

Smartcourse - Intelligent Course

1. Overview & Scope

SmartCourse is an AI-first learning platform designed with clear separation between the LMS domain and the AI intelligence layer, backed by an event-driven architecture for scalability and extensibility.

Current Scope

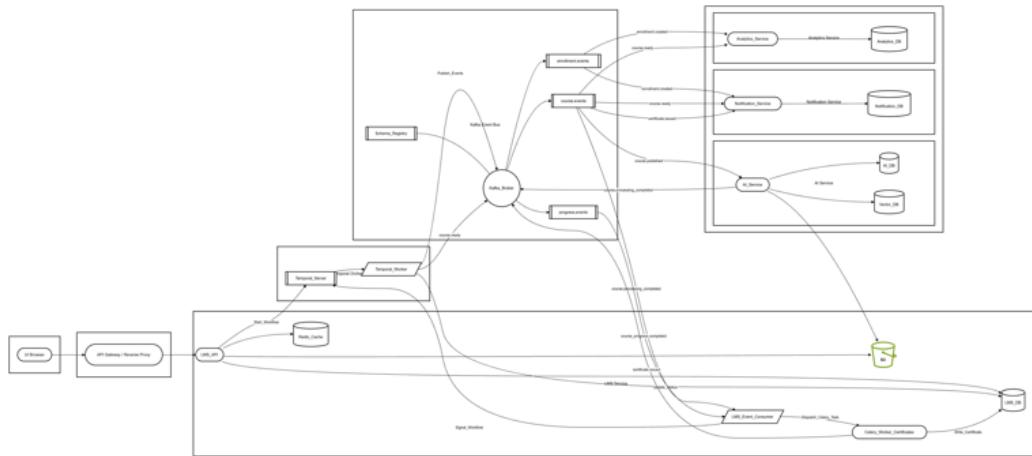
Area	Status	Notes
LMS Core Service	✓	Courses, assets, enrollments, progress
AI Service (RAG)	✓	Ingestion, embeddings, retrieval/chat
Kafka Backbone	✓	Outbox-driven events
Object Storage	✓	Course assets
Certificates (async)	✓	Triggered on course completion

Out of Scope (Planned)

- Notifications service
- Analytics service
- Dashboards/reporting APIs

Core principle: LMS DB is the source of truth; Kafka is for side effects/workflows.

