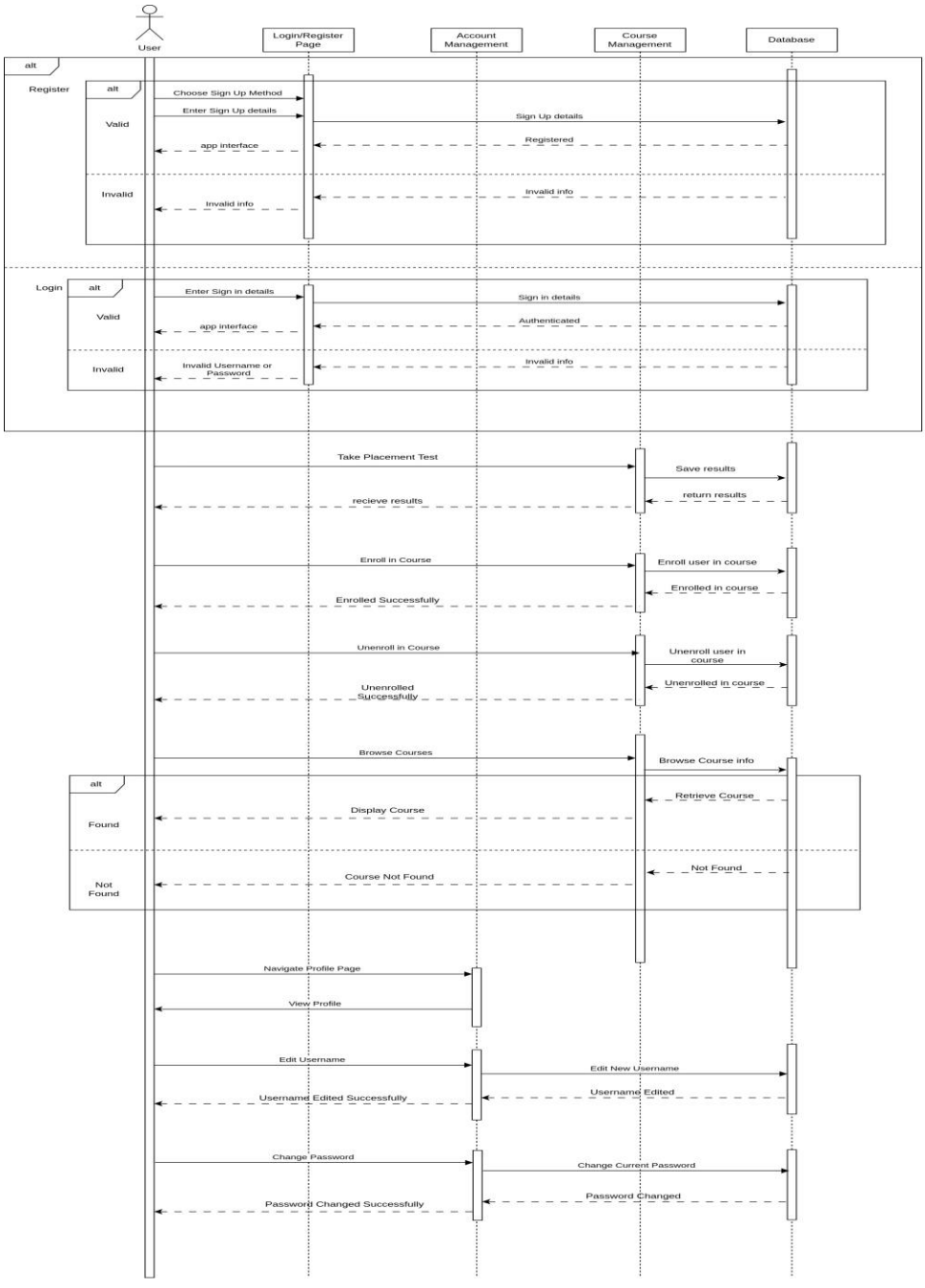
- It shows the flow of Login and Register activities, user can choose whether to login if he has account or register to create new account to access the home page. User will not be able to access the home page without verifying.

- After Logging in User can Take a placement test, enroll/unenroll in course, browse a desired course, manage his own account regarding various aspects like username and password, or he can logout.



