High-Level Goals (mapped to judging)

- **Innovation & Creativity:** Social graph (friends/follow/followers), team history, global & scoped leaderboards, badges/POAP — moves beyond "just an event tool."

- **Functionality:** Full workflows: creation → registration/team → round submissions → results → certs.

- **Scalability:** Multi-tenant (many orgs & events), real-time, queue-based processing; 1000+ users/events.

- **Tech Integration:** Azure SQL + MongoDB; Azure Web App/Functions/Storage; optional AI similarity, analytics, POAP.

- **UI/UX:** Modular dashboards; event-local sub-tabs keep the main app clean.

System Overview (component map)

Frontends

- **Web App (SPA/SSR)**: Next.js/React hosted on **Azure Web App**. Public site + authenticated dashboards (Organizer, Participant, Sponsor). Event pages have their own sub-navigation.

- **Admin Console**: feature-gated routes for platform admins.

API & BFF Layer

- **API Gateway**: Azure API Management (rate limits, keys).

- **BFF (Backend-for-Frontend)**: Node/NestJS (or FastAPI) composing microservices for each role's screens.

Core Microservices (modular; can ship as a modular monolith if time-boxed)

1. **Identity & Access Service**

   - Azure AD B2C (email + social login), JWT; roles: **Organizer, Participant, Sponsor, Admin** (Judging is handled by Organizer for transparency).

2. **Organization Service**

   ○ Org profiles, followers, verification, sponsors list.

3. **Event Service**

   ○ Create Event (single-page dynamic form by type: Hackathon/Conference/Meetup/Fest); rounds config (count, names, timelines, rules).

4. **Registration & Teaming Service**

   ○ Individual/team registration, invite friends, join existing team for that event; team roster per event.

5. **Submission & Forms Service**

   ○ **Built-in round forms** (dynamic fields: uploads, links, text) **or External link mode** (Google Form/Discord). Time-boxed enable/disable; visible only to qualified teams.

6. **Rounds & Progression Orchestrator**

   ○ Locks/unlocks rounds, advances teams (✅/❌), handles timestamps; timer jobs on Azure Functions.

7. **Evaluation & Leaderboard Service**

   ○ Prelim rounds: lightweight points + advance/eliminate; Final: weighted rubric → auto ranking; event-local leaderboard + **global leaderboard** across events.

8. **Announcements & Q&A (Community)**

   ○ Real-time feed per event; organizer posts; participant Q&A (threaded).

9. **Profiles & Social Graph Service**

   ○ User profiles (banner, avatar, bio, skills), friends/connect + follow, **team history**, wins, badges; search & suggestions.

10. **Certificates Service** *(bonus, now core)*

    ○ Auto-generate PDFs from templates; post to profile; "Add to LinkedIn" link.

11. **Similarity/Plagiarism Service** *(bonus, now core)*

- AI similarity checks across text/repos/assets using embeddings; flags for review.

12. **Analytics Service** *(bonus, now core)*

   - Organizer dashboards: registrations funnel, submission heatmaps, sponsor impressions, engagement.

13. **POAP/NFT Badges Service** *(bonus, now core)*

   - Optional mint on a low-fee chain; store badge refs; show in profile.

14. **Notifications Service**

   - Email/SMS/push for round opens, announcements, results; Azure Communication Services.

Real-Time & Async

- **Azure Web PubSub (SignalR compatible)** for announcements, Q&A, live leaderboards.

- **Azure Functions / Queues** for scheduled round switches, certificate batch jobs, similarity jobs, webhook ingestion.

Storage

- **Azure SQL Database**: structured relational (users, orgs, events, rounds, registrations, teams, roles, scoring, leaderboards, certificates index).

- **MongoDB** (on Azure): unstructured/flexible (submission payloads, dynamic form schemas, Q&A threads, announcement feed, embeddings cache, audit blobs).

- **Azure Blob Storage**: project files (PDF/ZIP/images), video placeholder thumbnails; CDN fronted.

Ops & Security

- Azure Front Door + CDN, WAF; Key Vault; App Config; Application Insights; CI/CD via GitHub Actions; multi-tenant guardrails & RBAC.

