IELTS AI Platform - Architecture, Project Structure & Task Roadmap

A) System Architecture (MVP → scale)

Frontend (Next.js), API Gateway (FastAPI), Workers (RQ/Celery), PostgreSQL + pgvector, Redis (queue + KV), S3/MinIO (assets), AI Providers (LLM/Whisper/TTS).
Observability: Sentry + OpenTelemetry; Auth: NextAuth/Clerk; Billing: Stripe (later).

B) Project Structure (monorepo)

ielts-platform/
■■ apps/web (Next.js)
■■ apps/api (FastAPI)
■■ workers/{scorer,generator}
■■ packages/{shared-schemas,scoring-metrics,rag-kit}
■■ infra/{docker,db,k8s}
■■ .github/workflows/{ci.yml,cd.yml}
■■ docs/

C) Roadmap & Sequential Tasks

Phase 0 — Setup & Environment
Phase 1 — Auth, Users, Sessions
Phase 2 — Writing Score MVP
Phase 3 — Speaking MVP
Phase 4 — Reading
Phase 5 — Listening
Phase 6 — RAG & Knowledge Base
Phase 7 — Dashboard & Learning Path
Phase 8 — Moderation & Safety
Phase 9 — Payment & Plans
Phase 10 — Production & Observability

Detailed Tasks (for Jira/GitHub Issues)

Core: Init monorepo, Docker Compose, Postgres+Alembic, NextAuth, Models CRUD, S3 presigned.
Writing: JSON schema, Worker pipeline, Prompts, FE editor.
Speaking: Upload audio, Whisper, Metrics, LLM judge.
Reading: Generator + Verifier, Renderer FE, Submit & scoring.
Listening: Script+TTS, Player FE, Submit.
RAG: Embed descriptors, retrieval, cite evidence.
Observability/Security: Sentry, OTEL, Redis rate-limit, secrets.
CI/CD: lint, test, deploy, migrate on deploy.