

# **System Design — EXMDirect**

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## **Overview**

EXMDirect is a modular system designed to support large-scale school testing with automation, security, and flexible

## **Architecture**

- Backend: Java 17+, Spring Boot, PostgreSQL
- Frontend: React (AntiCheat monitoring, QR auth)
- Integration: Telegram Bot API
- API Layer: REST + OpenAPI 3.0

## **Key Modules**

- Authentication Module (JWT)
- Test Management Module
- Result & Grading Engine
- AntiCheat Logging Module
- Hint Management System
- Telegram Notification Service

## **Business Logic & Use Cases**

- Teachers create and assign tests with optional 'hints'
- Students pass the test under AntiCheat monitoring
- System automatically grades and provides error analysis- Teachers receive detailed performance reports

## **Data Model (ER)**

Main Entities:

- User (id, name, role)
- Test (id, title, questions)
- Attempt (id, studentId, score, timestamps)
- AntiCheatEvent (type, timestamp, attemptId) - Hint (id, topic, content)

## **API Highlights**

- POST /auth/login
- POST /tests
- GET /results/{studentId}
- POST /anticheat/log- GET /hints/by-topic

## **Security & AntiCheat**

- JWT-based role separation (student/teacher/admin)
- Logging of tab-switch, inactivity, copy-paste
- QR-code based student exam access
- Telegram bot double-auth and event alerts