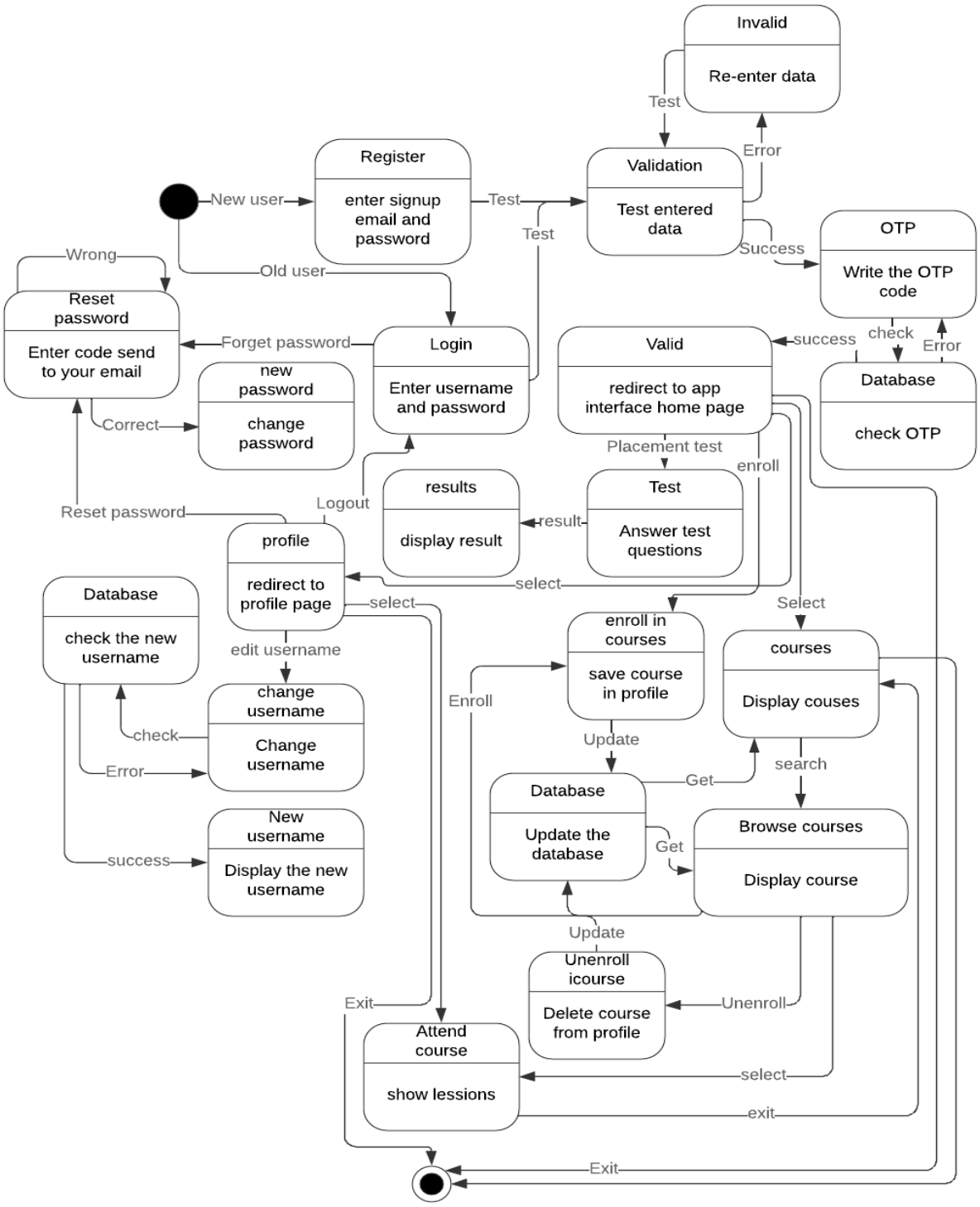
3.1.3 Sequence Diagram

The diagram describes the sequence of actions that a user can make starting by logging in if he already has an account. After providing his username and password, the system will check with the database if they are valid or not. On the other hand, if he is a new user, he can also register, and the system will add his account to the database if it is valid. Once the user logged in successfully, he can take a placement test to level his own proficiency in the language and then start his learning journey whether by enrolling in the recommended course or by browsing a specific course according to his level of knowledge, also if he is an old user and has taken a course before and want to unenroll form it he has the complete freedom to do so. Also, he could navigate to his profile for personal preferences if he wanted to change his username or password for security concerns. He can accomplish this task easily.



3.1.4 State Diagram

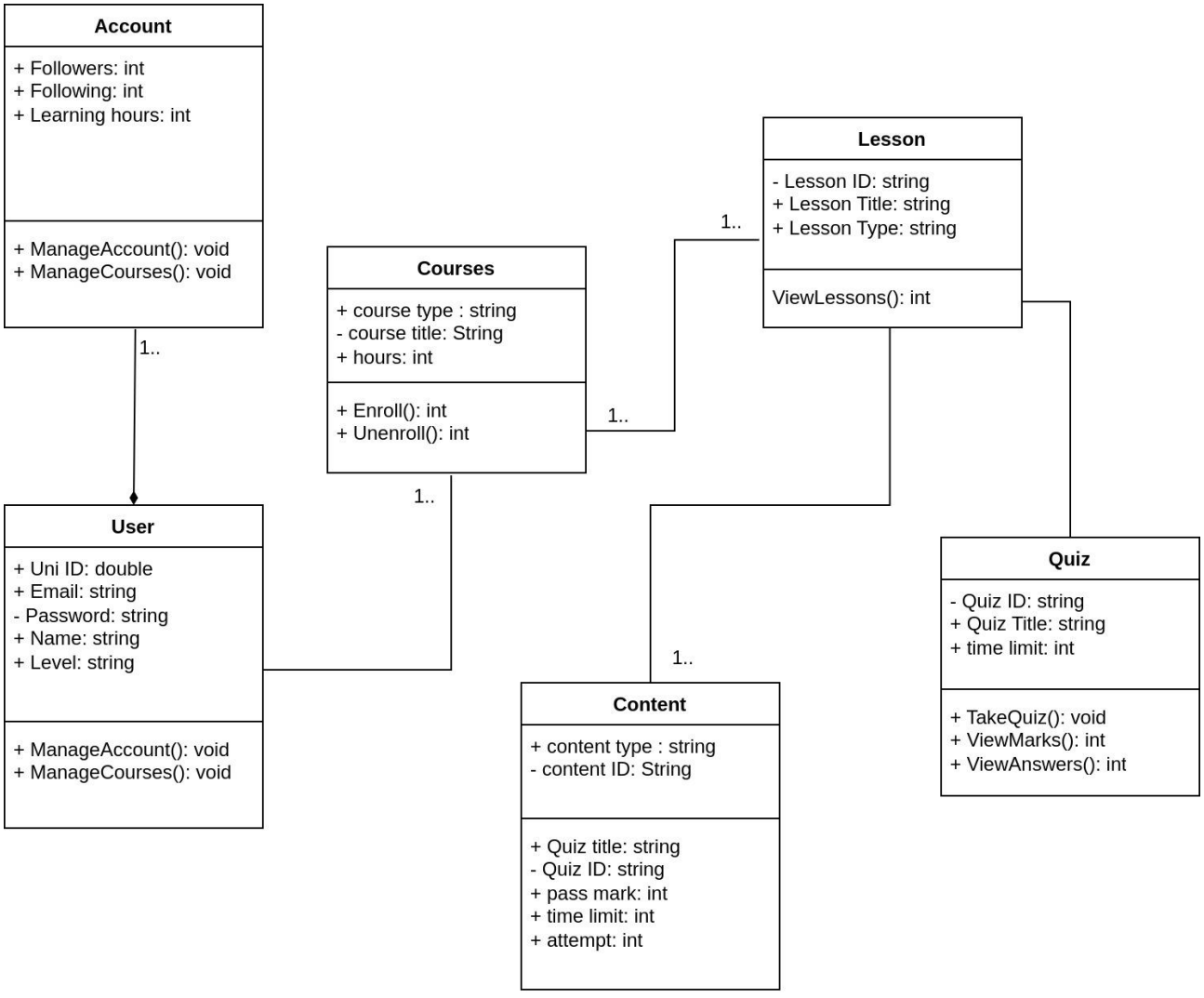
This Diagram shows the response of all the classes in the system to the user actions.



