***Building a Language Learning App***



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Introduction  
This project is about creating a simple yet functional prototype of a language learning app, inspired by Duolingo. The app will use core concepts of data structures and algorithms (DSA) in C++ to organize lessons, track user progress, and provide personalized learning paths. The focus will be on implementing these functionalities with basic C++ libraries, keeping the code simple and suitable for beginners. No advanced libraries, graphical interfaces, or external tools will be used, ensuring that the project remains accessible and focused on learning fundamental programming concepts.

Team Members  
We are a group of three team members, each responsible for specific parts of the project. One member will work on implementing trees and stacks/queues, which will be used to organize lessons and manage lesson progress. Another member will handle sorting and searching algorithms and use recursion for quizzes and grammar exercises. The third member will focus on creating dynamic programming algorithms to personalize the learning path and integrate the various components into a cohesive system.

Project Objectives  
The app will use a tree structure to organize lessons into levels. Each node in the tree will represent a lesson, and its child nodes will represent the next lessons in the sequence. Stacks will be used to track lessons that the user has completed, allowing for an undo feature, while queues will manage lessons that are pending review. Sorting algorithms will rank vocabulary words by difficulty or frequency, and binary search will enable quick retrieval of specific words. Dynamic programming will adjust the difficulty of lessons based on the user’s progress and performance. Recursion will be used to dynamically generate quizzes and solve grammar exercises.

Methodology  
The app will be divided into separate modules, each handling a specific functionality. For example, the tree module will manage lesson organization and provide functions to add lessons, navigate through them, and unlock new levels based on user progress. Sorting and searching modules will include manually implemented algorithms like merge sort or binary search for ranking and retrieving vocabulary words. The dynamic programming module will create personalized learning paths by analyzing the user’s strengths and weaknesses. Recursion will help generate quizzes based on progress and solve nested grammar exercises.

Deliverables  
The final deliverables will include the complete source code, written in a clean and beginner-friendly style. A testing plan will ensure that each module functions correctly. Finally, a 3-minute presentation will summarize the challenges faced, the lessons learned, and the Why, What, and How aspects of our project.

Technical Constraints  
This project will not include advanced features like file handling or database integration. The focus will remain on implementing basic DSA concepts without relying on advanced libraries, ensuring that the project is educational and suitable for learning C++ programming.

This app will serve as a practical way to apply fundamental DSA concepts in a real-world scenario while enhancing our understanding of programming. The result will be a simple and functional prototype that highlights the core ideas behind language learning applications.