Data Model (pragmatic)

Azure SQL (relational)

- `users(id, handle, name, email, role, university_id, created_at, …)`

- `orgs(id, handle, name, verified, …)`

- `org_followers(org_id, user_id)`

- `events(id, org_id, type, mode, title, description, start_at, end_at, registration_type, status, …)`

- `event_tracks(event_id, name)`

- `event_rounds(id, event_id, name, description, start_at, end_at, scoring_mode, weights_json)` *(weights for final)*

- `registrations(id, event_id, user_id, status)`

- `teams(id, event_id, name, created_by)`

- `team_members(team_id, user_id, role)`

- `round_access(round_id, team_id, is_unlocked)`

- `scores(round_id, team_id, judge_id NULL, points, rubric_json NULL)` *(final uses rubric)*

- `leaderboards(event_id, snapshot_json, published_at)`

- `badges(user_id, badge_type, source_event_id, metadata)`

- `certificates(id, event_id, user_id/team_id, type, url, issued_at)`

MongoDB (flexible/unstructured)

- `forms`: {event_id, round_id, mode: 'builtin'|'external', schema, external_url}

- `submissions`: {event_id, round_id, team_id, payload:{links, files}, timestamp}

- `announcements`: {event_id, author_id, body, media[], ts}

- `qna_threads`: {event_id, title, posts:[{author_id, body, ts}]}

- `profiles_extra`: {user_id, bio_long, skills[], socials{}, highlights[]}

- `similarity_jobs`: {submission_id, status, result:{matches[]}}

- `analytics_events`: {actor_id, type, event_id, ts, props}

Key Workflows (sequence)

1) Create Event (single-page dynamic)

1. Organizer fills **common fields** → selects *Hackathon/Conference/Meetup/Fest*.

2. Form **expands** with mode-specific fields (Hackathon adds # *rounds*, each with times, submission formats, scoring type).

3. Save → Event + Rounds in SQL; Forms schema in Mongo; blob containers provisioned.

2) Registration & Teaming (with social graph)

- Register as individual or create/join team for that event; invite **friends/followers**; team object scoped to event.

3) Round Orchestration

- Azure Function checks timelines → **unlock/lock** rounds, sets visibility for qualified teams, triggers notifications.

4) Submissions

- If **Built-in**: render dynamic form → payload stored in Mongo; files to Blob; SQL index row created.

- If **External**: show "Submit externally" button; optional webhook/CSV import to sync timestamps.

5) Evaluation & Results

- **Prelim**: Organizer assigns simple points and/or ✅ advance flags.

- **Final**: Organizer enters rubric scores (with weights per criterion) → service auto-ranks → publishes **event leaderboard**.

6) Transparency

- Event page shows **round status**, submission timestamps, qualified flags; final shows ranked list & marks.

7) Certificates

- On finalize, Function batch-generates certificate PDFs from HTML template, stores in Blob; profile updates; "Add to LinkedIn" link shown.

8) Global Leaderboard & Badges

- After each event, aggregate points → update user **global rank**; mint badges/POAP (optional) and attach to profile.

Real-Time & Notifications

- **Azure Web PubSub**: announcements, Q&A, live leaderboard ticks.

- **Azure Communication Services**: email/SMS for round open/close, results, invites.

Security, Multi-Tenancy, and Privacy

- **Tenant boundary** at `org_id` (row-level filters); event scoping everywhere.

- RBAC per role (Organizer/Participant/Sponsor/Admin).

- Private blobs with short-lived SAS URLs; size & type validation.

- Audit logs (Mongo) + App Insights traces.

Deployment Topology (Azure)

- **Azure Web App**: Next.js (frontend) + BFF/API.

- **Azure SQL Database** + **MongoDB (Atlas on Azure)**.

- **Azure Blob Storage** + **CDN**; **Front Door** + **WAF**.

- **Azure Functions**: schedulers, cert jobs, similarity jobs.

- **API Management**, **Key Vault**, **App Config**, **Application Insights**.

- **CI/CD**: GitHub Actions → build/test/deploy; infra via Bicep/Terraform.

- **Scalability**: scale-out Web App/Functions; shard high-volume Mongo collections (submissions, qna).

Optional-but-Now-Core Enhancements (from brief)

- **AI Similarity Detection** (embeddings + cosine similarity on extracted text/code) to flag likely plagiarism/similarity.

- **Automated Certificates** (PDF gen + share).

- **Sponsor/Partner Showcase** on event pages & org profiles.

- **Analytics Dashboard** (organizer insights).

- **Web3 POAP/NFT Badges** (opt-in).

- **Integrated Real-Time Leaderboard** (pub/sub updates).

Why this architecture fits the brief

It directly implements the **mandatory features** (event creation/management; registration/team; submissions & evaluation; real-time updates; role-based dashboards) and the **required stack** (Azure Database + MongoDB; Azure Web App/Functions/Storage). It also elevates the **bonus features** to first-class capabilities to maximize scoring on innovation and tech integration.