3.1.5 Class Diagram

The following figures represents the functions and attributes of the four main classes that the system use:

- User
- Account
- Courses
- Lesson
- Content
- Quiz



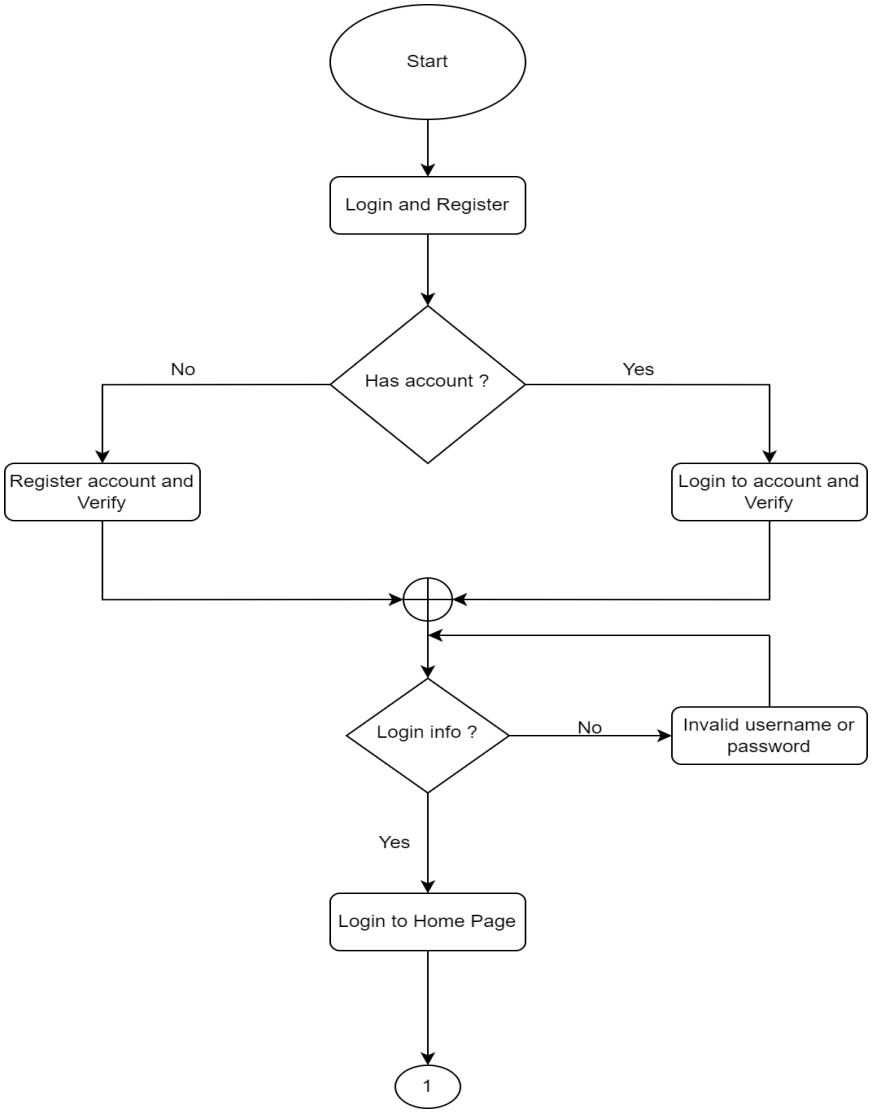
3.1.6 Flow Chart

Each one of the following flow charts represents a function in our system in detail.

