

Guide Approval (initials/date): _____

CAP4001 - Capstone Project Proposal Report

(Individual Report)

Student Name	Mayakuntla Lokesh
Student Register Number	22BCE9911
Programme	Bachelor of Technology
Semester/Year	Fall sem (2025-26)
Guide(s)	Saroj Kumar Panigrahy
Project Title	A Real-Time Player Finding System

Team Composition

Provide the information below for each member of the project team. Include all project team members, not just those in your discipline or those enrolled for Capstone project. Please also include yourself!

Reg. No	Name	Major	Role
22BCE9357	Adnan Hasshad Md	CSE	Project Manager & Technical Lead
22BCE9911	Mayakuntla Lokesh	CSE	Back-End Developer
22BCE9745	Thokala Sravan	CSE	Front-End Developer
22BCE20420	Tatikonda Srikeha	CSE	QA & Support Developer

Project and Task Description

Provide a brief (one or two page) technical description of the design project and your specific tasks, as outlined below: (use a separate sheet)

Provide a summary of the project

"A Real-Time Player Finding System" is an MVP social platform that connects gamers to find compatible teammates or opponents for online gaming. The platform addresses the common problem of discovering compatible players through user profiles, a public request board, and 1v1/team finder functionality. Users can post requests for specific games, view real-time player availability, and connect with others based on skill levels and preferences. The MVP prioritizes core discovery features with a clean UI, real-time notifications, and serverless architecture for scalability.

Describe the specific role and tasks that you individually will be completing

- 1. Backend Infrastructure:** Configure Express.js with TypeScript, establish backend structure, setup middleware, configure environment and error handling.
- 2. Database Design:** Design PostgreSQL schema with Drizzle ORM, create tables (users, profiles, requests, matches, notifications), implement indexing and constraints.
- 3. API Development:** Develop REST endpoints for authentication, player discovery, search/filtering, request management, implement Zod validation on all routes.
- 4. Core Business Logic:** Implement player finding algorithms with filtering, user profile management, request board logic, real-time notification handlers.
- 5. Real-time & Integration:** Setup WebSocket handlers for live updates, integrate Cloudflare R2 for profile storage, conduct API testing, query optimization.

Discuss in detail the specific approach that will be used to complete your portion of the design

Phase 1: Backend setup with Express.js and TypeScript, PostgreSQL connection, database schema design with Drizzle ORM.

Phase 2: Implement core API endpoints, database implementation, OAuth 2.0 authentication, query optimization and indexing.

Phase 3: Business logic for player discovery and search, WebSocket integration for real-time events, Cloudflare R2 file handling.

Phase 4: API testing and validation, performance optimization, documentation, bug fixes and refinements.

Describe the phases of the design process

Phase 1 (Week 1-2): Project planning, requirements analysis, database schema design with PostgreSQL, API architecture design.

Phase 2 (Week 3-4): Backend development with Express.js, database implementation with Drizzle ORM, API endpoint development, authentication setup.

Phase 3 (Week 5-6): Frontend development with React, real-time features with WebSocket, UI component creation, system integration testing.

Phase 4 (Week 7-8): Performance optimization, comprehensive testing, deployment configuration, documentation completion, QA validation.

Outcome Matrix

Describe your plan to demonstrate each of the outcomes below.

Outcomes	Plan for demonstrating outcome
a) an ability to apply knowledge of mathematics, science, and engineering	Will apply software engineering principles, relational database design, algorithms for player discovery, data structures, and distributed systems patterns for real-time functionality.
c) an ability to design a system, component, or process to meet desired needs within realistic constraints	Will design system architecture balancing feature completeness, performance, scalability, 8-week timeline, and serverless platform constraints (Replit, Neon PostgreSQL).
d) an ability to function on multidisciplinary teams	Will collaborate across frontend, backend, and QA roles, facilitate communication, coordinate efforts, and contribute to team success through defined responsibilities.
e) an ability to identify, formulate, and solve engineering problems	Will identify system bottlenecks, formulate solutions for real-time sync challenges, solve scalability issues, and troubleshoot integration problems during development.
g) an ability to communicate effectively	Will create technical documentation, API specifications, maintain code comments and documentation, and communicate design decisions clearly within the team.
k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	Will utilize React, Express.js, TypeScript, PostgreSQL, Drizzle ORM, WebSocket API, OAuth 2.0, Cloudflare R2, Git, and modern development workflows.

Realistic Constraints

Development Timeline: 8-week MVP cycle with feature prioritization.

Team Resources: 4-member team with defined backend, frontend, and QA roles.

Infrastructure: Serverless platform (Replit), Neon PostgreSQL, Cloudflare R2 storage.

Technical Complexity: Real-time request board, WebSocket connectivity, OAuth integration, database scalability.

Performance: Responsive design across devices, acceptable load times for concurrent player searches.

Scalability: MVP architecture with extensible design for future features and player base growth.

Engineering Standards

Code Standards: TypeScript strict mode, ESLint configuration, consistent naming, code reviews.

Database: Normalized schema design (3NF), proper indexing on frequently queried fields, referential integrity.

API: RESTful principles, HTTP status codes, Zod schema validation, OpenAPI documentation.

Security: Input validation, SQL injection prevention, OAuth 2.0 authentication, CORS configuration.

Testing: Unit tests, integration tests, end-to-end tests for critical user paths.

Documentation: API documentation, architecture diagrams, database schema documentation, code comments.

Version Control: Meaningful commits, branch management, collaborative code reviews, Git workflow.