# GlobaLingo

Software Requirements Specification

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CSCE 247: Software Engineering

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# 1. Introduction

## Purpose

Learning a new language requires consistent practice and self-motivation to succeed. Having access to a language learning tool can aid the user by breaking it down into portioned sections or lessons, ensuring the user continues to practice at their set pace. Such program can help the user stay motivated by tracking their progress, curating specific lessons to address problems in learning, as well as offer a pseudo-reward to make the user feel further accomplished. Our team intends to create a program that will keep the user engaged with game-like features, without sacrificing the program’s effectiveness as a language learning tool. The program will track the user’s progress through a set course of lessons, showing the specifics of where they are struggling and offering lessons to aid in those areas. These courses will cover vocabulary, grammar, sentence structure, pronunciation, and example conversation with importance on relevancy to a user-specified end-goal.

## Scope

This document will cover:

• Stakeholders in the product

• Example personas of potential users

• Time, technical and monetary constraints of production

• A hypothetic description of the program

• Competitive analysis of other similar programs to identify strengths to build off of and weaknesses to correct

# 2. Stakeholders

**Language Learners**

* **Beginners**: Individuals just starting to learn a new language, looking for basic vocabulary and grammar lessons.
* **Intermediate Learners**: Users with some language knowledge seeking to improve fluency and comprehension.
* **Advanced Learners**: Individuals seeking to achieve fluency and advanced language skills, possibly for professional or academic purposes.
* **Students**: School, college, or university students using the app for supplementary learning or as part of their coursework.
* **Professionals**: Users learning a language for career advancement, including expatriates, diplomats, and business professionals.
* **Travelers**: Individuals learning a language for travel purposes, looking for practical conversation skills.
* **Polyglots**: Enthusiasts learning multiple languages simultaneously, looking for diverse and challenging content.

**Secondary Stakeholders**

* **Educational Institutions**
  + **Schools and Universities**: Institutions integrating the app into their curriculum as a learning resource.
  + **Language Institutes**: Specialized institutions offering language courses that may partner with or endorse the app.
  + **Teachers and Instructors**: Educators using the app as a teaching tool or supplementing their lessons with app content.
* **Parents and Guardians**
  + **Parents of Young Learners**: Guardians looking for educational tools for their children to learn a new language.
  + **Homeschooling Families**: Families using the app as part of a homeschool curriculum.
* **Corporate Clients**
  + **HR Departments**: Companies offering the app as part of employee development or relocation packages.
  + **Training Providers**: Organizations providing language training as part of broader professional development programs.

## Personas

A screenshot of a computer

Description automatically generatedA screenshot of a computer screen

Description automatically generatedA person in a suit standing in front of a brown background

Description automatically generatedA person on a computer

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# 3. Constraints

**Time Constraints**

* + This project is to be completed with a time span of 12 weeks

**Monetary Constraints**

* + This project's development has been allocated a $0 budget

**Technical Constraints**

* + The code must be done in Java

# 4. Overall Description

This app will be a free mobile and web-based application that will prompt the user to create an account and specify their intention with language learning. For example, daily use of the language, occasional use in public, assist with school learning etc. From this, the program will focus on aspects of language learning that will guide the user to be able to accomplish their end goal. The lesson plans will be linear but allow users to “test out of” specific brackets of the language to progress faster. The program will also match their progress with other users and offer co-operative practice. The user will be offered lessons to aid in building vocabulary, constructing sentences, working on pronunciation, as well as correcting grammar. These lessons can be flash cards, fill in the blank, building sentences from provided words, and more. The program will track where errors are made and categorize them to identify where the user is struggling and build lessons specifically around those errors to promote better learning. There will also be features that keep the user engaged, such as leaderboards and a score system that can help the user gauge their progress against other users. In addition, app will have new structural components to support better tracking, user interaction, and security. So, the system will now utilizing multiple classes to manage user’s progress, game-like features, and security roles.

* 1. ProgressList Class:
  + A progress List class will store and mange the user’s progress through an array list of Progress objects. Each progress object will track individual lessons or sections progress.
  + Progress Track allows the system to track each user’s progress through many levels such as lessons, sections, and courses. All Progress will be stored in ProgressList, which holds data of where user left off and what areas need better focus.
  + Performance Assessments will allow instructors or the system to spectate the user’s performance based on their progression within sections and lessons. This will help improve productivity.