3.1.6.1 Register and Login

The following figures show the steps of register and login functionalities:

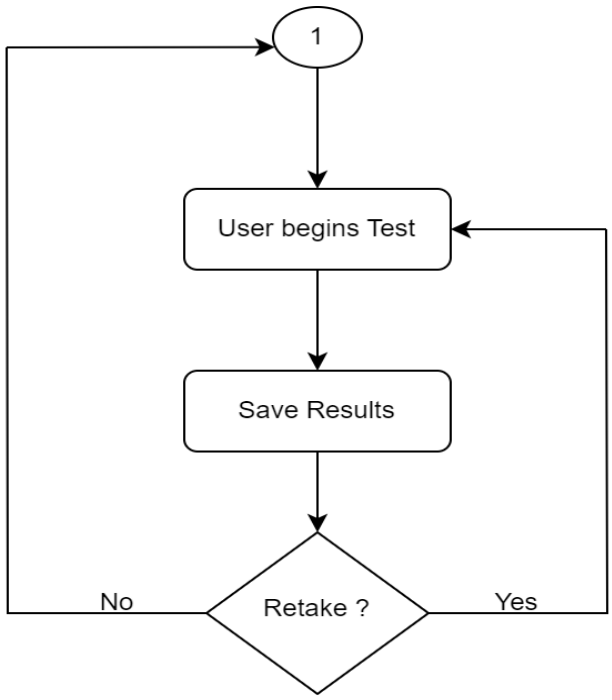
- The user either register to create new account or login by his account.
- User can login by entering username and password.
- The system will let the user access the home page if the information is valid.



3.1.6.2 Placement Test

The following figure shows the steps for Taking the placement test:

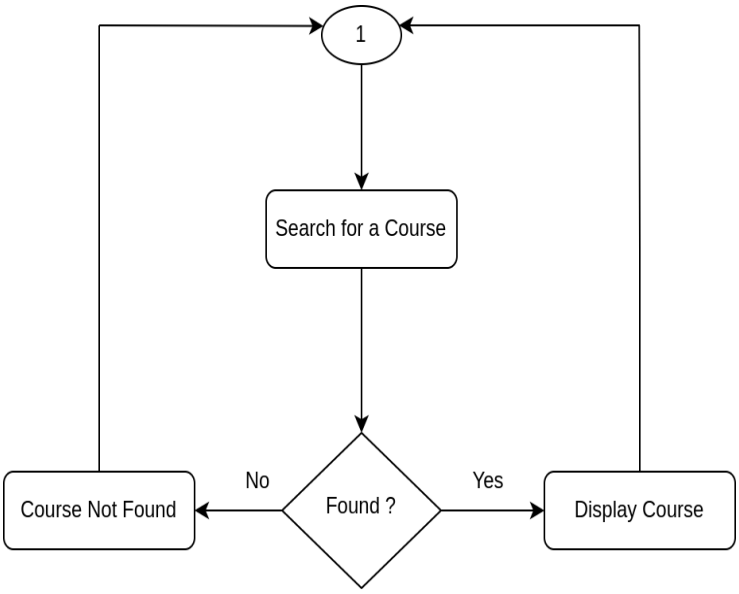
When the user has successfully logged in and prompted to the homepage, he has the option to undertake a placement test to determine his level of proficiency in the language rather than starting from a very beginning level.



3.1.6.3 Browse Courses

The following figure shows the steps of browsing a course:

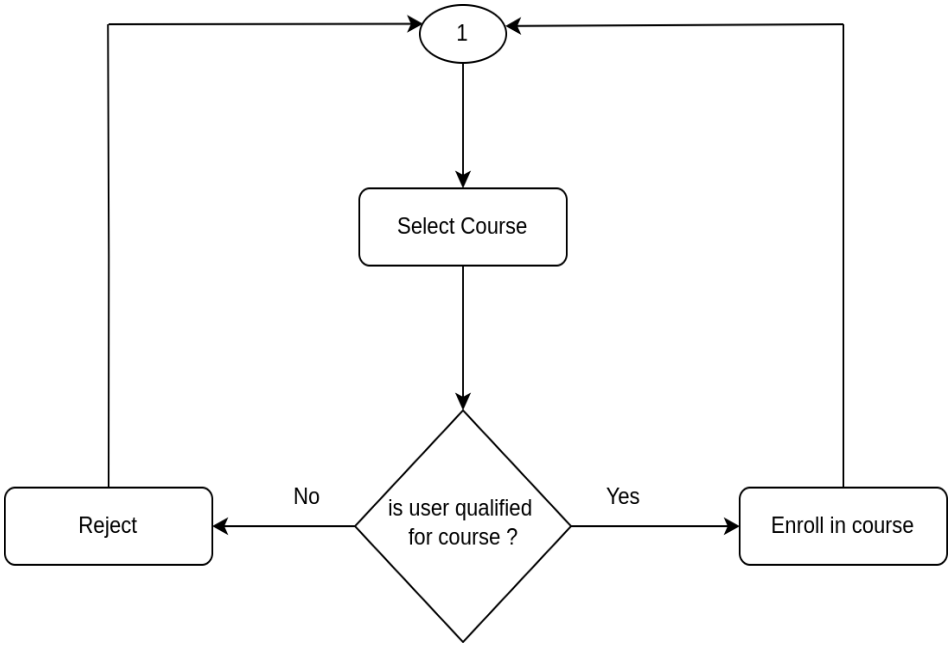
- The User enters the course name.
- The system checks whether it is available or not.



