flowchart TD

%% ====== Clients ======

A1[Student UI\n(Assignments • XP • Tutor • Portfolio)]

A2[Teacher Console\n(Policies • Draft Day • Grading • Analytics)]

A3[Parent Portal\n(Read-only Progress/Showcase)]

%% ====== Edge / API Layer ======

GW[(API Gateway\nAuthZ • Rate Limits • Idempotency)]

AUTH[Auth Service\n(JWT • Roles • RLS)]

MQ[(Event Bus\nWebhooks • Jobs Triggers)]

%% ====== Core Services ======

XP[XP Engine\n(Formula • Caps • Team Split)]

LB[Leaderboard Service\n(Top-5 Snapshots • Streaks)]

BADGE[Badge Engine\n(Auto-Awards)]

DRAFT[Draft Day Service\n(Snake Draft • Constraints • Rollback)]

GRADE[Grading Service\n(Rubrics • Regrades)]

RPT[Standards & Evidence\n(CPALMS Coverage • Exports)]

ANALYTICS[Observability\n(Metrics • Alerts • Dashboards)]

%% ====== Tutor Pipeline ======

TUTORGW[AI Tutor Gateway\n(Policy Pipeline)]

POLICY[Policy & Scope Engine\n(Modes • Allowlist • Blocklist • Whitelist)]

RAG[RAG Retriever\n(Week Lesson Corpus)]

LLM[Model Inference\n(HINT • SNIPPET • EXPLANATION)]

MODQ[Moderation Queue\n(Teacher Oversight)]

%% ====== Integrity / Safety ======

INTEGRITY[Integrity Engine\n(Plagiarism • AI-Abuse • XP Anomalies)]

%% ====== Storage ======

DB[(Postgres\nstudents/classes/assignments\nxp\_events/badges/leaderboards)]

VEC[(Vector Store\nLesson Corpus per Week)]

AUDIT[(Audit Logs)]

FILES[(Object Storage\nArtifacts • Portfolio Assets)]

%% ====== Jobs ======

CRON[Scheduled Jobs\n(Leaderboards • Badges • Coverage • Plagiarism)]

%% ====== External ======

DEPLOY[Portfolio Publisher\n(GitHub Pages/Static Host)]

%% ----- Edges -----

A1 -->|JWT| GW

A2 -->|JWT| GW

A3 -->|JWT (read-only)| GW

GW --> AUTH

GW --> XP

GW --> LB

GW --> BADGE

GW --> DRAFT

GW --> GRADE

GW --> RPT

GW --> TUTORGW

GW --> INTEGRITY

GW --> ANALYTICS

%% Tutor pipeline

TUTORGW --> POLICY

POLICY --> RAG

RAG --> VEC

POLICY --> LLM

LLM --> MODQ

TUTORGW -->|Log decisions| DB

%% Core services <-> DB

XP --> DB

LB --> DB

BADGE --> DB

DRAFT --> DB

GRADE --> DB

RPT --> DB

INTEGRITY --> DB

ANALYTICS --> DB

GW --> DB

%% Logs & files

GW --> AUDIT

A1 -->|Upload artifacts| FILES

CRON --> LB

CRON --> BADGE

CRON --> RPT

CRON --> INTEGRITY

CRON --> ANALYTICS

%% Portfolio publish

FILES --> DEPLOY

DEPLOY --> A1

%% Eventing

GW --> MQ

MQ --> CRON

%% Teacher controls

A2 -->|Policy edits| POLICY

A2 -->|Moderate| MODQ

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classDef svc fill:#f7f7ff,stroke:#667,stroke-width:1.2px

classDef edge fill:#fff7e6,stroke:#b67,stroke-width:1.2px

class DB,VEC,AUDIT,FILES store

class XP,LB,BADGE,DRAFT,GRADE,RPT,ANALYTICS,INTEGRITY,TUTORGW,POLICY,RAG,LLM,MODQ,CRON svc

class GW,AUTH,MQ edge