1. Question Class and subclasses:
   * Question class was expanded to handle multiple types of questions as to provide variety and engagement in lessons. Such as multiple choice that presents a list of options where the user finds the correct answer. It will provide similar answers to the right one but are false and has a mechanism to shuffle options.
   * Flashcards will also be presented to show a term or sentence for translation and the user will type out the response. The app will track both correct and incorrect answers and adjust the difficulty accordingly.
   * Matching is also included and displays a list of similar words or phrases in two columns, where the user matches the correct answers.
   * Sentence Buildings has a phrase, or word provided the user arranges into the correct sentence structure.
2. Dynamic Difficulty:
   * Takes notes from user performance and the system will dynamically adjust the lesson difficulty by selecting questions types that focus on a individuals weaker areas of learning.

# 5. Business Use Cases

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1. Enhanced Progress Tracking
   * The system shall implement the ProgressList class to store and retrieve a user's progress through individual lessons, sections, and courses.
   * The system shall give detailed progress reports accessible to the user and optionally available to instructors or supervisors.
   * The progress system shall calculate overall progress and provide feedback on areas needing improvement.
2. Expanded Question Types
   * The system shall support four distinct question types: Multiple Choice, Flashcard, Matching, and Sentence Build.
   * Each question type shall have specific methods for displaying content and validating user input.
   * The system shall allow lessons to incorporate multiple question types within a single session.
3. User Customization and Engagement
   * The system shall allow users to customize their in-game avatars using items such as hats, faces, bodies, and capes.
   * Avatar customization shall be managed through the Avatar class, which tracks available items and current user selections.
   * Users can earn additional avatar items through lesson completion, which are stored in loot crates. The items are managed through enumerations of available Hat, Face, Body, and Cape objects.

# 6. Functional Requirements

Please refer to the link below for Functional Requirements: <https://docs.google.com/spreadsheets/d/1cu4unTWhvgbRvt5kjkk3tvx2trRugISH0zuZYYsPDsc/edit?usp=sharing>

# 7. Non-Functional Requirements

**Look and Feel Requirements**

* 1. The user interface shall be visually appealing
  2. The user interface shall be easily navigable

**Usability Requirements**

* 1. The program must contain a plain-text User Interface that allows all users, regardless of technical knowledge, to operate the app.
  2. Program will incorporate disability features

**Performance Requirements**

* + Program shall be able to run on any device that can handle Java based applications, with a stable internet connection

**Maintainability and support requirements**

* + The system shall be multi-platform, supporting latest Windows, MacOS and Linux machines

**Security requirements**

* + All Personally Identifiable Information of users shall be stored in an encrypted database

**Legal Requirements**

* + rogram will cooperate with all Federal and State Laws

Please refer to the link below for Non-Functional Requirements: <https://docs.google.com/spreadsheets/d/1cu4unTWhvgbRvt5kjkk3tvx2trRugISH0zuZYYsPDsc/edit?usp=sharing>

# 8. Definition and Acronyms

1. User: The person who interacts with the language learning application to learn lessons and have practice.
2. Avatar: A customizable digital representation of the user in the app, which can be altered by adding items like hats, clothes, masks, face wear, or other accessories.
3. Loot Crate: A reward given to users after completing tasks such as lesson streaks or completing a lesson, containing random avatar customizations or in-app bonuses.
4. Progress Bar: A visual chart that indicates how far a user has progressed through a lesson or course.
5. Daily Streak: A counter tracking how many days a user has completed at least one lesson.
6. Leaderboard: A ranking system showing user standings based on progress, points, or lesson completion.
7. Placement Test: An initial test to determine the user’s language proficiency and to place them at the appropriate learning level.
8. GDPR (General Data Protection Regulation): A European Union law regulating how personal data should be processed and stored, ensuring privacy and security.
9. HTTPS (Hypertext Transfer Protocol Secure): A secure version of HTTP that encrypts communication over a computer network.
10. Text-to-Speech (TTS): A feature that reads out loud the written text to aid in pronunciation and practice.
11. ProgressList: A class that stores the user's lesson, section, and course progress in an array list format.
12. Avatar: A digital representation of the user in the game, which can be customized by changing features such as hats, faces, bodies, and capes.
13. Security: A class responsible for managing encryption, account deletion, and security breach reporting.
14. Loot Crate: A reward system that provides users with random avatar items or bonuses for achieving certain milestones.
15. MultipleChoice: A question format that presents the user with multiple answer options.
16. Flashcard: A question type where users translate a term or phrase.
17. Matching: A question type where users match words or phrases between two lists.
18. SentenceBuild: A question type where users arrange words or phrases into the correct sentence order.