3.1.6.4 Enroll in Course

The Following figure shows the process of enrolling in a course:

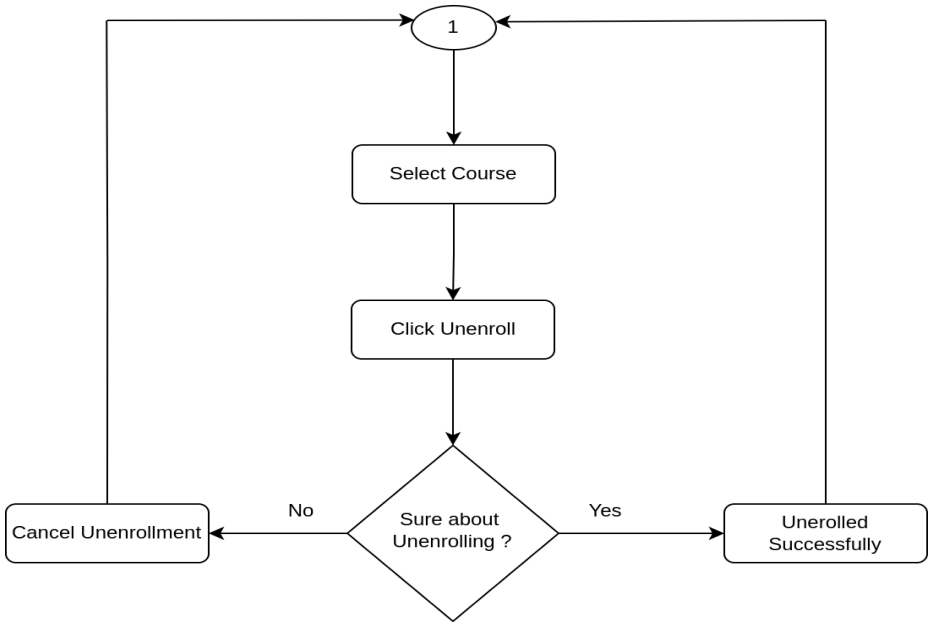
- Selecting the desired course, you want to enroll in.
- The System checks your level of proficiency to confirm this enrollment.
- Otherwise, the system will reject due to incompatibility with your level.



3.1.6.5 Unenroll in Course

The Following figure shows the process of unenrolling in a course:

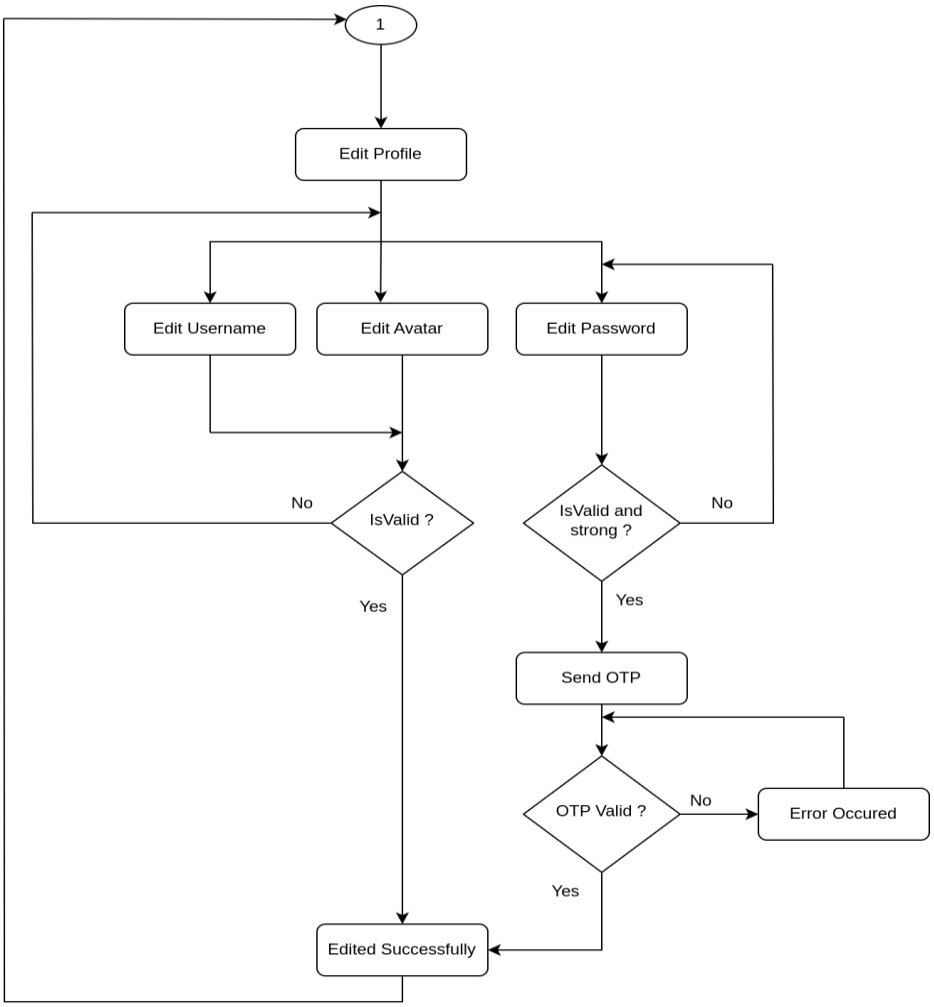
- Selecting the desired course, you want to unenroll from.
- The System prompts you with a check statement if you still want to confirm your unenrollment.
- Otherwise, the System will cancel your request.



