

# DUOLINGO DATABASE POSTER

UNIVERSIDAD DISTRITAL FRANCISCO JOSÉ DE CALDAS

BRAYAN ESTIVEN AGUIRRE ARISTIZABAL<sup>1</sup> 20231020156 MARLON YECID RIVEROS GUIO<sup>2</sup> 20231020208

#### INTRODUCTION

Language learning platforms demand robust systems capable of managing large volumes of data quickly and reliably. Inspired by the popular Duolingo platform, this project addresses the challenge of designing a database model that efficiently integrates users, courses, lessons, achievements, and progress tracking. The model tackles critical issues such as the conversion of many-to-many relationships into one-to-many associations and ensures scalability and consistency through modern deployment practices.

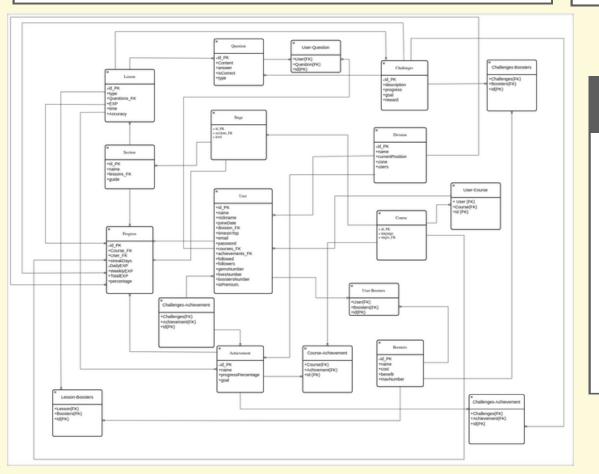
### GOAL

Develop and implement a robust, scalable database model that:

- Efficiently manages interactions among users, courses, and educational content.
- Answers the research question: How can we structure a data architecture that supports continuous evolution and growth in language learning platforms?
- The expected outcome is an integrated system validated both theoretically (with relational algebra) and practically through full CRUD operations.

### PROPOSED SOLUTION

The solution is based on an Entity-Relationship (ER) model that defines key entities (User, Course, Lesson, Achievement, and Progress) and their interrelationships. And implement the model with Sql and python



### **RESULTS**

- Theoretical Validation: The database model successfully supports complex queries using relational algebra, confirming its robustness.
- CRUD Operations: The system efficiently performs create, read, update, and delete operations without compromising data integrity.
- Standardized Deployment: Docker ensures a controlled, reproducible environment that facilitates smooth transitions from development to production.
- Performance Comparison: When compared to previous solutions, this model excels in modularity, scalability, and efficient data handling.

## CONCLUSION

This project demonstrates that integrating theoretical concepts (ER modeling and relational algebra) with modern tools (Docker, Python, DAO, and Faker) results in a robust and adaptable database architecture for language learning platforms. The clear separation of concerns and practical validation confirm that the system not only meets current requirements but is also well-prepared for future enhancements and technological challenges.

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