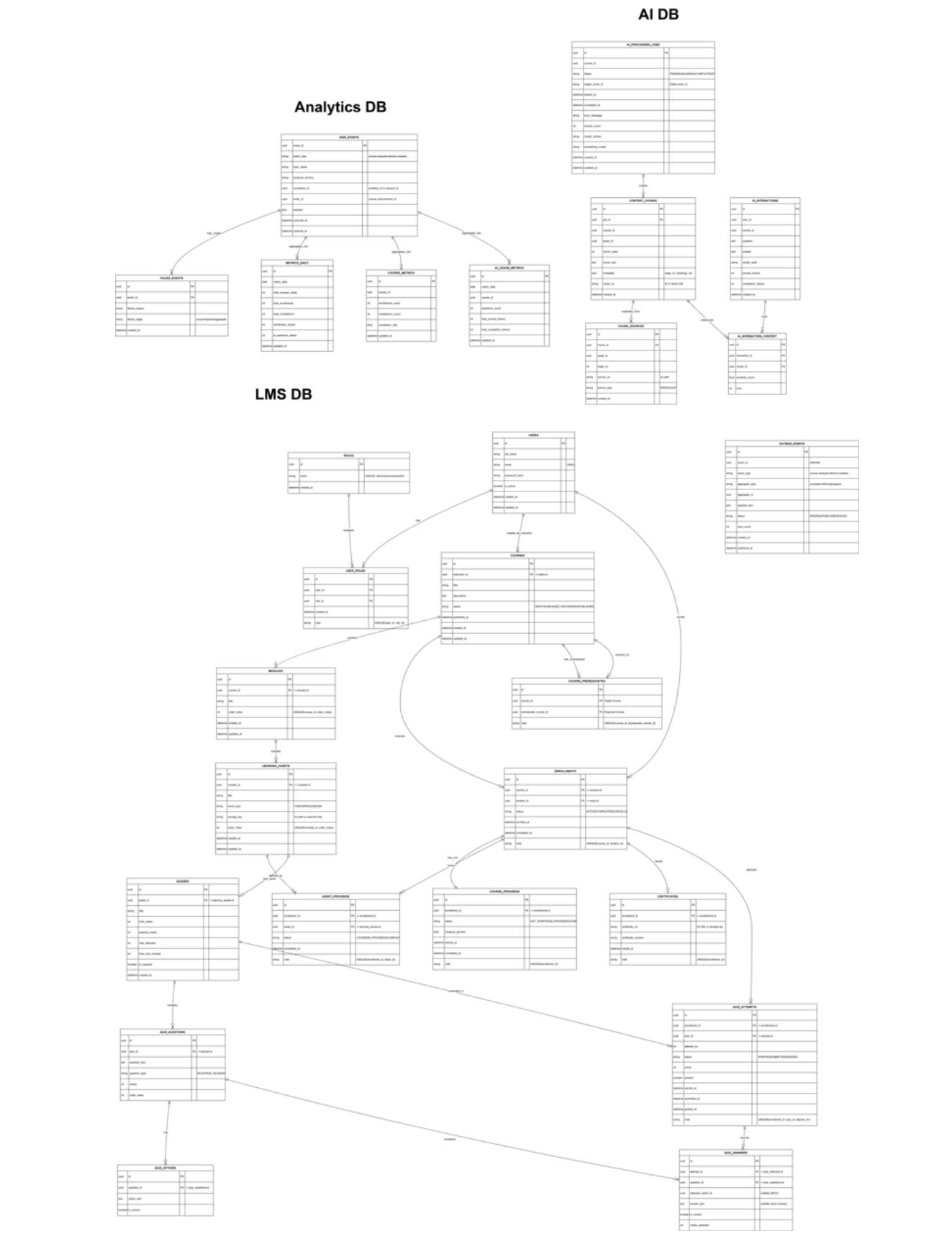
2. High-Level System Architecture



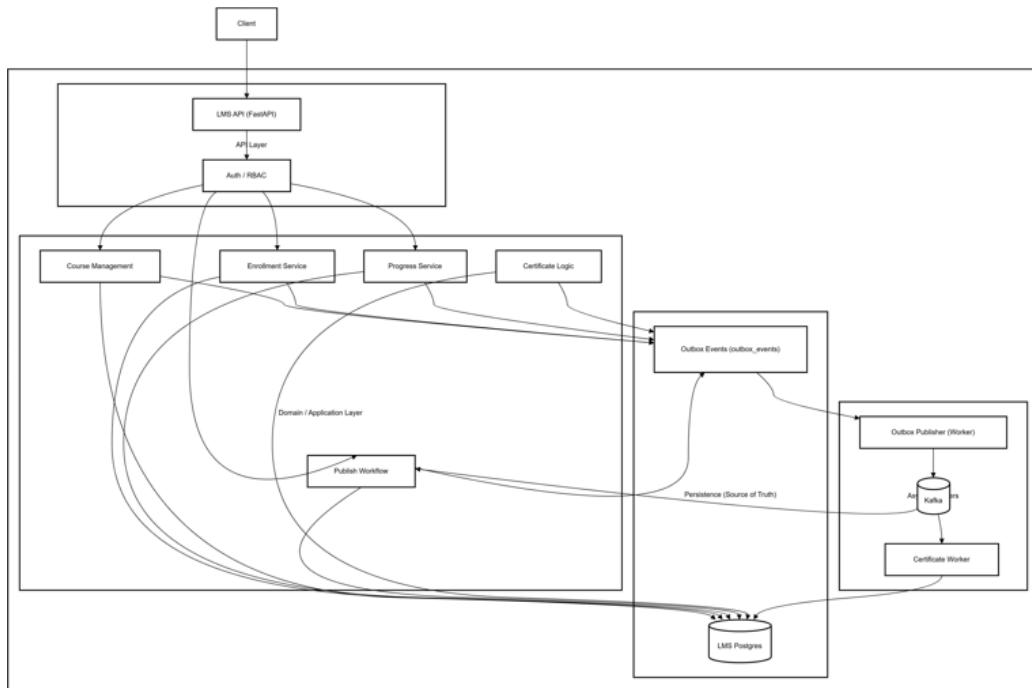
Key Responsibilities

Component	Responsibility
LMS Service	Owns learning state and domain rules
AI Service	Owns indexing + RAG
Outbox + Kafka	Decouples side effects from core transactions
Object Storage	Stores learning assets
Notification Service	Send Email/ Notifications /Sms