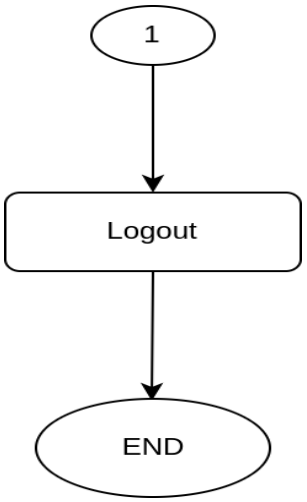
3.1.6.6 Edit Profile

The figure shows the workflow of edit profile functions:

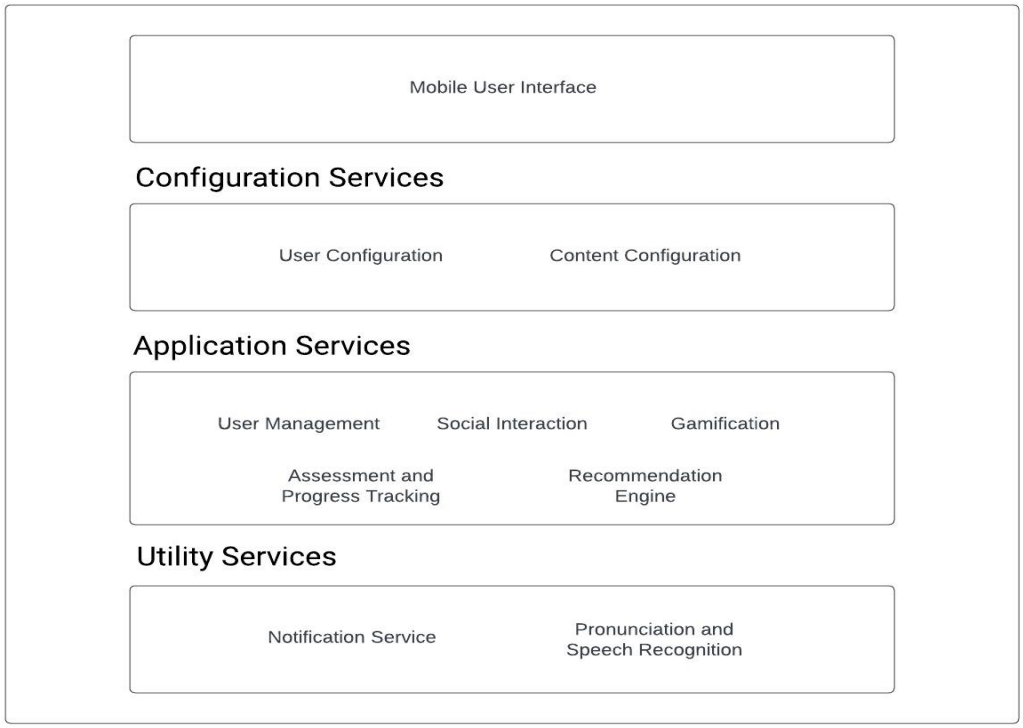
- When the user chooses to edit his profile, he can edit his password, Avatar, or password.
- We took special care of the password from a security perspective and added “OTP” to enhance this aspect.
- If the password is valid but the OTP is incorrect the user can’t change the password.


1
Edit Profile
Edit Username
Edit Avatar
Edit Password
No
IsValid ?
IsValid and strong ?
No
Yes
Yes
Send OTP
OTP Valid ?
No
Error Occured
Yes
Edited Successfully