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# 9. Competitive Analysis

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|  | **Rosetta Stone** |
| Strengths | Rosetta Stone stands out by having an immersive language learning approach that offers 25 languages and provides interactive lessons.  The app has access to all platforms and offers offline access. This offline access is convenient for users who do not always have internet connectivity.  It provides TruAccent technology that helps individuals and professionals learn pronunciation with a more pronounced accent. It helps build a better authentic accent if you’re in a certain country.  Rosetta Stone also offers a lifetime subscription that’s allows those dedicated to learning a language. It teaches users a product that is long-term. |
| Weaknesses | The platform provides a structured approach that acts as its strength, however, can also act as a limitation. The lessons it provides can feel rigid and tedious, which may not appeal to all styles of learning. Especially those who seek a flexible and gamified learning experience.  Then the cost of Rosetta Stone is high, particularly compared to free options such as Duolingo or Google translate. This could be an obstacle for casual learners or people with a budget.  Rosetta Stone lacks engagement features like games or social interactions tools that make the experience feel greater. |
| Audience/Focus | Rosetta Stone is targeted towards serious language learners, including professors, students, travelers, and professionals who wish to be fluent. It is well suited for individuals that prefer a traditional and immersive learning experience. It would appeal to institutions, companies, and individuals that have the time and money to master a new language. The platform has a focus of having structured lessons and pronunciation accuracy. This would be most useful to professionals or universities that need to have a way to learn a language. |
|  | **Google Translate** |
| Strengths | Google Translate is one of the most accessible language tools that is available and is very versatile. It provides over 100 languages allowing it to be one of the most comprehensive translation instruments.  It has the ability to instantly translate text, voice, images, and web pages. It is common for travelers and users that need a swift, on-the-go translation. The app is also free, which makes it easily accessible to a global audience with no price tag.  The platform is a Google product, hence it has the capability to work with other Google services, such as Chrome and Google Assistant. Which enhance the usability across multiple devices. |
| Weaknesses | Google Translate is a strong competitor, nevertheless it has limitations such as translation quality. The platform is adequate for quick translation; however, the accuracy of translation can vary depending on the specified language and the complexity of text.  Languages that have insufficient available data have a likely chance of being less reliable. Google translate is not designed to be a language learning tool; therefore, it lacks structured lessons and exercise. This is unlike language learning platforms such as Duolingo or Rosetta Stone.  The result of these limitations makes it not suitable for users searching to develop a deeper understanding or fluency in a foreign language. Google Translate acts as supplementary tool for individuals that have some language skills. |
| Audience/Focus | Google Translate is primarily focused on casual users who need a rapid translation rather than an organized learning experience. This would include travelers, business professionals, and anyone who needs to understand or communicate in a foreign language spontaneously. The tool is also widely used by students, universities, high schools, and companies who need to translate text for research or other purposes. As it is free and easy to access, Google Translate attracts an extensive audience, including individuals who may not be interested in learning a language but rather using it as a tool. |

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|  | **Duolingo** |
| Strengths | Duolingo has gained mass success by having a highly engaging, gamified approach for learning a language. It makes language learning feel like playing a game, with users leveling up, earning points, and maintaining streaks for daily practices.  By being gamed based for a language learning tool it keeps users motivated and enthralled over time. It offers courses in over 40 languages and includes more niche languages that are less taught. This appeals to a wider diverse user base.  Duolingo Is an app that is free to use and has an optional premium platform that will remove ads and offers specific features. It has a strong community that has features such as forums and leaderboards that promote an idea of social learning and some competition, which further enriches the user’s experience. |
| Weaknesses | Duolingo’s idea of making it game based is a strength in it of itself but has some drawbacks. It focuses on bite-sized lessons and gamification can cause a superficial understanding of the user’s choice of languages. Especially for users that already have some skill in a language.  The app is also tailored towards beginners and intermediate learners and may not have the capability of providing an in-depth or rigorous lesson. This would not be useful for individuals aiming to achieve a higher level of proficiency.  Duolingo has a reliance of ads in the free version, which can be a distraction and may derail people from their learning experience. In addition, the app lacks advanced grammar summaries or cultural context. |
| Audience/Focus | Duolingo’s audience includes casual learners, students, and hobbyists who are interested in learning a new language excitingly and engagingly. The platform's reachable, game-based interface makes it notably appealing to younger individuals and those who may be discouraged by more established language learning methods. Duolingo is also in demand among users who want to learn a language for travel or personal purposes rather than for professional or academic purposes. |