3. System ERD

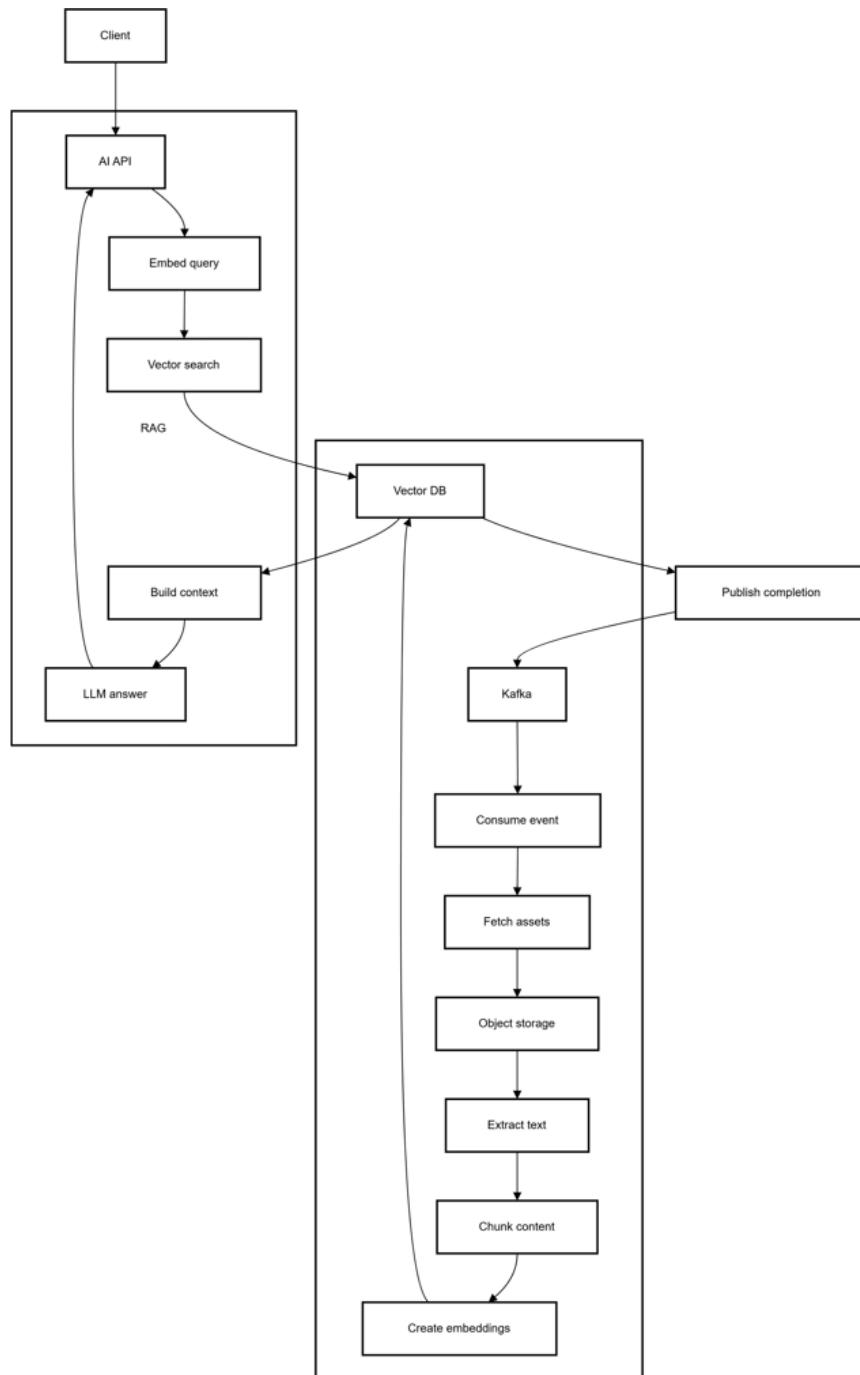


4. LMS Core Architecture ERD



Layer	Responsibility
API	Auth, courses, enrollment
Domain	Progress, completion, rules
Persistence	Postgres, outbox
Async	Celery, Kafka publisher