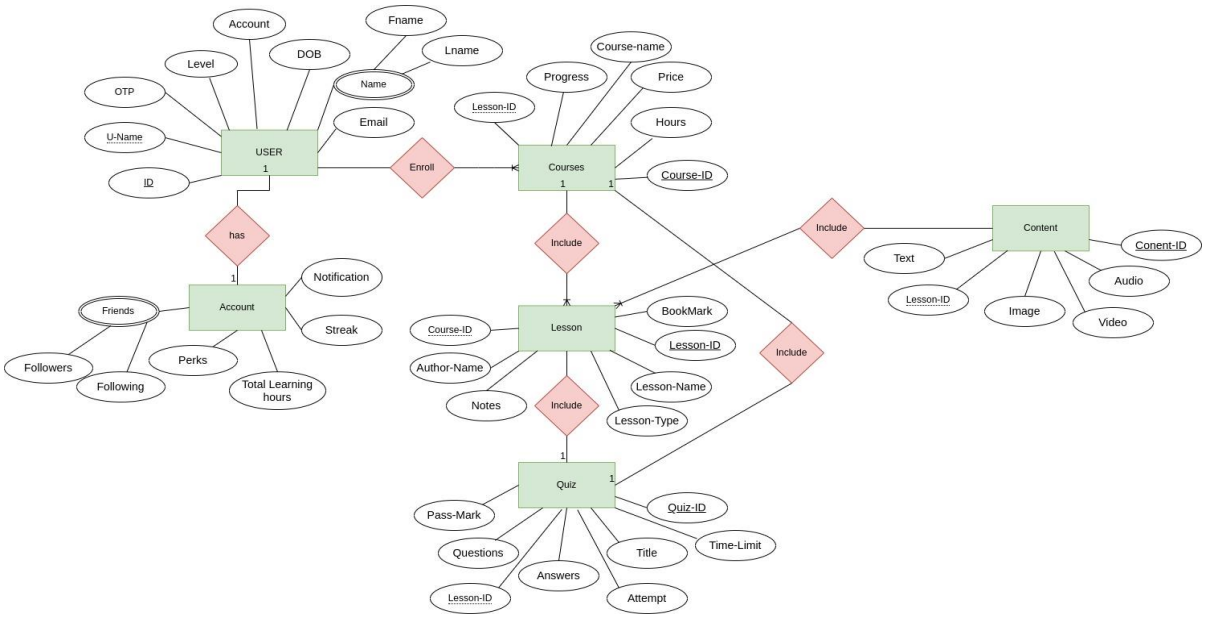
3.1.6.7 Logout


1
Logout
END

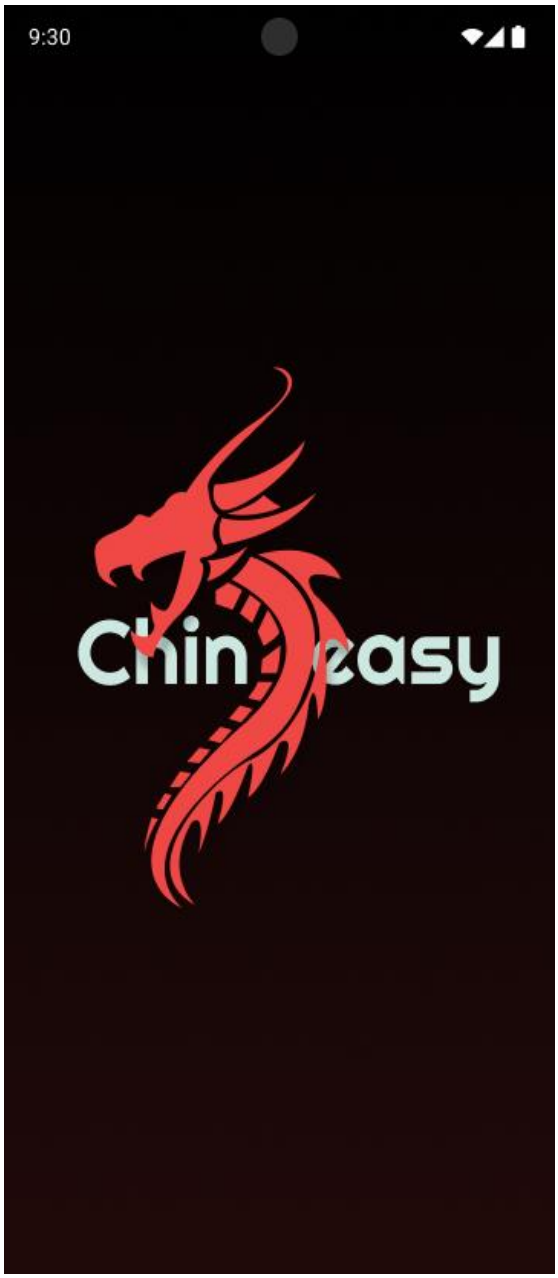
3.1.7 System Architecture

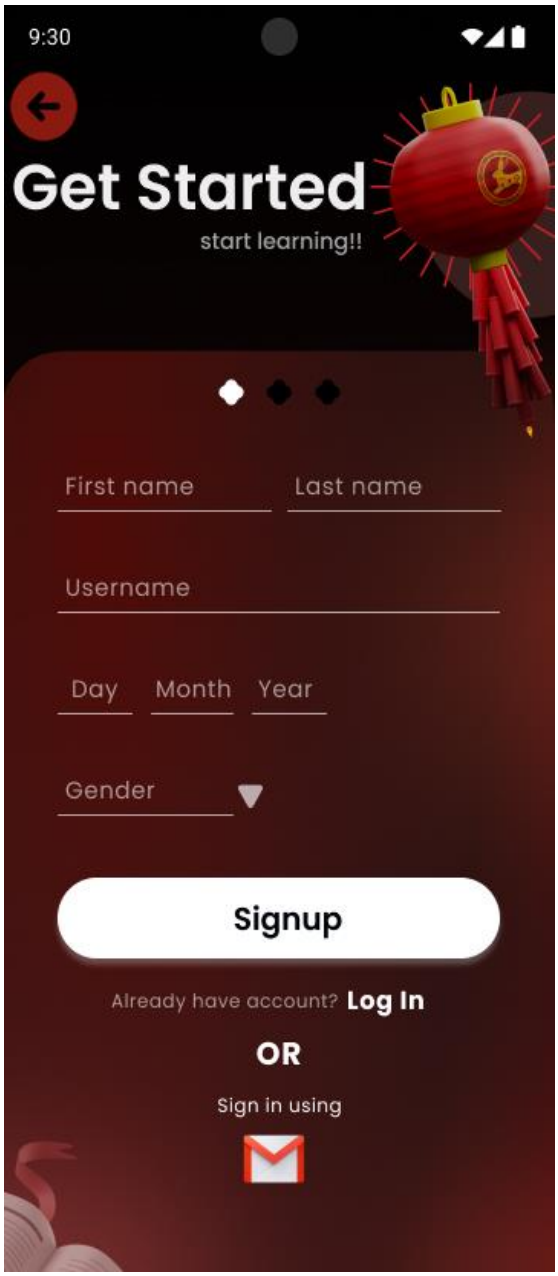


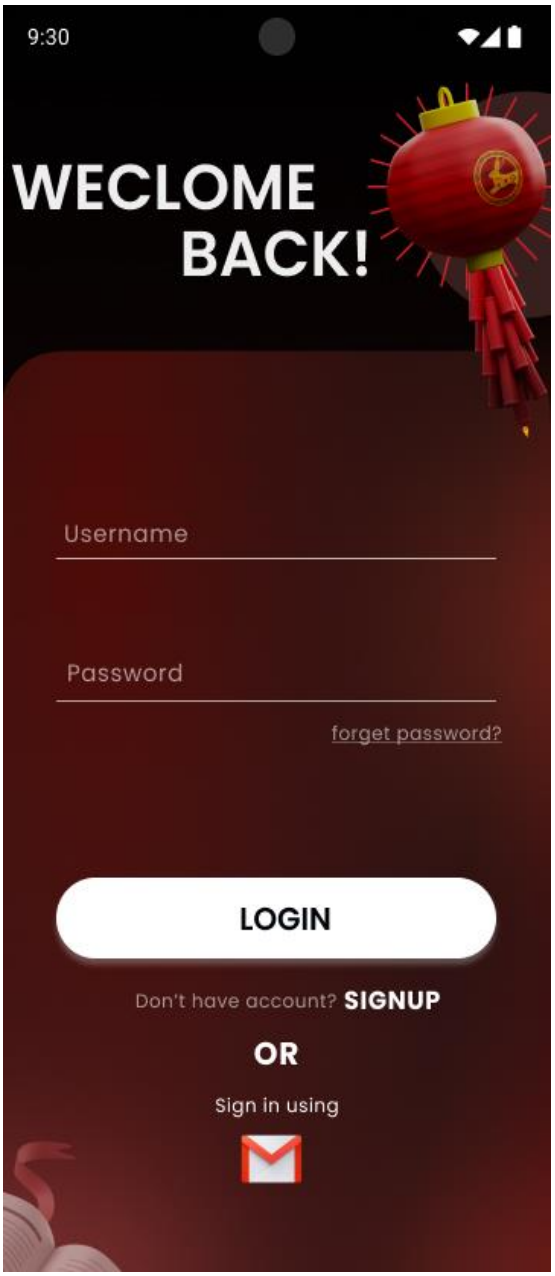
3.1.8 Entity Relationship Diagram



Application Design Interface

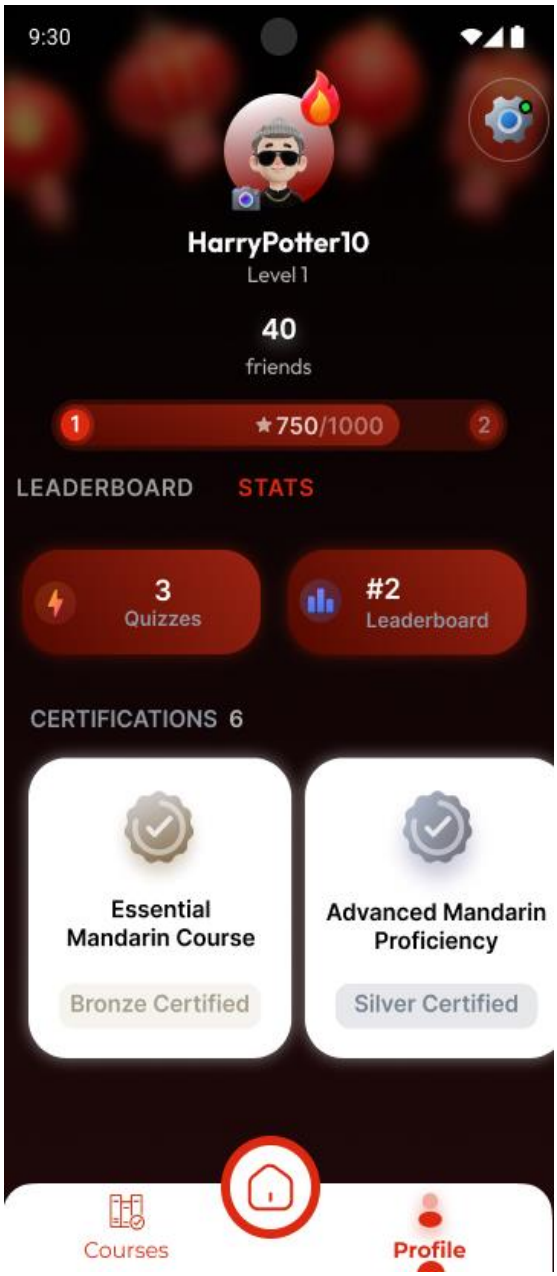



9:30
Get Started
start learning!!
First name
Last name
Username
Day
Month
Year
Gender
Signup
Already have account? Log In
OR
Sign in using


9:30
WECLOME
BACK!
Username
Password
forget password?
LOGIN
Don't have account? SIGNUP
OR
Sign in using


9:30
Welcome Harry!
Let's learn together
Active Level
See Course
Beginner level
Chapter 2
72%
Pinyin: Chinese Phonetic System
Continue your journey!
Continue Studying
Word of the day
旅行
Meaning: Travel
culture
view all
food
Courses
Profile


9:30
Journey to Fluency
Level 1
250 Points to next level
1
★ 750/1000
2
Mandarin Courses
common
beginner course
+90
advanced course
+30
Travel Course
+90
Courses
Profile


9:30
HarryPotter10
Level 1
40
friends
1
★750/1000
2
LEADERBOARD
STATS
3
Quizzes
#2
Leaderboard
CERTIFICATIONS 6
Essential Mandarin Course
Bronze Certified
Advanced Mandarin Proficiency
Silver Certified
Courses
Profile


9:30
HarryPotter10
Level 1
40
friends
1
★750/1000
2
LEADERBOARD
STATS
HarryPotter10 2750 XP
HarryPotter12 2550 XP
3 HarryPotter10 2250 XP
4 HarryPotter10 2050 XP
5 HarryPotter10 1750 XP
6 HarryPotter10 1650 XP
7 HarryPotter10 1400 XP
8 HarryPotter10 1200 XP
9 HarryPotter10 1000 XP
Courses
Profile

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