## Summary

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Rosetta Stone** | **Google Translate** | **Duolingo** |
| **Pricing** | $149 for Lifetime Subscription (One-time payment for unlimited access to 25 languages) | Free (Accessible to everyone, no premium option) | Free with ads; Premium subscription available at $6.99/month, which removes ads and provides extra features |
| **Languages Supported** | 25 languages | Over 100 languages | 40+ languages |
| **Learning Approach** | Focuses on immersive and contextual learning using TruAccent speech recognition technology | Has real-time text, voice, and image translation that provides quickness but lacks structured lessons | Has interactive game exercises and lessons to grow daily practice and learning |
| **Content Structure** | Follows structured lessons that are progressive from beginner to advanced skills | Has no structured learning system and is seen more as a translation tool with limits on language learning content | Interactive lessons that are game-like in structure and more short term based to be used for daily practice |
| **User Engagement** | Moderate while finding engagement through those looking for structured courses | Low due to not being designed for engagement, but rather for quick and functional translations | Has high engagement due to the gamification and its features such as leaderboards and daily streaks |
| **Special Features** | TruAccent speech recognition that provides feedback on user’s pronunciation | Has instant text, image and voice translation and has the ability to support multiple modes of translation among devices | Uses gamification and social learning such as incorporating points, levels, and streaks |
| **Accessibility** | Provides offline access and can used on mobile or desktop devices | It is widely accessible and can be used on the web, mobile apps, and other Google services | Also, widely accessible and provides offline features in the premium version |
| **Audience** | Serious learners (Perfect for professionals, students, and serious travelers) | Casual users such as travelers and individuals searching for quick translation | Learners and Students but ideal for beginners and hobbyists looking to learn. |
| **Strengths** | Comprehensive and has an immersive curriculum | Versatility and a much wider language support | Engaging and provides an exciting learning experience |
| **Weaknesses** | Has a high price tag and follows a very rigid structure making it less flexible | Offers limited learning and has accuracy issues such as in its quality of translation | Has limited advanced content skills due to being for beginners and has ads |

Following the competitive analysis of Rosetta Stone, Duolingo, and Google Translate, has taught us a lesson on opportunities and considerations for developing GlobaLingo. Rosetta Stone has presented a comprehensive and immersive curriculum that is well for serious learners but comes with a high cost and unyielding structure. Then Google Translate is versatile and has instant translation in over 100 languages and appeals to individuals needing an on-the-fly translation. However, it still lacks a designed learning lesson structure. Duolingo excels in an engaging and game-like approach that attracts beginners and intermediate learners, students, teachers, and hobbyists but lacks content for more advanced lessons. Therefore, our desire is a mix of building off these competitors so that it is engaging using games but also having a flexible but well-balanced structure for lessons and exercises. This would draw users to be more focused and satisfied with language learning lessons.

# 11. References

1. ISO/IEC 25010:2011 – International standard for software product quality, providing guidance on usability, security, and maintainability for software.
2. General Data Protection Regulation (GDPR) – The EU regulation for privacy and data protection, used to guide the app's compliance with data handling laws.
3. Web Content Accessibility Guidelines (WCAG 2.1) – Guidelines for making web content more accessible, ensuring the app is usable for users with disabilities.
4. Duolingo Application – An existing language learning app that served as inspiration for features like streaks, gamification, and user engagement.

# Appendices

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**Appendix A: System Diagrams**

* **Overview**: Diagrams illustrating the development of the app, showing how user data, lesson plans, and features interact.

**Appendix B: User Flow**

* **Case Diagram**: Indicates the user journey, from making an account to completing lessons, challenges, and collecting rewards.

**Appendix C: Sample Lesson Plan**

* **Lesson Types**:
  + **Multiple Choice**: Users answer questions with four options.
  + **Flashcards**: Users see a word and type the correct translation.
  + **Matching**: Users match words with their correct translations.
  + **Sentence Building**: Users construct sentences using the provided words.

**Appendix D: Accessibility Features**

* **Text-to-Speech**: Converts a certain language text into spoken language to assist users who have difficulty reading and better pronunciation.
* **High Contrast Themes**: Supports users with visual disabilities by offering high contrast between text and background.

**Appendix E: Glossary**

* **Avatar**: A customizable character from which user’s change outfits from earning loot crates.
* Placement Test: A test that will finds the difficulty that the User should be learning at. It is an initial test for all incoming users.

**Appendix F: Legal and Compliance Information**

* **Data Protection**: Information on how the app handles and stores user data in compliance with GDPR and other applicable laws.
* **Security Measures**: Details on how the app encrypts personal data and uses HTTPS for secure communication.