Addis Ababa Science and Technology University

College of Engineering

Department of Software Engineering

Thesis Disertation

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Automated Code Review E-Learning System

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Introduction

Introduction

- The Automated Code Review E-Learning System is a system designed to enhance coding assessments at universities.
- It provides real-time feedback on C++, Java, and Python code submissions through an AI-driven approach.
- It will reduce grading time, ensure fair and consistent evaluations, and empower students with actionable insights via an intuitive analytics dashboard, elevating programming education.

Problem Statement & Proposed Solution

Problem Statement

- Challenges in current coding assessments
  - Manual reviews are time-consuming and inefficient.
  - Academic dishonesty such as plagiarism undermines fairness.
  - Lack of timely and personalized feedback impacts learning outcomes.
  - Paper-based exams, USB submissions, and Telegram bots lack scalability.

Proposed Solution

- An AI-driven e-learning platform to automate code review for C++, Java, Python.
- Features:

❖ Real-time, personalized feedback for students.

❖ Analytics dashboard for teachers to monitor performance.

❖ Scalable, secure system with Laravel backend and React frontend.

System Requirement

System Requirements

Functional Requirements

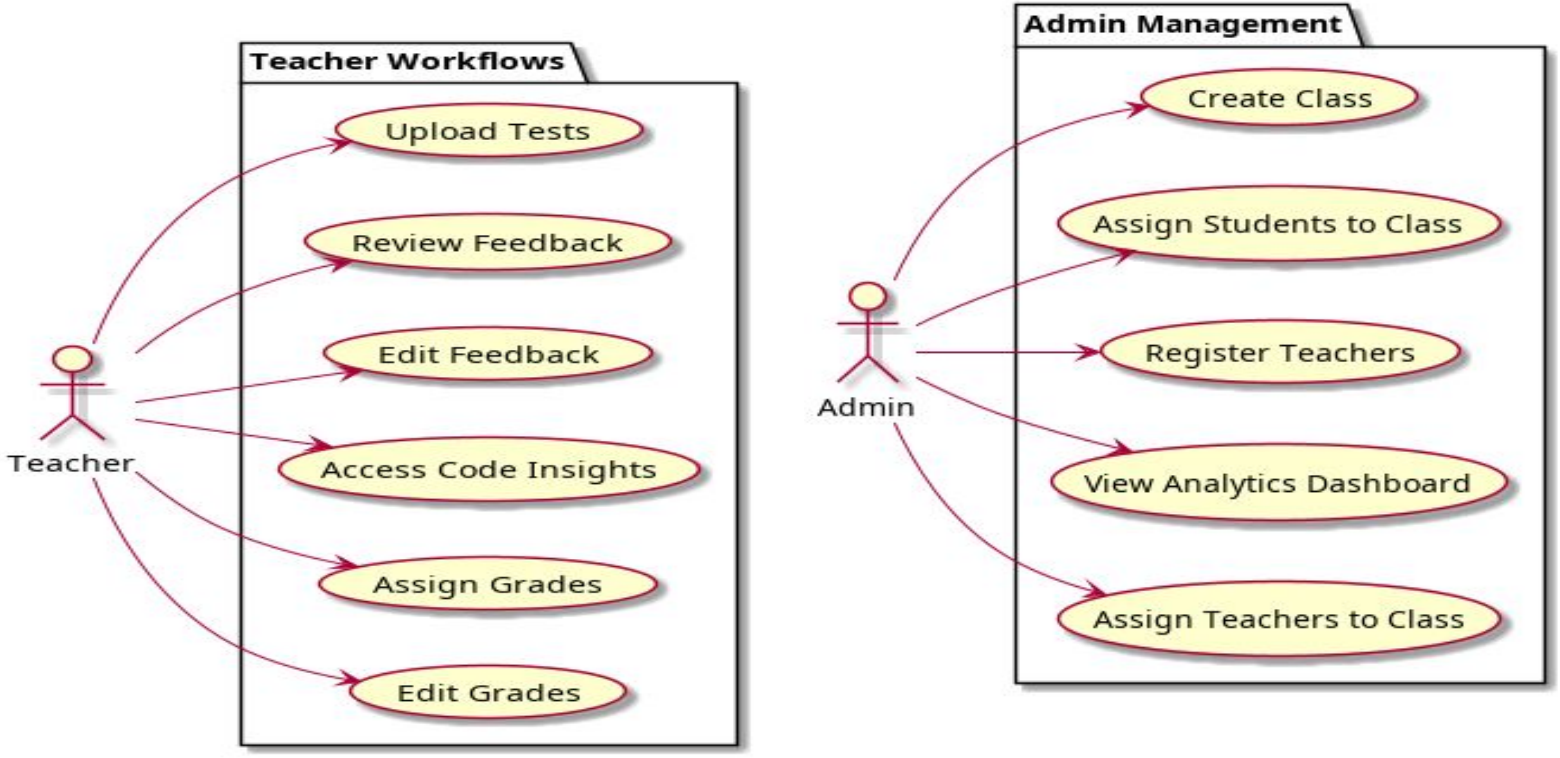
- Code Submission
- Automated Evaluation
- Feedback Generation
- Test Management.
- Analytics Dashboard
- Admin Features