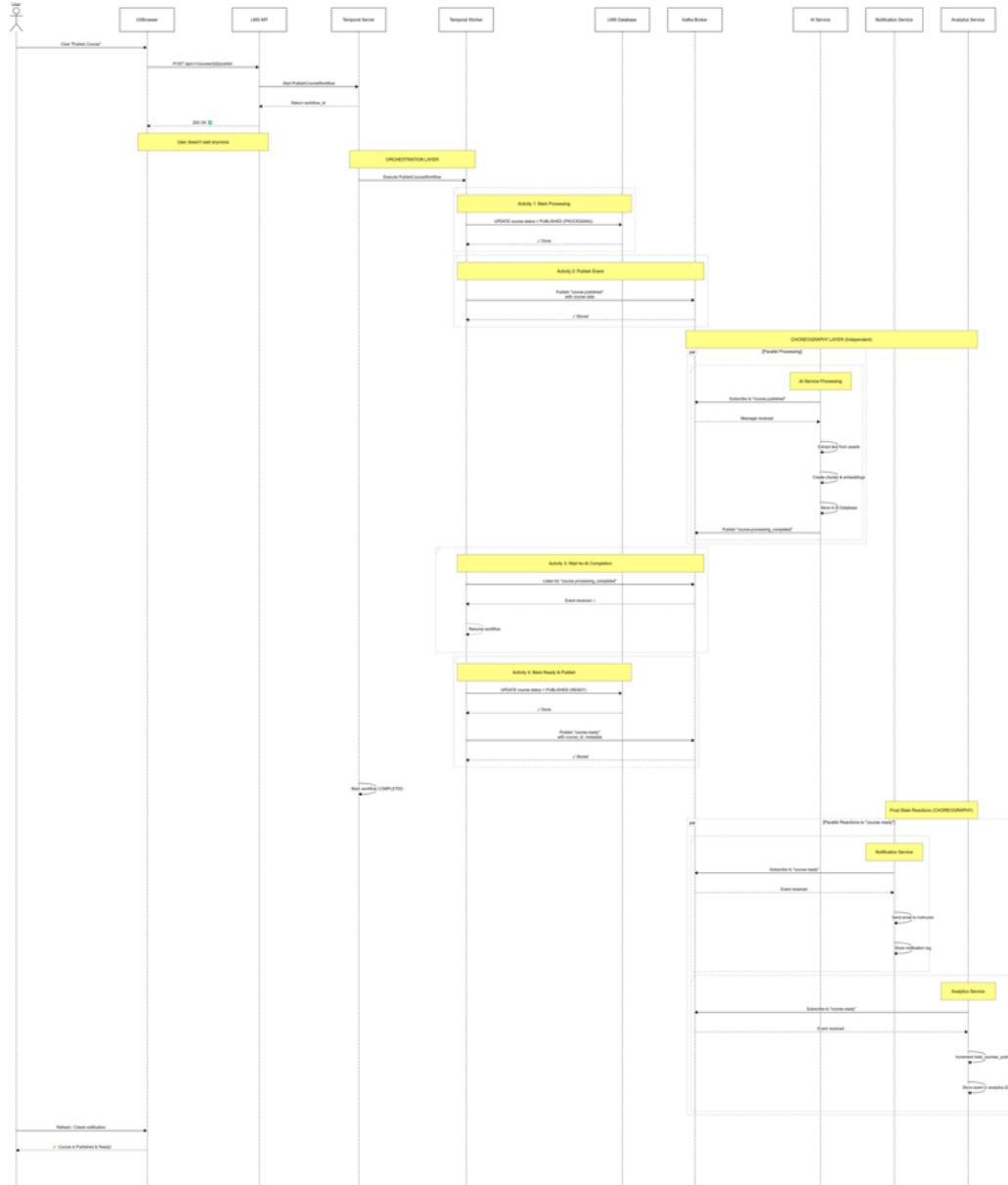
5. AI / RAG Architecture



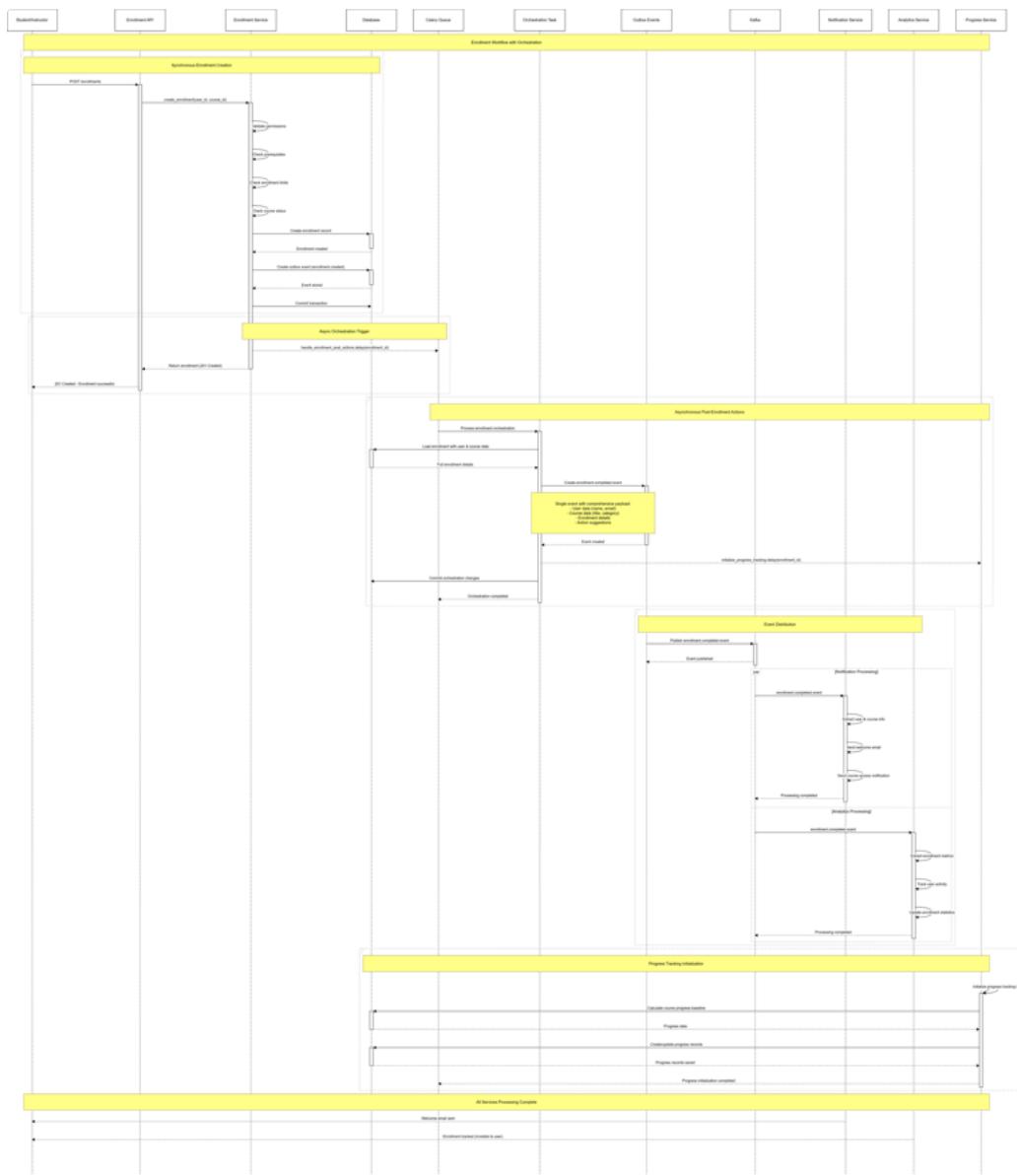
Stage	Description
Ingestion	Pulls course assets from storage
Chunking	Splits into retrievable segments
Embeddings	Stores vectors in pgvector

Retrieval	Similarity search for context
LLM	Groq answers using retrieved context

6. System Sequence — Course Publish → AI Processing



7. System Sequence — Enrollment → Progress Init



8. Current Deliverables & Future Enhancements

 Delivered

- LMS core workflows
 - AI service with RAG
 - Outbox + Kafka backbone
 - Async certificate generation



- Notifications service

- Analytics service
- Dashboards/reporting APIs
- Observability (tracing/metrics)
- Code improvements
- Documentation improvement