Non-Functional Requirements

- Scalability
- Security
- Usability
- Performance
- Maintainability

Use case Diagrams

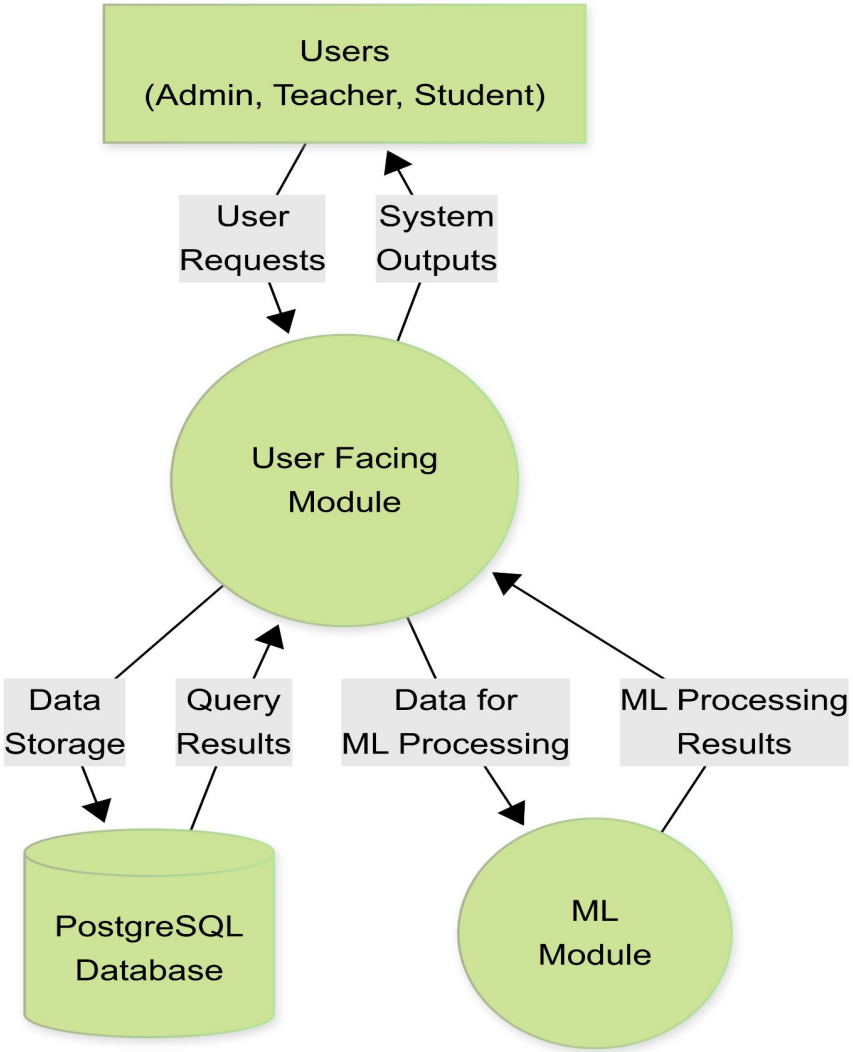
Use Case Diagrams



System Architechture

System Architecture

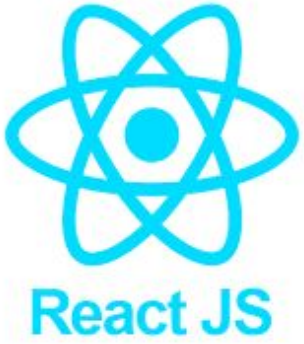
- Two-module system separating user interaction from ML for simplified development and clear responsibilities.
- **User-Facing Module**:
  - Handles authentication, code submissions, test creation, and data management.
  - React (frontend), Laravel + Inertia.js (backend), PostgreSQL (database).
- **ML Module**:
  - Analyzes code and generates feedback using AI models.
  - PyTorch-trained models, Flask backend, Python virtual environment.


Users
(Admin, Teacher, Student)
User
Requests
System
Outputs
User Facing
Module
Data
Storage
Query
Results
Data for
ML Processing
ML Processing
Results
PostgreSQL
Database
ML
Module

Tools & Tech stack

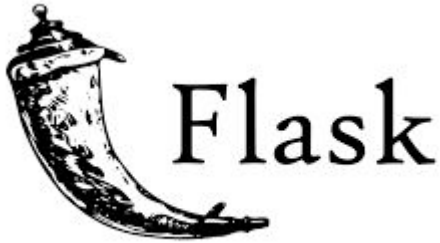
Tools and Tech stack

Frontend



Tools and Tech stack

Backend



Tools and Tech stack

Database

Tools and Tech stack

Model Training

Thank You!

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